R422-E1/R422-INF-E1

NOVASCALE

Installation and User's Guide

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R422-E1/R422-INF-E1

Installation and User's Guide

Hardware

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Preface

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the NovaScale R422-E1/R422-INF-E1. Installation and maintenance should be performed by experienced technicians only.

The NovaScale R422-E1/R422-INF-E1 is a 1U Twin (two serverboards in a 1U chassis) rackmount server chassis and two R422-E1/R422-INF-E1 serverboards. The R422-E1/R422-INF-E1 serverboards supports dual Intel® 5400/5300LV/5200/5100LV Series processors.

Manual Organization

Chapter 1: Introduction

The first chapter provides a checklist of the main components included with the server system and describes the main features of the NovaScale R422-E1/R422-INF-E1 serverboard and the NovaScale R422-E1/R422-INF-E1 chassis.

Chapter 2: Server Installation

This chapter describes the steps necessary to install the NovaScale R422-E1/R422-INF-E1 into a rack and check out the server configuration prior to powering up the system. If your server was ordered without the processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

Chapter 3: System Interface

Refer to this chapter for details on the system interface, which includes the functions and information provided by the control panel on the chassis as well as other LEDs located throughout the system.

Chapter 4: System Safety

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the NovaScale R422-E1/R422-INF-E1.

Chapter 5: Advanced Serverboard Setup

Chapter 5 provides detailed information on the R422-E1/R422-INF-E1 serverboard, including the locations and functions of connectors, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

Chapter 6: Advanced Chassis Setup

Refer to Chapter 6 for detailed information on the R422-E1/R422-INF-E1 1U rackmount server chassis. You should follow the procedures given in this chapter when installing, removing or reconfiguring SAS/SATA or peripheral drives and when replacing system power supply units and cooling fans.

Chapter 7: BIOS

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

Appendix A: BIOS POST Messages

Appendix B: BIOS POST Codes

Appendix C: Intel HostRAID Setup Guidelines

Appendix D: Adaptec HostRAID Setup Guidelines

Appendix E: System Specifications

Notes

Notes

Table of Contents

Chapter 6. Advanced Chassis Setup

Chapter 7. BIOS

Appendix A. BIOS POST Messages

Appendix B. BIOS POST Codes

Appendix C. Intel HostRAID Setup Guidelines

Appendix D. Adaptec HostRAID Setup Guidelines

Appendix E. System Specifications

Chapter 1. Introduction

1-1   Overview

The NovaScale R422-E1/R422-INF-E1 is a "1U Twin" server comprised of the 1U chassis and two (twin) R422-E1/R422-INF-E1 serverboards. Please refer to our web site for information on operating systems that have been certified for use with the NovaScale R422-E1/R422-INF-E1.

In addition to the serverboard and chassis, various hardware components may have been included with the NovaScale R422-E1/R422-INF-E1, as listed below.

- Four (4) CPU heatsinks (SNK-P0017)

- SATA Accessories:
  Four (4) SATA hard drive carriers [MCP-220-00001-03(01)]
  One (1) internal SATA backplane (BPN-SAS-808)
  One (1) SATA cable set (CBL-0201L)

- Two (2) PCI-E x16 riser cards (RSC-R1U-E16R)

- Six (6) 4-cm high-performance fans (FAN-0085L)

- Rackmount hardware with screws (CSE-PT51L):
  Two (2) rack rail assemblies
  Six (6) brackets for mounting the rack rails in a rack/telco rack

- One (1) CD containing drivers and utilities

- NovaScale R422-E1/R422-INF-E1 Installation and User's Guide, ref. 86 A1 93EW

1-2   Serverboard Features

At the heart of the NovaScale R422-E1/R422-INF-E1 lies two R422-E1/R422-INF-E1 dual processor serverboards, which are based on Intel's 5400 chipset. Below are the main features of the NovaScale R422-E1/R422-INF-E1 serverboard. Note that the features on each board are doubled for the server.

Processors

Each NovaScale R422-E1/R422-INF-E1 serverboard supports dual Intel® 5400/5300LV/5200/5100LV Series processors. Please refer to our web site for a complete listing of supported processors (www.bull.com).

Memory

The NovaScale R422-E1/R422-INF-E1 serverboard has eight 240-pin DIMM sockets that can support up to 64 GB of ECC FBD (Fully Buffered DIMM) DDR2-800/667/533 SDRAM. Memory can be installed in both interleaved (dual-channel) and non-interleaved (single-channel) configurations. All memory modules used to populate the system should be the same size, type and speed.

Serial ATA

The South Bridge (ESB2) of the 5400 chipset includes a Serial ATA controller for 3 Gb/s SATA drives. The hot-swappable SATA drives are connected to a backplane that provides power, bus termination and configuration settings. RAID 0 and 1 are supported.

PCI Expansion Slots

Each NovaScale R422-E1/R422-INF-E1 serverboard has one PCI-Express 2.0 x16 slot, so two PCI-Express 2.0 x16 slots are provided in the server. In the NovaScale R422-E1/R422-INF-E1 server configuration, riser cards have been pre-installed to support two low-profile PCI-Express 2.0 x16 add-on cards.

Ethernet Ports

Two Intel® 82563EB network controllers are integrated into each of the serverboards to support a total of four Gigabit LAN ports (100/1000Base-T/1000BaseTX, RJ45 output).

Onboard Controllers/Ports

Onboard I/O backpanel ports include one COM port, a VGA port, two USB ports, two Gigabit LAN (NIC) ports and (on the NovaScale R422-INF-E1 only) an InfiniBand® (MT25204 controller) 20 Gbps port. There are two sets of I/O ports included in the server (one set for each severboard).

InfiniBand Port Bracket: The InfiniBand port bracket is a small "U" shaped bracket that secures the connector to the I/O port shield. This allows the I/O shield, not the serverboard, to support the cable's weight. The bracket can be found on the connector itself.

When installing the serverboard, remove the bracket from the InfiniBand port. Slide the port through the shield, and then replace the bracket to secure the port to the I/O shield.

ATI Graphics Controller

The NovaScale R422-E1/R422-INF-E1 serverboard features an integrated ATI video controller based on the ES1000 graphics chip. The ES1000 was designed specifically for servers, featuring low power consumption, high reliability and superior longevity.

Other Features

Other onboard features that promote system health include voltage monitors, a chassis intrusion header, auto-switching voltage regulators, chassis and CPU overheat sensors, virus protection and BIOS rescue.
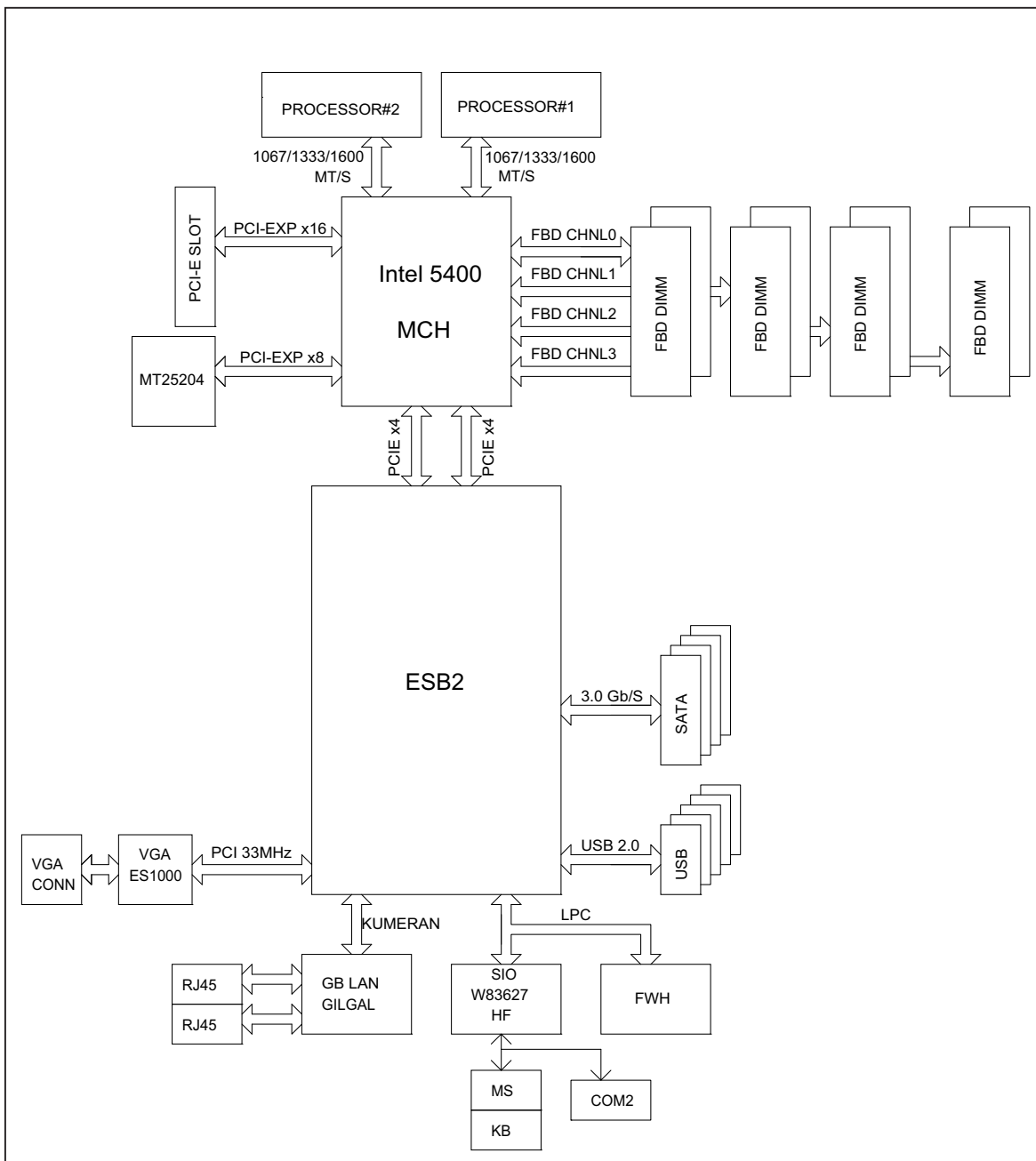
**Figure 1-1. Intel 5400P Chipset:
System Block Diagram**

Note: This is a general block diagram. Please see Chapter 5 for details.

1-3   Server Chassis Features

The following is a general outline of the main features of the 1U chassis. Details on the chassis can be found in Chapter 6.

System Power

The NovaScale R422-E1 chassis includes a single 980W cold-swap power supply, which provides the power to both serverboards housed in the chassis.

SATA Subsystem

The NovaScale R422-E1 chassis was designed to support four SATA hard drives, which are hot-swappable units.

Control Panel

The NovaScale R422-E1 chassis features two independant control panels associated with each serverboard in the chassis. Each control panel has LEDs to indicate power on, network activity, hard disk drive activity and system overheat conditions. Each control panel also includes a main power button and a system reset button.

Rear I/O Panel

The NovaScale R422-E1 chassis is a 1U rackmount chassis. Its I/O panel provides a slots for two low-profile PCI-E x16 expansion cards, two COM ports, four USB ports, two VGA ports and four Gb Ethernet ports. The NovaScale R422-INF-E1 also provides two InfiniBand ports. See Chapter 6 for details.

Cooling System

The NovaScale R422-E1 chassis has an innovative cooling design that features two sets of triple (for a total of six) 4-cm high-performance fans. A fan speed control setting in BIOS allows fan speed to be determined by system temperature.

1-4   1U Twin: System Notes

As a 1U Twin configuration, the NovaScale R422-E1/R422-INF-E1 is a unique server system. With two system boards incorporated into a single chassis, there are several points you should keep in mind.

System Power

A single power supply is used to provide the power for both serverboards. Each serverboard however, can be shut down independently of the other with the power button on its own control panel.

Although they share a common power supply, the I^{2}C signals used for power supply monitoring are received by the primary serverboard only. (When viewed from the front of the chassis, the serverboard on the left is referred to as the primary board and the serverboard on the right as the secondary.)

SATA Backplane/Drives

As a system, the NovaScale R422-E1/R422-INF-E1 supports the use of four SATA drives. The SATA backplane works as a single backplane divided into two sections. This means that while a single power connector is used and functions such as overheating apply to both sections together, each pair of SATA drives is logically connected to its own serverboard. Consequently, RAID setup is limited to a two-drive scheme (RAID cannot be spread across all four drives).

Notes

1-7

1-8

Chapter 2. Server Installation

2-1   Overview

This chapter provides a quick setup checklist to get your NovaScale R422-E1/R422-INF-E1 up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components.

2-2   Unpacking the System

You should inspect the box the NovaScale R422-E1/R422-INF-E1 was shipped in and note if it was damaged in any way. If the server itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the NovaScale R422-E1/R422-INF-E1. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Be sure to read the Rack and Server Precautions in the next section.

2-3   Preparing for Setup

The box the NovaScale R422-E1/R422-INF-E1 was shipped in should include two sets of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Follow the steps in the order given to complete the installation process in a minimum amount of time. Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (~63 cm/~25 inches).

- Leave approximately 76 cm (30 inches) of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.

- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).

- This product is not suitable for use with visual display work place devices according to §2 of the the German Ordinance for Work with Visual Display Units.

Rack Precautions

 Warnings and Precautions!

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.

- In single rack installation, stabilizers should be attached to the rack.

- In multiple rack installations, the racks should be coupled together.

- Always make sure the rack is stable before extending a component from the rack.

- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

Server Precautions

- Review the electrical and general safety precautions in Chapter 4.

- Determine the placement of each component in the rack *before* you install the rails.

- Install the heaviest server components on the bottom of the rack first, and then work up.

- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.

- Allow the hot plug SATA drives and power supply modules to cool before touching them.

- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

- Make sure all power and data cables are properly connected and not blocking the chassis airflow. See Chapter 5 for details on cable connections.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

2-4   Installing the System into a Rack

This section provides information on installing the NovaScale R422-E1/R422-INF-E1 into a rack unit with the rack rails provided. If the system has already been mounted into a rack, you can skip ahead to Sections 2-5 and 2-6. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. You should also refer to the installation instructions that came with the rack unit you are using.

Identifying the Sections of the Rack Rails

You should have received two rack rail assemblies in the rack mounting kit. Each assembly consists of two sections: an inner fixed chassis rail that secures directly to the server chassis and an outer fixed rack rail that secures directly to the rack itself (see Figure 2-1). Two pairs of short brackets to be used on the front side of the outer rails are also included.

Installing the Inner Rails

Both the left and right side inner rails have been pre-attached to the chassis. Proceed to the next step.

**Figure 2-1. Identifying the Sections of the Rack Rails
(right side rail shown)**

Outer Rail (attaches to rack)

Inner Rail (pre-installed)

Locking Tab
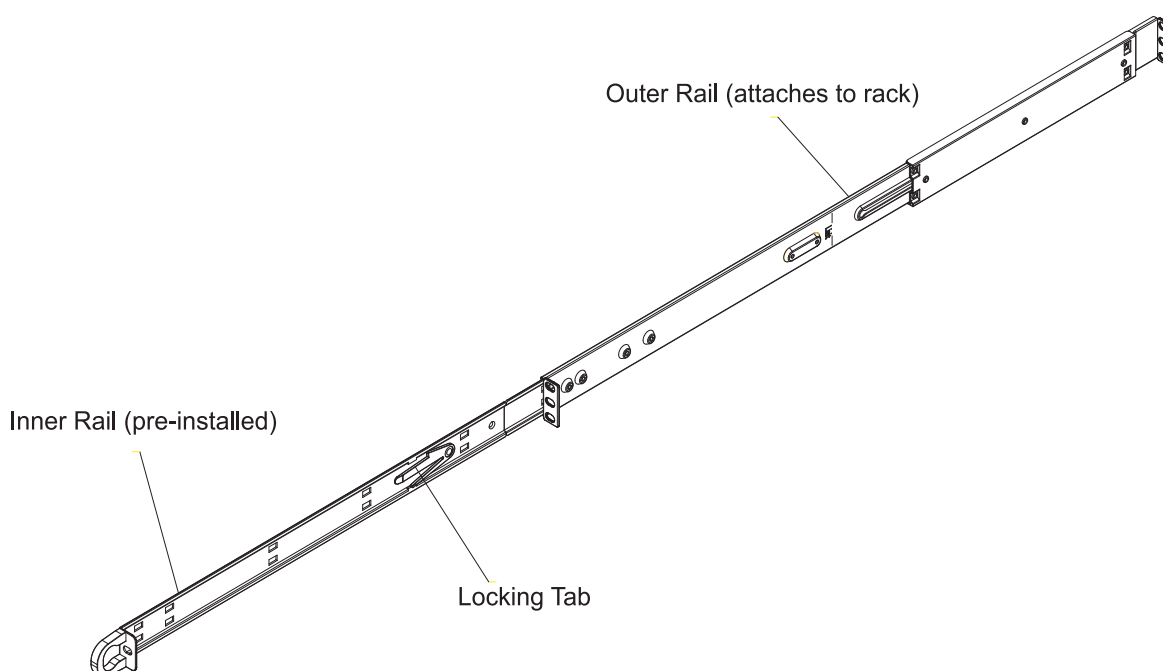
Installing the Outer Rails

Begin by measuring the distance from the front rail to the rear rail of the rack. Attach a short bracket to the front side of the right outer rail and a long bracket to the rear side of the right outer rail. Adjust both the short and long brackets to the proper distance so that the rail can fit snugly into the rack. Secure the short bracket to the front side of the outer rail with two M4 screws and the long bracket to the rear side of the outer rail with three M4 screws. Repeat these steps for the left outer rail.

Locking Tabs

Both chassis rails have a locking tab, which serves two functions. The first is to lock the server into place when installed and pushed fully into the rack, which is its normal position.

Warning DANGER:

No other lock prevents the server from coming completely out of the rack when you pull it out for servicing.

Figure 2-2. Installing the Rack Rails
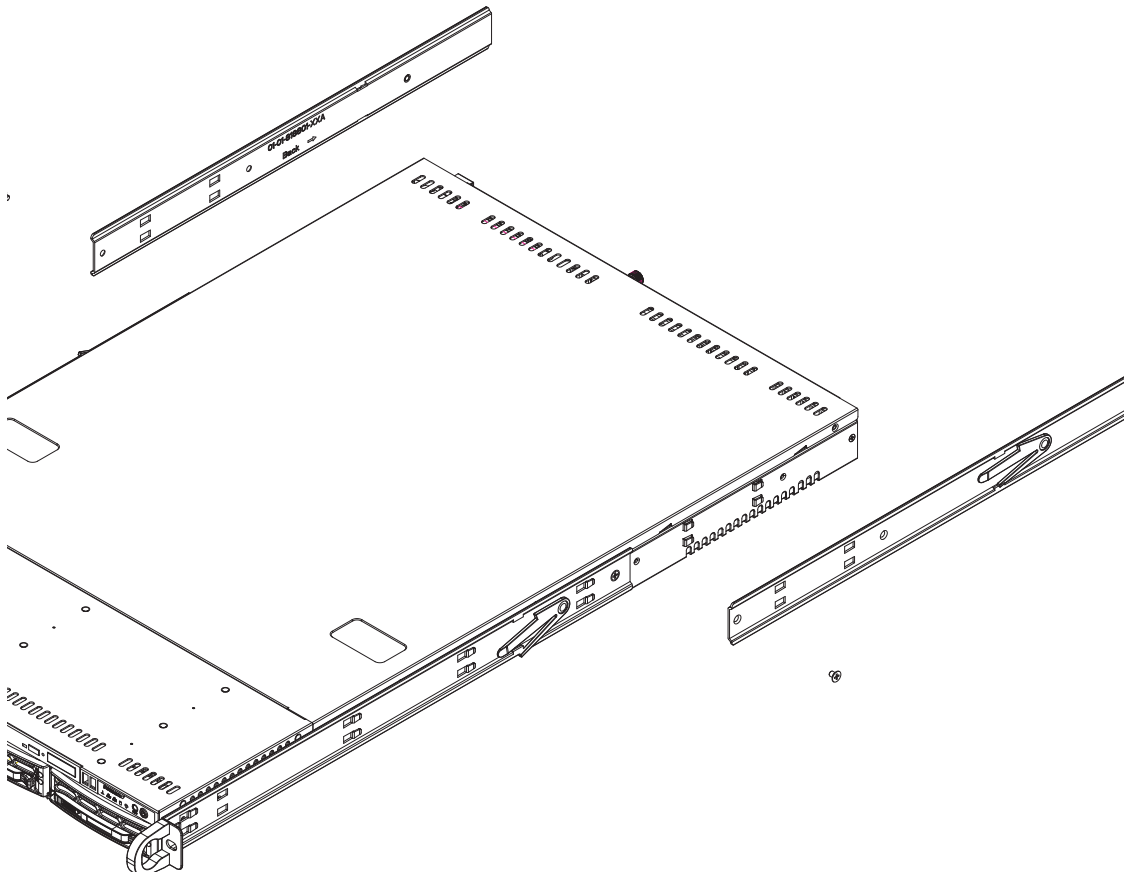
Installing the Server into the Rack

You should now have rails attached to both the chassis and the rack unit. The next step is to install the server into the rack. Do this by lining up the rear of the chassis rails with the front of the rack rails. Slide the chassis rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting). See Figure 2-3.

When the server has been pushed completely into the rack, you should hear the locking tabs "click". Finish by inserting and tightening the thumbscrews that hold the front of the server to the rack.

2-5   Checking the Serverboard Setup

After you install the NovaScale R422-E1/R422-INF-E1 in the rack, you will need to open the top cover to make sure the serverboard is properly installed and all the connections have been made.

Accessing the Inside of the System

1.   Release the retention screws that secure the system to the rack.

2.   Grasp the two handles on either side and pull the system straight out until it locks (you will hear a "click").

3.   Remove the four screws (two on the sides and two on the top) that secure the top cover to the chassis. Place your thumbs in the two rectangular recesses and push the cover away from you (toward the rear of the chassis) until it stops. You can then lift the top cover from the chassis to gain full access to the inside of the server (see Figure 2-4).

4.   To remove the system from the rack completely, depress the locking tabs in the chassis rails (push the right-side tab down and the left-side tab up) to continue to pull the system out past the locked position.

Figure 2-3. Installing the Server into a Rack
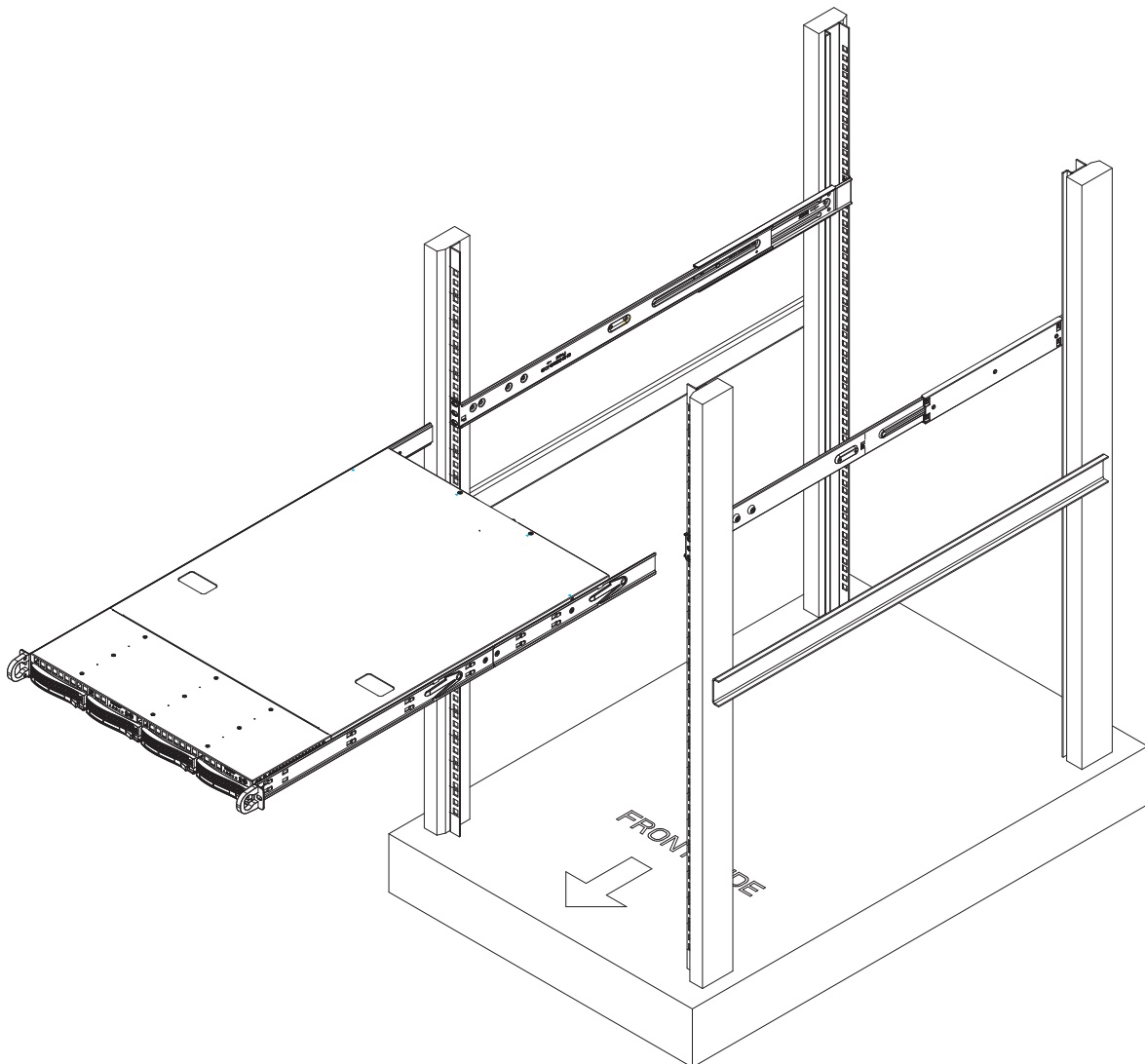
Checking the Components and Setup

1. You may have one or two processors already installed in each of the two serverboards. Each processor needs its own heatsink. See Chapter 5 for instructions on processor and heatsink installation.

2. Your server system may have come with system memory already installed. Make sure all DIMMs are fully seated in their slots. For details on adding system memory, refer to Chapter 5.

3. You can install two add-on cards to the system. See Chapter 5 for details on installing PCI add-on cards.

4. Make sure all power and data cables are properly connected and not blocking the chassis airflow. See Chapter 5 for details on cable connections.

2-6   Preparing to Power On

Next, you should check to make sure the peripheral drives and the SATA drives and SATA backplane have been properly installed and all connections have been made.

Checking the SATA drives

1. All drives are accessible from the front of the server. The SATA disk drives can be installed and removed from the front of the chassis without removing the top chassis cover.

2. Depending upon your system's configuration, your system may have one or two drives already installed. If you need to install SATA drives, please refer to Chapter 6.

Checking the Airflow

1. Airflow is provided by six sets of 4-cm fans (each set of fans consists of two fans that are mounted back to back) and an air shroud. The system component layout was carefully designed to direct sufficient cooling airflow to the components that generate the most heat.

2. Note that all power and data cables have been routed in such a way that they do not block the airflow generated by the fans.

Providing Power

1. Plug the power cords from the power supplies unit into a high-quality power strip that offers protection from electrical noise and power surges.

2. It is recommended that you use an uninterruptible power supply (UPS).

3. Finally, depress the power on button on the front of the chassis.

Figure 2-4. Accessing the Inside of the System

Notes

2-10
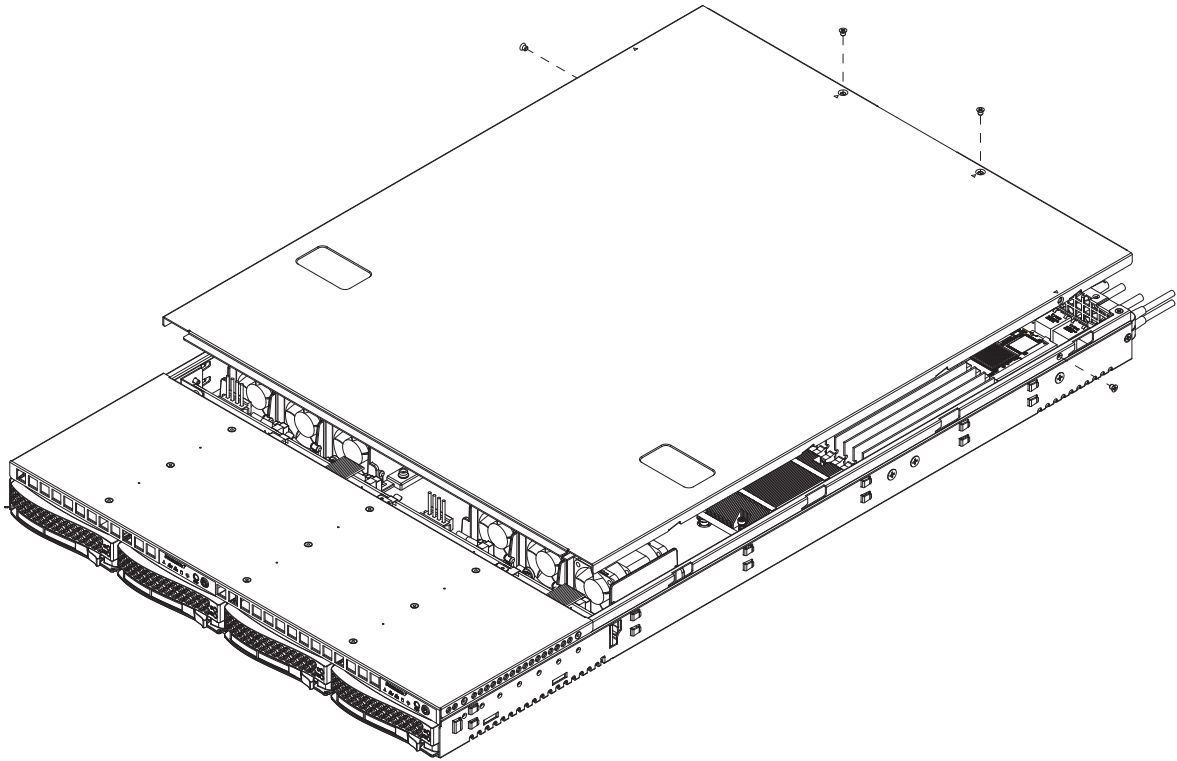
Chapter 3. System Interface

3-1   Overview

There are several LEDs on the two control panels as well as others on the SATA drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. There are also two buttons on each control panel. This chapter explains the meanings of all LED indicators and the appropriate response you may need to take. Note that the server has two control panels, one for each serverboard installed in the system. This allows each severboard to be controlled independently of the other.

3-2   Control Panel Buttons

There are two push-buttons located on each control panel: a reset button and a power on/off button.

Reset

RESET

Depressing the reset button will reboot only the serverboard it is associated with.

Power

This is the main power button, which is used to apply or turn off the main system power only to the serverboard it is connected to. Depressing this button removes the main power but keeps standby power supplied to the serverboard.

3-3   Control Panel LEDs

Each of the two control panels located on the front of the NovaScale R422-E1/R422-INF-E1 chassis has five LEDs. Each LED provides you with critical information related its own specific serverboard. This section explains what each LED indicates when illuminated and any corrective action you may need to take.

Overheat/Fan Fail

When this LED flashes, it indicates a fan failure. When on continuously it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly (see Chapter 5). This LED will remain flashing or on as long as the indicated condition exists.

NIC2

Indicates network activity on LAN2 when flashing

NIC1

Indicates network activity on LAN1 when flashing.

HDD

Channel activity for the hard disk drives. This light indicates SATA drive activity on the NovaScale R422-E1/R422-INF-E1 when flashing.

Power

Indicates power is being supplied to the system's power supply unit. This LED should normally be illuminated when the system is operating.

3-4   SATA Drive Carrier LEDs

Each SATA drive carrier has two LEDs.

- **Green:** When illuminated, the green LED on the front of the SATA drive carrier indicates drive activity. A connection to the SATA backplane enables this LED to blink on and off when that particular drive is being accessed.

- **Red:** There is no function associated with the red LED.

Notes

3-4

Chapter 4. System Safety

4-1   Electrical Safety Precautions

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Basic electrical safety precautions should be followed to protect yourself from harm and the NovaScale R422-E1/R422-INF-E1 from damage:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.

- Do not work alone when working with high voltage components.

- Power should always be disconnected from the system when removing or installing main system components, such as the serverboard, memory modules and floppy drive. When disconnecting power, you should first power down the system with the operating system first and then unplug the power cords of all the power supply units in the system.

- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power if necessary.

- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.

- Do not use mats designed to decrease static electrical discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.

- The power supply power cords must include a grounding plug and must be plugged into grounded electrical outlets.

- Serverboard Battery: **CAUTION** - There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarites (see Figure 4-1). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

- Mainboard replaceable soldered-in fuses: Self-resetting PTC (Positive Temperature Coefficient) fuses on the mainboard must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact technical support for details and support.

4-2   General Safety Precautions

Follow these rules to ensure general safety:

- Keep the area around the NovaScale R422-E1/R422-INF-E1 clean and free of clutter.

- The NovaScale R422-E1/R422-INF-E1 weighs approximately 40 lbs (~18.2 kg) when fully loaded. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.

- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.

- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.

- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.

- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.

4-3   ESD Precautions

Electrostatic discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. An electrical discharge is created to neutralize this difference, which can damage electronic components and printed circuit boards. The following measures are generally sufficient to neutralize this difference before contact is made to protect your equipment from ESD:

• Use a grounded wrist strap designed to prevent static discharge.

• Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.

• Touch a grounded metal object before removing the board from the antistatic bag.

• Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.

• Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.

• When handling chips or modules, avoid touching their pins.

• Put the serverboard and peripherals back into their antistatic bags when not in use.

• For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

4-4　Operating Precautions

Care must be taken to assure that the chassis cover is in place when the Nova-Scale R422-E1/R422-INF-E1 is operating to assure proper cooling. Out of warranty damage to the system can occur if this practice is not strictly followed.

Figure 4-1. Installing the Onboard Battery

LITHIUM BATTERY

BATTERY HOLDER

OR

LITHIUM BATTERY

BATTERY HOLDER
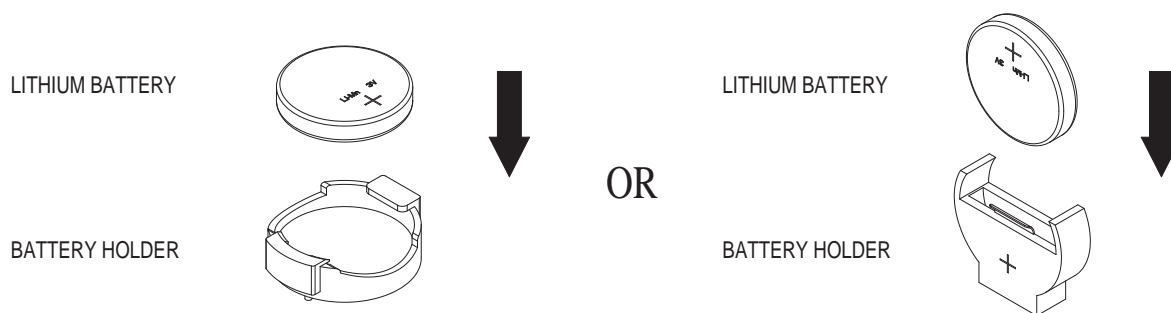
Battery model: CR2032 3 Volts or equivalent type (Varta, Sony, Matsushita, Panasonic, FDK).

Chapter 5. Advanced Serverboard Setup

This chapter covers the steps required to install the NovaScale R422-E1/R422-INF-E1 serverboard into the chassis, connect the data and power cables and install add-on cards. All serverboard jumpers and connections are also described. A layout and quick reference chart are included in this chapter for your reference. <u>Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.</u>

5-1   Handling the Serverboard

Electrostatic discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally sufficient to protect your equipment from electric static discharge.

Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).

- Touch a grounded metal object before removing any board from its antistatic bag.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Unpacking

The serverboard is shipped in antistatic packaging to avoid electrostatic discharge. When unpacking the board, make sure the person handling it is static protected.

5-2   Serverboard Installation

This section explains the first step of physically mounting the serverboard into the chassis. Following the steps in the order given will eliminate the most common problems encountered in such an installation. To remove the serverboard, follow the procedure in reverse order.

Accessing the Inside of the System

1. Remove all four screws securing the top cover of the chassis: two at the top rear of the cover and one on each side lip, also near the back.

2. Place both thumbs in the indentations and push the cover back until it slides off.

3. Lift the top cover from the chassis to gain full access to the inside of the server. (If already installed in a rack, you must first release the retention screws that secure the unit to the rack, then grasp the two handles on either side and pull the unit straight out until the rails lock into place. See Figure 2-5.)

Check Compatibility of Serverboard Ports and I/O Shield

Make sure that the I/O ports on the serverboards align properly with their respective holes in the I/O shield at the back of the chassis when installing.

Mounting the Serverboard onto the Serverboard Tray

1. Carefully mount the serverboards by aligning the board holes with the raised metal standoffs that are visible in the chassis.

2. Insert screws into all the mounting holes on your serverboards that line up with the standoffs and tighten until snug (if you screw them in too tight, you might strip the threads).

3. Metal screws provide an electrical contact to the serverboard ground to provide a continuous ground for the system.

5-3   Connecting Cables

Now that the serverboards are installed, the next step is to connect the cables to the boards. These include the data cables for the peripherals and control panel and the power cables.

Connecting Data Cables

The cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the flow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). The following data cables (with their locations noted) should be connected. (See the serverboard layout for connector locations.) Note that each connection listed should be made for both serverboards in the chassis.

- SATA drive cables (I-SATA0 ~ I-SATA1)

- Control Panel cable (JF1)

Connecting Power Cables

The NovaScale R422-E1/R422-INF-E1 serverboard has two 20-pin ATX power supply connectors for connection to the ATX power supply. Only one of these from each board should be connected to the power supply. The "Primary ATX Power Header" is used to supply power to the primary serverboard and the "Secondary ATX Power Header" is used to supply power to the secondary serverboard. Connect the power supply to only one of these on both boards (primary = left, secondary = right when viewed from front of server). See Section 5-9 for power connector pin definitions.

Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators. All JF1 wires have been bundled into a single ribbon cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis.

Figure 5-1. Control Panel Header Pins

	20	19	
Ground	●	●	NMI
x (Key)	●	●	x (Key)
Power On LED	●	●	Vcc
HDD LED	●	●	Vcc
NIC1 LED	●	●	Vcc
NIC2 LED	●	●	Vcc
OH/Fan Fail LED	●	●	Vcc
Power Fail LED	●	●	Vcc
Ground	●	●	Reset (Button)
Ground	●	●	Power (Button)
	2	1	
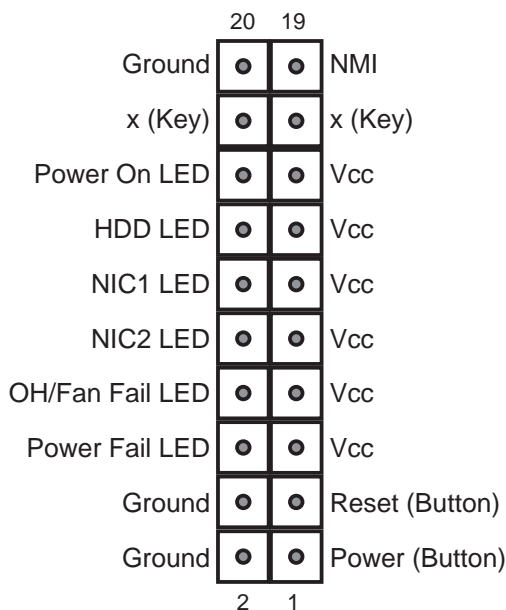
5-4   I/O Ports

The I/O ports are color coded in conformance with the PC 99 specification. See Figure 5-2 below for the colors and locations of the various I/O ports.

Figure 5-2. I/O Ports

LAN1   LAN2   InfiniBand Port

USB 0/1 Ports   COM2 Port (Turquoise)   VGA Port (Blue)
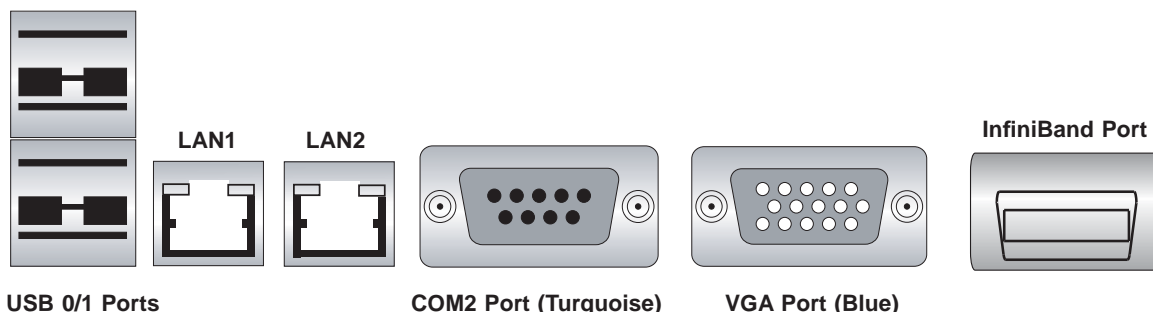
Note: The InfiniBand port is included on the NovaScale R422-INF-E1 only. To prevent damage to the port or serverboard, an InfiniBand bracket (included) must be used to secure the connector to the I/O shield.

5-5   Processor and Heat Sink Installation

! When handling the processor, avoid placing direct pressure on the label area of the fan. Also, do not place the serverboard on a conductive surface, which can damage the BIOS battery and prevent the system from booting up.

IMPORTANT! Always connect the power cord last and remove it first before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket *before* you install the heat sink and fan. The NovaScale R422-E1/R422-INF-E1 serverboard can support either one or two Xeon 5400/5300LV/5200/5100LV type processors. If installing one processor only, install it into CPU socket #1. If installing two processors, install two processors with the same model and "stepping".

Notes:

1. Intel's boxed Xeon® CPU package contains a CPU fan and heat sink assembly. If you buy a CPU separately, make sure that you use only Intel-certified multi-directional heatsinks and fans.

2. When purchasing a Xeon® 5400/5200 CPU or when receiving a serverboard with a CPU pre-installed, make sure that the CPU plastic cap is in place and none of the CPU pins are bent; otherwise, contact the retailer immediately.

Installing the Processor

1. A black PnP cap is attached to the load plate to protect the CPU socket. Press the load lever down and away from the retention clasp to release the load plate from its locked position.

Load lever

PnP cap
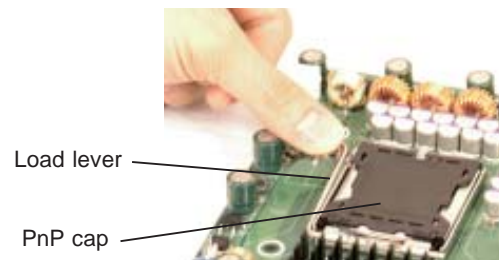
2. Gently lift the load lever to open the load plate.

Load plate released
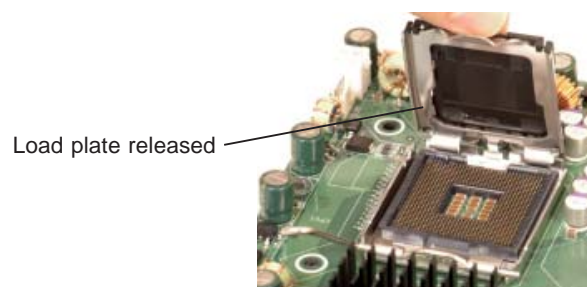
3. Use your thumb and your index finger to hold the CPU at opposite sides.

4. Align pin1 of the CPU (the corner marked with a triangle) with the notched corner of the CPU socket.

5. Find the corner of the CPU that has a semi-circle cutout below a gold dot (CPU key). This corner should be aligned with the cutout on the socket (socket key).

6. Once aligned, carefully lower the CPU straight down into the socket. Do not drop the CPU on the socket, do not move the CPU horizontally or vertically and do not rub the CPU against any surface or any of the contacts, which may damage the CPU and/or contacts.

7. With the CPU in the socket, inspect the four corners of the CPU to make sure that it is properly installed.

8. Use your thumb to gently push the load lever down until it snaps into the retention clasp.

9. If the CPU is properly installed into the socket, the PnP cap will be automatically released from the load plate when the lever locks. Remove the cap. Repeat steps to install a second CPU if desired.

Warning! Keep the plastic PnP cap. The serverboard must be shipped with the PnP cap properly installed to protect the CPU socket. Shipment without the PnP cap properly installed will void the warranty.

Gold dot

Socket key

CPU key

Notched corner

CPU pin 1

Load lever

CPU installed in socket
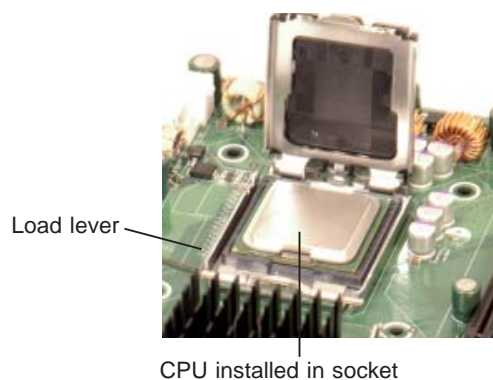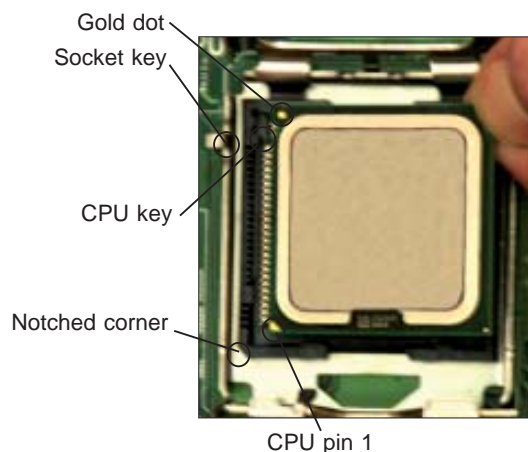
PnP cap released from load plate
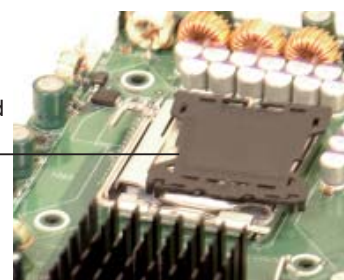
Installing the Heat Sink

1. Do not apply any thermal grease to the heat sink or the CPU die; the required amount has already been applied.

2. Place the heat sink on top of the CPU so that the four mounting holes are aligned with those on the (preinstalled) heat sink retention mechanism.

3. Screw in two diagonal screws (i.e. the #1 and the #2 screws) until just snug. Do not fully tighten the screws or you may damage the CPU.)

4. Add the two remaining screws then finish the installation by fully tightening all four screws.
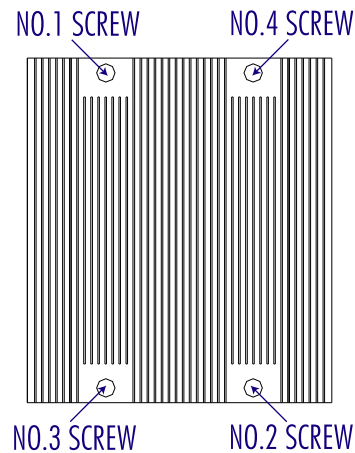
Removing the Heat Sink

Warning! We do not recommend that the CPU or the heat sink be removed. However, if you do need to uninstall the heat sink, please follow the instructions below to prevent damage to the CPU or the CPU socket.

1. Unscrew and remove the heat sink screws from the serverboard in the sequence as show in the picture above.

2. Hold the heat sink and <u>gently</u> wriggle the heat sink to loosen it from the CPU. (Do not use excessive force when wriggling the heat sink!!)

3. Once the heat sink is loose, remove it from the CPU.

4. Clean the surface of the CPU and the heat sink to get rid of the old thermal grease. Reapply the proper amount of thermal grease (reference Shin-Etsu G751) on the surface before you re-install the heat sink.

5-6 Installing Memory

 CAUTION! Exercise extreme care when installing or removing DIMM modules to prevent any possible damage.

Memory support

The NovaScale R422-E1/R422-INF-E1 serverboard has eight 240-pin DIMM sockets that can support up to 64 GB of ECC FBD (Fully Buffered DIMM) DDR2-800/667/533 SDRAM (for a total of 128 GB in the system). The memory scheme is interleaved, so you must populate two slots at a time, beginning with slot 1A and 2A, then slots 3A and 4A, etc. on each serverboard. See chart below for optimizing your DIMM installation.

Installing memory modules

Insert each memory module vertically. Pay attention to the notches along the bottom of the module to prevent inserting it incorrectly. Gently press down on the DIMM module until it snaps into place in the slot (see Figure 5-3).

Figure 5-3. DIMM Installation
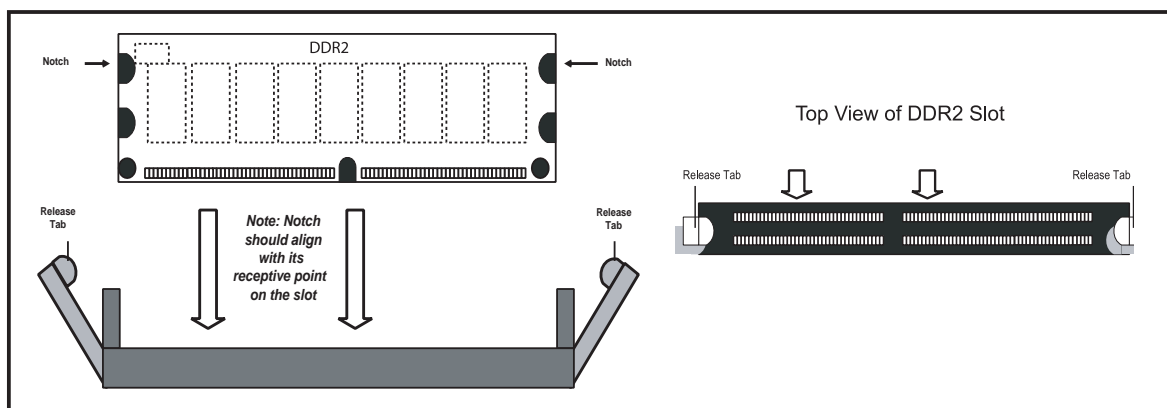
To Install: Insert module vertically and press down until it snaps into place. Pay attention to the bottom notches.

To Remove: Use your thumbs to gently push each release tab outward to free the DIMM from the slot.

Optimized DIMM Configurations							
	Branch 0				**Branch 1**		
Number of DIMMs	**Bank 1 (Channel 0)**		**Bank 2 (Channel 1)**		**Bank 3 (Channel 2)**		**Bank 4 (Channel 3)**
2 DIMMs	1A	---	2A	---	---	---	---	---
4 DIMMs	1A	---	2A	---	3A	---	4A	---
6 DIMMs	1A	1B	2A	2B	3A	---	4A	---
8 DIMMs	1A	1B	2A	2B	3A	3B	4A	4B
Notes: i. DIMM slot# specified = DIMM slot to be populated; "---" = unpopulated DIMM slot. **ii.** Use the memory modules of the same speed and type on a motherboard. **iii.** Interleaved memory is supported when pairs of DIMM modules are installed. To optimize memory performance, please populate pairs of memory modules in both Branch 0 and Branch 1. **iv.** For memory to work properly, you need to follow the restrictions listed above.							

Possible System Memory Allocation & Availability			
System Device	Size	Physical Memory Remaining (Available) (3 GB Total System Memory)	Physical Memory Remaining (Available) (4 GB Total System Memory)
Firmware Hub flash memory (System BIOS)	1 MB	3.00	3.99
Local APIC	4 KB	3.00	3.99
Area Reserved for the chipset	2 MB	3.00	3.99
I/O APIC (4 Kbytes)	4 KB	3.00	3.99
PCI Enumeration Area 1	256 MB	3.00	3.76
PCI Express (256 MB)	256 MB	3.00	3.51
PCI Enumeration Area 2 (if needed) -Aligned on 256-MB boundary-	512 MB	3.00	3.01
VGA Memory	16 MB	2.85	2.85
TSEG	1 MB	2.84	2.84
Memory available to OS & other applications		2.84	2.84

5-7   Adding PCI Cards

PCI-Express 2.0 Slot

The NovaScale R422-E1/R422-INF-E1 includes two preinstalled riser cards. These riser cards support two low-profile PCI-Express 2.0 (second generation PCI-E) cards to fit inside the chassis.

PCI Card Installation

The riser card has already been preinstalled into the serverboard. Perform the following steps to add a PCI add-on card:

1. Remove the PCI slot shield on the chassis by releasing the locking tab.

2. Insert the add-on card into the riser card.

3. Secure the add-on card with the locking tab.

5-8   Serverboard Details

Figure 5-4. NovaScale R422-E1/R422-INF-E1 Layout
(not drawn to scale)
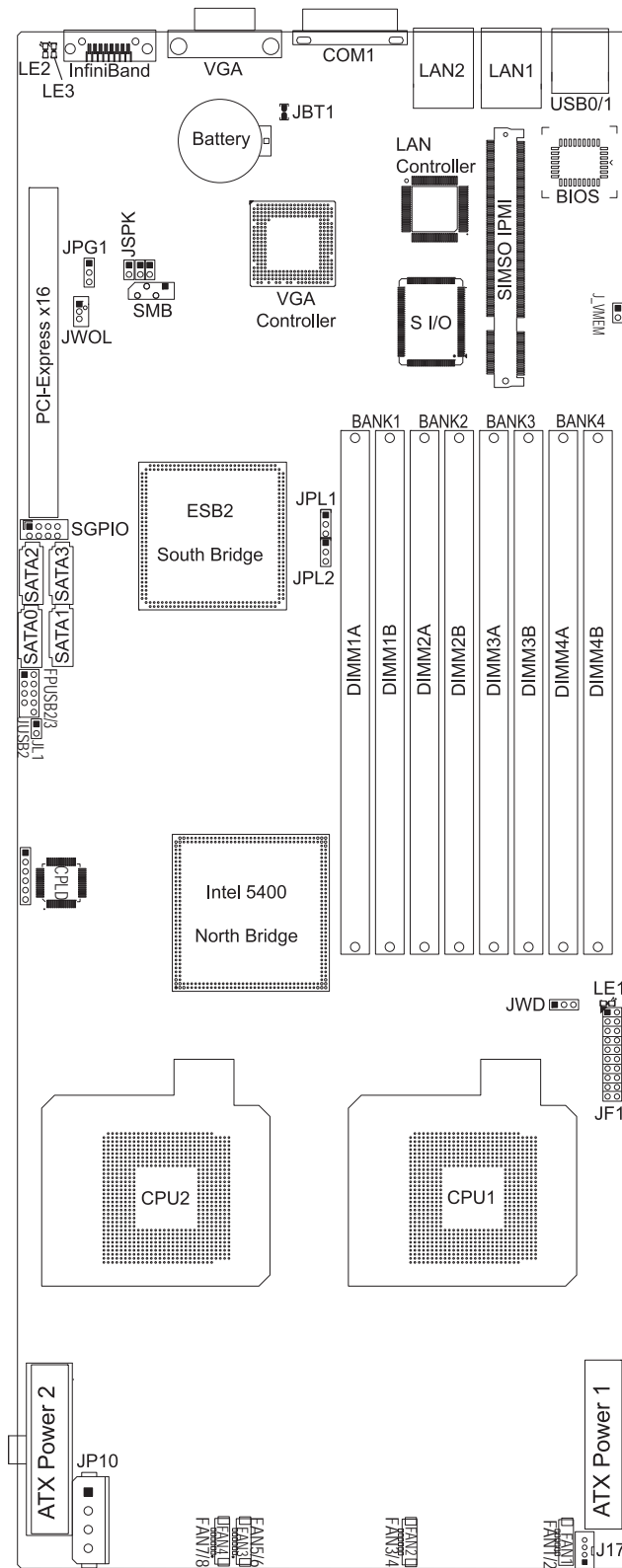
NovaScale R422-E1/R422-INF-E1 Serverboard Quick Reference

Jumper	Description	Default Setting
JBT1	CMOS Clear	(See Section 5-10)
JI^{2}C1/JI^{2}C2	I^{2}C to PCI-Express Slot	Open (Disabled)
JPG1	VGA Enable/Disable	Pins 1-2 (Enabled)
JPL1/JPL2	LAN1/2 Enable/Disable	Open (Enabled)
JWD	Watch Dog	Pins 1-2 (Reset)

Connector	Description
FAN 1-8	Chassis/CPU Fan Headers
LAN1/2	Gigabit Ethernet (RJ45) Ports
J17	PWR SMBus I^{2}C Connector
SGPIO	Serial General Purpose Input/Output Header
SIMSO IPMI	SIMSO Slot
COM1	COM1 Serial Port
InfiniBand	InfiniBand Port
JF1	Front Panel Connector
JL1	Chassis Intrusion Header
JP10	4-pin Power Connector (for HDDs)
ATX Power 1	20-pin ATX Power Connector
ATX Power 2	20-pin ATX Power Connector
I-SATA0 ~ I-SATA6	SATA Ports 1~6
USB0/1	Universal Serial Bus (USB) Ports
USB2/3	Universal Serial Bus (USB) Headers
JWOL	Wake-On-LAN Header

LED	Description
LE1	Onboard Power
LE2	InfiniBand Link (Green)
LE3	InfiniBand Activity (Yellow)

Jumpers not indicated are for test purposes only.

The InfiniBand port is included on the NovaScale R422-INF-E1 only.

5-9   Connector Definitions

ATX Power 20-pin Connector Pin Definitions (ATX Power 1/2)			
Pin#	Definition	Pin #	Definition
11	PS On	1	Ground
12	5VSB	2	Ground
13	Ground	3	Ground
14	Ground	4	Ground
15	Ground	5	Ground
16	NC2	6	NC1
17	12V	7	12V
18	12V	8	12V
19	12V	9	12V
20	12V	10	12V

ATX Power Connector

The main ATX power supply con-nectors on the NovaScale R422-E1/ R422-INF-E1 serverboard meets the SSI (Superset ATX) 24-pin specifica-tion. Refer to the table on the right for the pin definitions. Only one of the two ATX power connectors from each serverboard should be connected to the power supply.

Auxiliary Power Connector

A 4-pin 12V auxiliary power connector is included to provide power to hard drive disks. See the table on the right for pin definitions.

Auxiliary Power Pin Definitions (JP10)	
Pin#	Definition
1	+12V
2	Ground
3	Ground
4	+5V

PW_ON Connector

The PW_ON connector is on pins 1 and 2 of JF1. This header should be connected to the chassis power but-ton. See the table on the right for pin definitions.

Power Button Pin Definitions (JF1)	
Pin#	Definition
1	PW_ON
2	Ground

Reset Connector

The reset connector is located on pins 3 and 4 of JF1 and attaches to the reset switch on the computer chas-sis. See the table on the right for pin definitions.

Reset Button Pin Definitions (JF1)	
Pin#	Definition
3	Reset
4	Ground

Overheat LED (OH)

Connect an LED to the OH connection on pins 7 and 8 of JF1 to provide advanced warning of chassis overheating. Refer to the table on the right for pin definitions.

OH/Fan Fail LED Pin Definitions (JF1)	
Pin#	Definition
7	Vcc
8	Ground

NIC2 (LAN2) LED

The LED connections for LAN2 are on pins 9 and 10 of JF1. Attach LAN LED cables to display network activity. See the table on the right for pin definitions.

NIC2 LED Pin Definitions (JF1)	
Pin#	Definition
9	Vcc
10	Ground

NIC1 (LAN1) LED

The LED connections for LAN1 are on pins 11 and 12 of JF1. Attach LAN LED cables to display network activity. See the table on the right for pin definitions.

NIC1 LED Pin Definitions (JF1)	
Pin#	Definition
11	Vcc
12	Ground

HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. Attach the hard drive LED cable here to display disk activity (for any hard drives on the system, including SAS, Serial ATA and IDE). See the table on the right for pin definitions

HDD LED Pin Definitions (JF1)	
Pin#	Definition
13	Vcc
14	HD Active

Power On LED

The Power On LED connector is located on pins 15 and 16 of JF1. This connection is used to provide LED indication of power being supplied to the system. See the table on the right for pin definitions.

Power LED Pin Definitions (JF1)	
Pin#	Definition
15	5V Stby
16	Control

NMI Button

The non-maskable interrupt button header is located on pins 19 and 20 of JF1. Refer to the table on the right for pin definitions.

NMI Button Pin Definitions (JF1)	
Pin#	Definition
19	Control
20	Ground

Fan Headers

The NovaScale R422-E1/R422-INF-E1 serverboard has four 6-pin proprietary fan headers. Each fan header supports two 3-pin fans. See the table on the right for pin definitions. **Note**: The onboard fan speed is controlled by the CPU die temperature.

Fan Header Pin Definitions (Fan1/2 - Fan7/8)			
Pin #	Definition	Pin #	Definition
1	PWR (DC Speed CTRL)	4	Ground
2	Tachometer for Fan 1/3/5	5	Tachometer for Fan 2/4/6
3	Ground	6	PWR (DC Speed CTRL)

Chassis Intrusion

The Chassis Intrusion header is designated JL1. See the board layout for the location of JL1 and the table on the right for pin definitions.

Chassis Intrusion Pin Definitions (JL1)	
Pin#	Definition
1	Intrusion Input
2	Ground

USB Ports Pin Definitions (USB0/1)	
Pin#	Definition
1	+5V
2	PO-
3	PO+
4	Ground
5	N/A

Universal Serial Bus (USB)

There are two Universal Serial Bus ports located on the I/O panel and two additional USB headers located on the serverboard. The headers, labeled USB2 and USB3, can be used to provide front side USB access (cables not included). See the tables on the right for pin definitions.

USB Headers Pin Definitions (USB2, USB3)			
USB3/5 Pin #	Definition	USB2/4 Pin #	Definition
1	+5V	1	+5V
2	PO-	2	PO-
3	PO+	3	PO+
4	Ground	4	Ground
5	Key	5	No connection

LAN1/2 (Ethernet Ports)

Two gigabit Ethernet ports (designated LAN1 and LAN2) are located beside the VGA port on the I/O backplane. These ports accept RJ45 type cables.
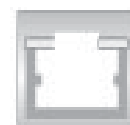
LAN 1   **LAN 2**

Wake-On-LAN

The Wake-On-LAN header is designated JWOL on the serverboard. See the table on the right for pin definitions. You must enable the LAN Wake-Up setting in BIOS to use this function. (You must also have a LAN card with a Wake-On-LAN connector and cable to use this feature.)

Wake-On-LAN Pin Definitions (JWOL)	
Pin#	Definition
1	+5V Standby
2	Ground
3	Wake-up

Serial Ports

One serial port is included on the serverboard: COM1 is a port located beside the VGA port. See the table on the right for pin definitions.

Serial Port Pin Definitions (COM1)			
Pin #	Definition	Pin #	Definition
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	NC

Note: NC indicates no connection.

SGPIO Header

An SGPIO (Serial General Purpose Input/Output) header is included on the serverboard. This header is used to communicate with the System Monitoring chip on the backplane to monitor SATA activity. See the table on the right for pin definitions.

SGPIO Header Pin Definitions (SGPIO)			
Pin#	Definition	Pin	Definition
1	*NC	2	*NC
3	Ground	4	DATA Out
5	Load	6	Ground
7	Clock	8	*NC

Note: NC indicates no connection.

SMB Power (I²C)

The header at J17 is for I²C, which may be used to monitor the status of the power supply, fan and system temperature. See the table on the right for pin definitions.

SMB Power (I²C) Pin Definitions (J17)	
Pin#	Definition
1	Clock
2	Data
3	Power Fail
4	Ground
5	+3.3V

5-10 Jumper Settings

To modify the operation of the serverboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the serverboard layout pages for jumper locations.

Note: On a two-pin jumper, "Closed" means the jumper is on both pins and "Open" means the jumper is either on only one pin or completely removed.

Connector Pins

Jumper

Setting
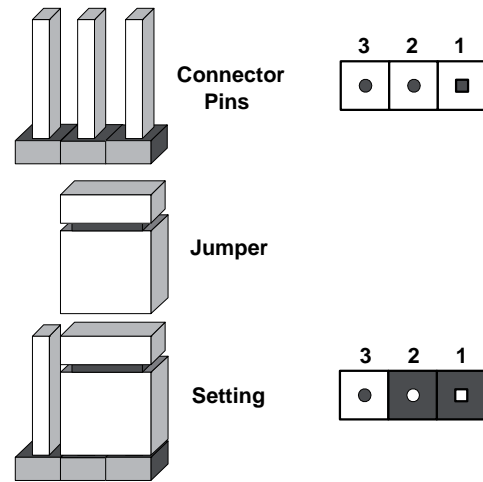
CMOS Clear

JBT1 is used to clear CMOS (which will also clear any passwords). Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

To Clear CMOS

1. First power down the system and unplug the power cord(s).

2. With the power disconnected, short the CMOS pads with a metal object such as a small screwdriver.

3. Remove the screwdriver (or shorting device).

4. Reconnect the power cord(s) and power on the system.

Note: *Do not use the PW_ON connector to clear CMOS.*

VGA Enable/Disable

JPG1 allows you to enable or disable the VGA port. The default position is on pins 1 and 2 to enable VGA. See the table on the right for jumper settings.

VGA Enable/Disable Jumper Settings (JPG1)	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

LAN1/LAN2 Enable/Disable

Change the setting of jumper JPL1 to enable or disable the LAN1 port and JPL2 to enable or disable the LAN2 port on the serverboard. See the table on the right for jumper settings. The default setting is enabled.

LAN1/2 Enable/Disable Jumper Settings (JPL1/2)	
Jumper Setting	Definition
Open	Enabled
Pins 2-3	Disabled

I2C to PCI-Express Slot

JI^2C1/JI^2C2 allows you to enable the I^2C bus to communicate with the PCI-Express slot. For the jumpers to work properly, please set both jumpers to the same setting. If enabled, both jumpers must be enabled. If disabled, both jumpers must be disabled. See the table on the right for jumper settings.

I²C to PCI-Express Slot Jumper Settings (JPI²C1/JPI²C2)	
Jumper Setting	Definition
Closed	Enabled
Open	Disabled

Watch Dog Enable/Disable

JWD enables the Watch Dog function, a system monitor that takes action when a software application freezes the system. Jumping pins 1-2 will have WD reboot the system if a program freezes. Jumping pins 2-3 will generate a non-maskable interrupt for the program that has frozen. See the table on the right for jumper settings. <u>Watch Dog must also be enabled in BIOS.</u>

Watch Dog Jumper Settings (JWD)	
Jumper Setting	Definition
Pins 1-2	Reset
Pins 2-3	NMI
Open	Disabled

Note: when Watch Dog is enabled, the user must write their own application software to disable the Watch Dog Timer.

5-11 Onboard Indicators

LAN1/LAN2 LEDs

The Ethernet ports (located beside the VGA port) have two LEDs. On each Gb LAN port, one LED indicates activity when blinking while the other LED may be green, amber or off to indicate the speed of the connection. See the table on the right for the functions associated with the connection speed LED.

LAN LED (Connection Speed Indicator)	
LED Color	Definition
Off	10 MHz
Green	100 MHz
Amber	1 GHz

Onboard Power LED (LE1)

There is an Onboard Power LED (LE1) located near JF1. When the green light is on or flashing, the power is connected. Unplug the power cable before removing and changing any components. See the table on the right for indications.

Onboard Power LED Indicator (LE1)	
LED Color	Definition
Green (Solid)	Power On, System On
Green (Flashing)	Power Standby: power cable connected, System: Off
Off	Power: Off, power cable: not connected

InfiniBand LED Indicators (LE2/LE3)

Two InfiniBand LED indicators (LE2/LE3) are located near the InfiniBand port. The green LED (LE2) is the InfiniBand Link LED while the yellow LED (LE3) indicates activity. Refer to the tables on the right for details.

InfiniBand Link LED (LE2)		
Color	Status	Definition
Green	Solid	InfiniBand Connected
Off	Off	No connection

InfiniBand Link LED (LE3)		
Color	Status	Definition
Yellow	Solid	InfiniBand: Active
Yellow	Dim	InfiniBand: Connected, Activity: Idle
Off	Off	No connection

Notes

5-20

Notes

Chapter 6. Advanced Chassis Setup

This chapter covers the steps required to install components and perform maintenance on the NovaScale R422-E1 chassis. For component installation, follow the steps in the order given to eliminate the most common problems encountered. If some steps are unnecessary, skip ahead to the step that follows. The only tool you will need to install components and perform maintenance is a Philips screwdriver.

6-1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully. The following measures are generally sufficient to protect your equipment from ESD discharge.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.

- Touch a grounded metal object before removing any board from its antistatic bag.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Unpacking

The serverboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure the person handling it is static protected.

Figure 6-1. Chassis Front View

Control Panel: Primary Serverboard   Control Panel: Secondary Serverboard

SATA Drives
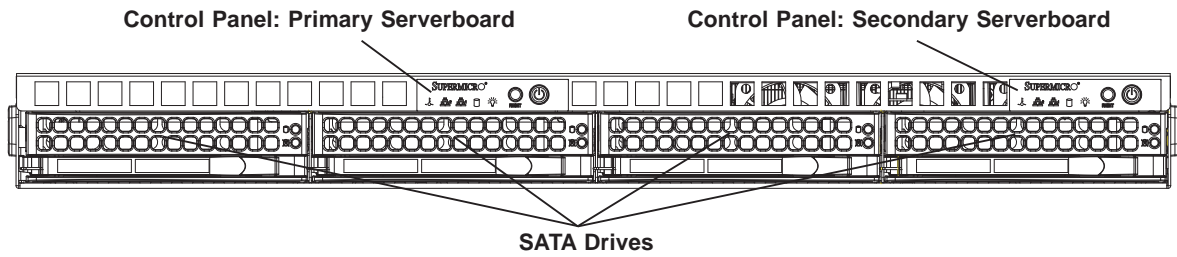
Figure 6-2. Chassis Rear View

LAN Ports   PCI-Express x16 Slot   Power Supply   LAN Ports   PCI-Express x16 Slot

USB Ports   COM Port   VGA Port   InfiniBand Port*   USB Ports   COM Port   VGA Port   InfiniBand Port*
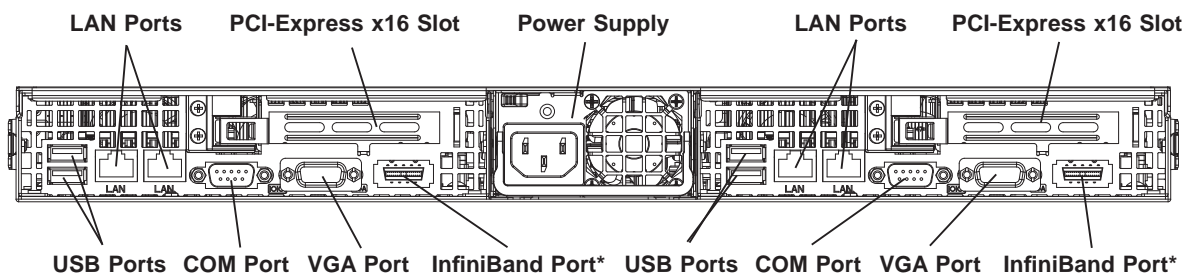
*The InfiniBand ports are included on the NovaScale R422-INF-E1 only.

6-2   Control Panel

Each control panel on the front of the chassis must be connected to the JF1 connector on its assiciated serverboard to provide you with system control buttons and status indicators. (When viewed from the front of the chassis, the serverboard on the left is referred to as the primary serverboard and the serverboard on the right as the secondary.)

These wires have been bundled together in a ribbon cable to simplify the connection. Connect the cable from JF1 on the serverboard to the control panel PCB (printed circuit board). Make sure the red wire plugs into pin 1 on both connectors. Pull all excess cabling out of the airflow path. The LEDs inform you of system status for the serverboard it is connected to. See Chapter 3 for details on the LEDs and the control panel buttons. Details on JF1 can be found in Chapter 5.

6-3   System Fans

Each serverboard has its own set of three 4-cm high-performance fans (for a total of six in the chassis) to provide the cooling for the NovaScale R422-E1/R422-INF-E1. Fan speed may be controlled by a setting in BIOS (see Chapter 7).

System Fan Failure

If a fan fails, the remaining fans will ramp up to full speed and the overheat/fan fail LED on the control panel will blink on and off. Replace any failed fan at your earliest convenience with the same type and model (the system can continue to run with a failed fan). Remove the top chassis cover while the system is still running to determine which of the fans has failed. Then power down the system before replacing a fan. Removing the power cord is also recommended as a safety precaution.

6-4   Drive Bay Installation/Removal

Accessing the Drive Bays

SATA Drives: Because of their hotswap capability, you do not need to access the inside of the chassis or power down the system to install or replace SATA drives. Proceed to the next step for instructions. **Note:** The operating system you use must have RAID support to enable the hot-swap capability of the SATA drives.

> ⚠ *Use caution when working around the SATA backplane. Do not touch the backplane with any metal objects and make sure no cables touch the backplane. Also, regardless of how many SATA drives are installed, all four drive carriers must remain in the chassis to maintain proper airflow.*

SATA Drive Installation

The SATA drives are mounted in drive carriers to simplify their installation and removal from the chassis. These carriers also help promote proper airflow for the system. For this reason, even empty carriers without drives installed must remain in the chassis.

Mounting a SATA Drive in a Carrier

1.   Install the drive into the carrier with the printed circuit board side facing down so that the mounting holes align with those in the carrier.

2.   Secure the drive to the carrier with four screws, as shown in Figure 6-3.

Figure 6-3. Mounting a Drive in a Carrier
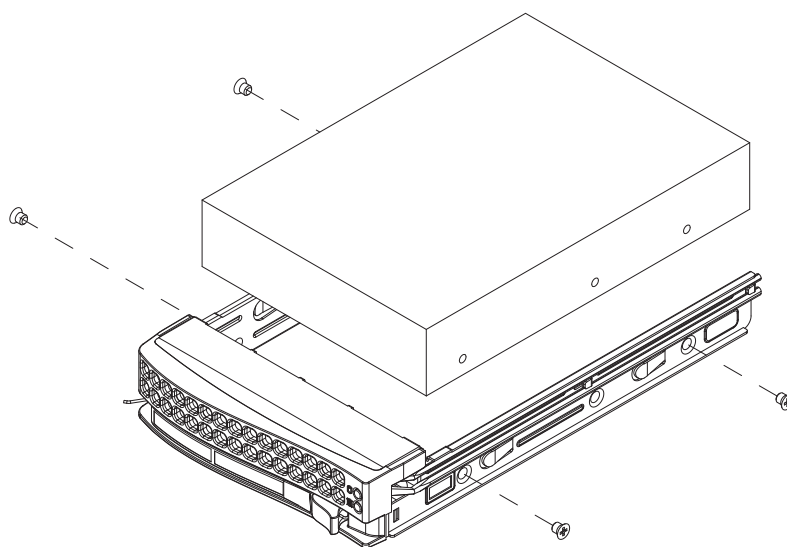
Installing/Removing Hot-swap SATA Drives

1. To remove a carrier, push the release button located beside the drive LEDs.

2. Swing the handle fully out and use it to pull the unit straight out (see Figure 6-4).

Figure 6-4. Removing a SATA Drive
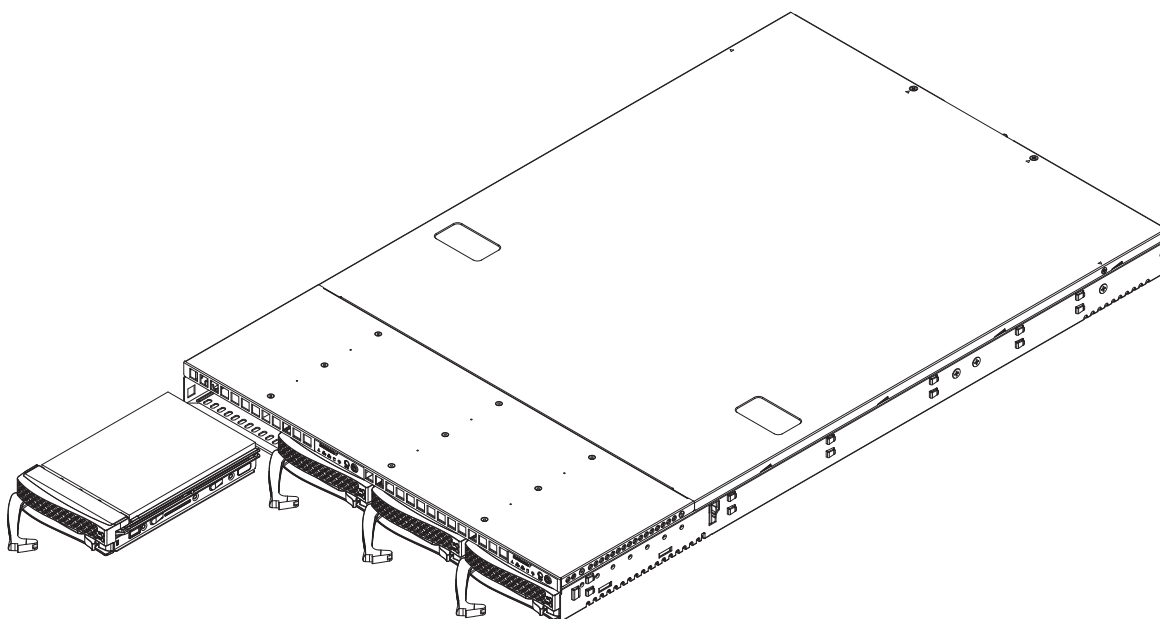
6-5   Power Supply

The NovaScale R422-E1/R422-INF-E1 has a single 980 watt power supply. This power supply has the capability of operating at 100 - 240 input volts. Depress <u>both</u> main power buttons on the front of the chassis and then unplug the AC power cord to completely remove power from the system before removing the power supply.

Power Supply Failure

If the power supply unit fails, the system will shut down and you will need to replace the power supply unit. Replacement units can be ordered directly from Bull S.A.S. (PWS-981-1S).

Replacing the Power Supply

Accessing the Inside of the System

1. Remove the top chassis cover by releasing the retention screws that secure the unit to the rack.

2. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").

3. The top cover of the chassis is secured with four screws: two at the top rear of the cover and one on each side lip, also near the back. Remove all four, then place both thumbs in the indentations and push the cover back until it slides off.

4. Lift the top cover from the chassis to gain full access to the inside of the server.

Removing the Power Supply

1. <u>First unplug the power cord from the system.</u>

2. To remove the failed power unit, remove the two screws on the back of the power supply, which secure it to the chassis.

3. Lift the unit straight out of the chassis. (See Figure 6-5.)

Installing a New Power Supply

1. Replace the failed unit with the exact same power supply model.

2. Carefully insert the new unit into position in the chassis and secure it with the two screws at the rear of the unit.

3. Before reconnecting the power cord, make sure the power switch on the power supply is in the off position.

4. Reconnect the power cord, replace the chassis top cover and push the unit back into the rack.

5. Finish by turning the power switch on the power supply on, and then depress the power buttons on the front of the chassis.

Figure 6-4. Removing the Power Supply
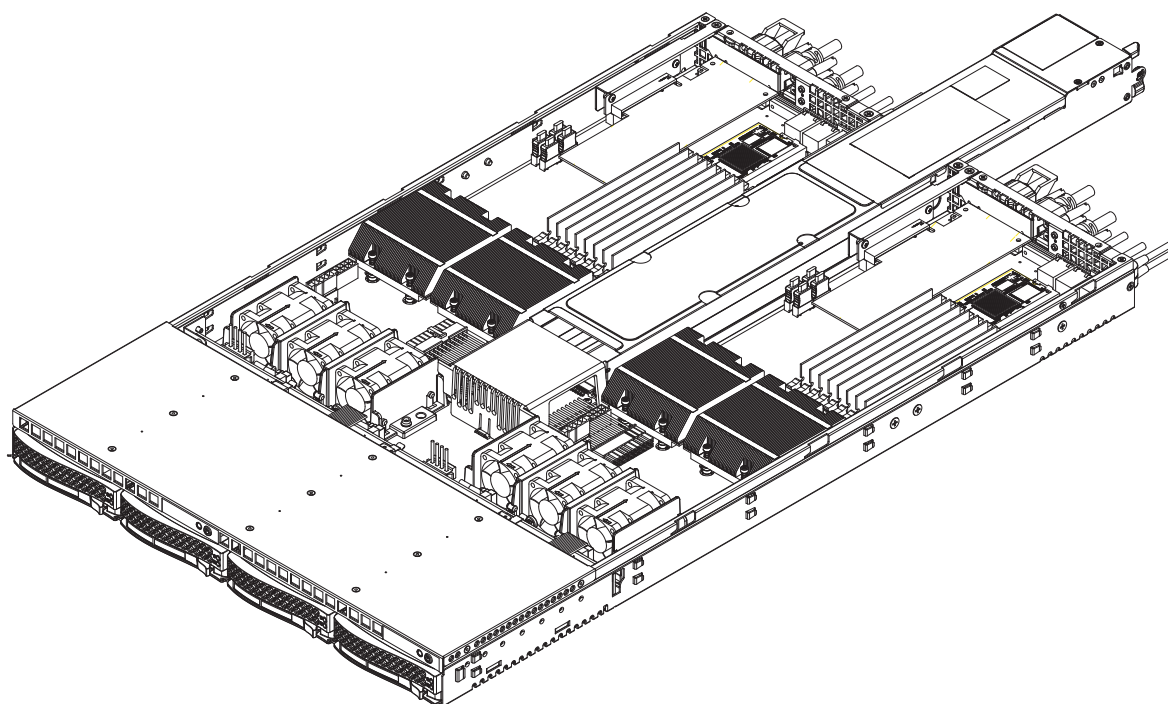
Chapter 7. BIOS

7-1   Introduction

This chapter describes the Phoenix BIOS™ Setup utility for the NovaScale R422-INF-E1. The Phoenix ROM BIOS is stored in a flash chip and can be easily upgraded using a floppy disk-based program.

Note: Due to periodic changes to the BIOS, some settings may have been added or deleted and might not yet be recorded in this manual. Please refer to the Manual Download area of the Bull S.A.S. web site <http://www.bull.com> for any changes to the BIOS that may not be reflected in this manual.

System BIOS

The BIOS is the Basic Input Output System used in all IBM® PC, XT™, AT®, and PS/2® compatible computers. The Phoenix BIOS stores the system parameters, types of disk drives, video displays, etc. in the CMOS. The CMOS memory requires very little electrical power. When the computer is turned off, a backup battery provides power to the CMOS Logic, enabling it to retain system parameters. When the computer is powered on, the computer is configured with the values stored in the CMOS Logic by the system BIOS, which gains control at boot up.

How To Change the Configuration Data

The CMOS information that determines the system parameters may be changed by entering the BIOS Setup utility. This Setup utility can be accessed by pressing the <Delete> key at the appropriate time during system boot.

Starting the Setup Utility

Normally, the only visible POST (Power On Self Test) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the BIOS Setup utility. From the main menu, you can access the other setup screens, such as the Security and Power menus. Beginning with Section 7-3, detailed descriptions are given for each parameter setting in the Setup utility.

> **Warning:** Do not shut down or reset the system while updating BIOS to prevent possible boot failure.

7-2 Running Setup

Default settings are in bold text unless otherwise Noted.

The BIOS setup options described in this section are selected by choosing the appropriate text from the main BIOS Setup screen. All displayed text is described in this section, although the screen display is often all you need to understand how to set the options as shown on the following page.

When you first power on the computer, the Phoenix BIOS™ is immediately activated.

While the BIOS is in control, the Setup program can be activated in one of two ways:

  1.   By pressing <Delete> immediately after turning the system on, or

  2.   When the message shown below appears briefly at the bottom of the screen during the POST (Power On Self-Test), press the <Delete> key to activate the main Setup menu:

Press the <Delete> key to enter Setup

7-3 Main BIOS Setup

All main Setup options are described in this section. The main BIOS Setup screen is displayed below.

Use the Up/Down arrow keys to move among the different settings in each menu. Use the Left/Right arrow keys to change the options for each setting.

Press the <Esc> key to exit the CMOS Setup Menu. The next section describes in detail how to navigate through the menus.

Items that use submenus are indicated with the ▶icon. With the item highlighted, press the <Enter> key to access the submenu.

Main BIOS Setup Menu

```
            PhoenixBIOS Setup - Copyright 1985-2004 Phoenix Technologies Ltd.
   Main    Advanced   Security   TPM State   Boot   Exit

                                                        Item Specific Help
      System Time:              [16:36:51]
      System Date:              [11-07-2007]
                                                     <Tab>, <Shift-Tab>, or
      BIOS Date                                      <Enter> selects field.

    ▶ SATA Port 1
    ▶ SATA Port 2
    ▶ SATA Port 3
    ▶ SATA Port 4


      Serial ATA:               [Enabled]
      SATA Controller Mode Option: [Enhanced]
      SATA RAID Enable          [Disabled]
      ICH Raid CodeBase         [Intel]
      SATA AHCI Enable          [Disabled]

      System Memory:            [XXXX KB]
      Extended Memory:          [XXXX KB]



   F1  Help  ↑↓ Select Item  -/+   Change Values    F9   Setup Defaults
   Esc Exit  ↔ Select Menu   Enter Select ▶ Sub-Menu  F10 Previous Values
```

Main Setup Features

System Time

To set the system date and time, key in the correct information in the appropriate fields. Then press the <Enter> key to save the data.

System Date

Using the arrow keys, highlight the month, day and year fields, and enter the correct data. Press the <Enter> key to save the data.

BIOS Date

This field displays the date when this version of BIOS was built.

▶SATA Port 1, SATA Port 2, SATA Port 3 and SATA Port 4

These settings allow the user to set the parameters of IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave, SATA Port 3 , SATA Port 4 slots. Hit <Enter> to activate the following sub-menu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the sub-menu are:

Type

This option allows the user to select the type of IDE hard drive. The option **Auto** will allow the BIOS to automatically configure the parameters of the HDD installed at the connection. Enter a number between 1 to 39 to select a predetermined HDD type. Select User to allow the user to enter the parameters of the HDD installed. Select CDROM if a CDROM drive is installed. Select ATAPI if a removable disk drive is installed.

Multi-Sector Transfers

This item allows the user to specify the number of sectors per block to be used in multi-sector transfer. The options are **Disabled**, 4 Sectors, 8 Sectors, and 16 Sectors.

LBA Mode Control

This item determines whether the Phoenix BIOS will access the IDE Channel 0 Master Device via the LBA mode. The options are Enabled and **Disabled.**

32 Bit I/O

This option allows the user to enable or disable the function of 32-bit data transfer. The options are Enabled and **Disabled**.

Transfer Mode

This option allows the user to set the transfer mode. The options are **Standard**, Fast PIO1, Fast PIO2, Fast PIO3, Fast PIO4, FPIO3/DMA1 and FPIO4/DMA2.

Ultra DMA Mode

This option allows the user to select Ultra DMA Mode. The options are **Disabled**, Mode 0, Mode 1, Mode 2, Mode 3, Mode 4, and Mode 5.

Serial ATA

This setting allows the user to enable or disable the function of Serial ATA. The options are Disabled and **Enabled.**

SATA Controller Mode Option

Select **Compatible** to allow the SATA and PATA drives to be automatically-detected and be placed in the Legacy Mode by the BIOS. Select Enhanced to allow the SATA and PATA drives to be to be automatically-detected and be placed in the Native IDE Mode. (**Note: The Enhanced mode is supported by the Windows 2000 OS or a later version.**)

When the SATA Controller Mode is set to "Enhanced", the following items will display:

Serial ATA (SATA) RAID Enable

Select Enable to enable Serial ATA RAID Functions. (For the Windows OS environment, use the RAID driver if this feature is set to Enabled. When this item is set to Enabled, the item: "ICH RAID Code Base" will be available for you to select either Intel or Adaptec Host RAID firmware to be activated. If SATA RAID is set to **Disabled**, the item-SATA AHCI Enable will be available.) The options are Enabled and **Disabled**.

ICH RAID Code Base

Select Intel to enable Intel's SATA RAID firmware. Select Adaptec to use Adaptec's HostRAID firmware. The options are **Intel** and Adaptec**.**

SATA AHCI Enable

Select Enable to enable the function of Serial ATA Advanced Host Interface. (Take caution when using this function. This feature is for advanced programmers only. The options are Enabled and **Disabled**.)

System Memory

This display informs you how much system memory is recognized as being present in the system.

Extended Memory

This display informs you how much extended memory is recognized as being present in the system.

7-4   Advanced Setup

Choose Advanced from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. The items with a triangle beside them have sub menus that can be accessed by highlighting the item and pressing <Enter>.

```
            PhoenixBIOS Setup - Copyright 1985-2004 Phoenix Technologies Ltd.
    Main   Advanced   Security   TPM State   Boot   Exit

                                                          Item Specific Help
      ▶ Boot Features
      ▶ Memory Cache
      ▶ PCI Configuration                               Select Boot features
      ▶ Advanced Chipset Control
      ▶ Advanced Processor Options
      ▶ I/O Device Configuration
      ▶ DMI Event Logging
      ▶ Console Redirection
      ▶ Hardware Monitor
      ▶ IPMI












    F1  Help   ↑↓ Select Item    -/+   Change Values    F9  Setup Defaults
    Esc Exit   ↔  Select Menu    Enter Select ▶ Sub-Menu  F10 Previous Values
```

▶Boot Features

Access the submenu to make changes to the following settings.

QuickBoot Mode

If enabled, this feature will speed up the POST (Power On Self Test) routine by skipping certain tests after the computer is turned on. The settings are **Enabled** and Disabled. If Disabled, the POST routine will run at normal speed.

QuietBoot Mode

This setting allows you to **Enable** or Disable the graphic logo screen during boot-up.

POST Errors

Set to **Enabled** to display POST Error Messages if an error occurs during bootup. If set to Disabled, the system will continue to boot without displaying any error message even when a boot error occurs.

ACPI Mode

Use the setting to determine if you want to employ ACPI (Advanced Configuration and Power Interface) power management on your system. The options are **Yes** and No.

Power Button Behavior

If set to **Instant-Off**, the system will power off immediately as soon as the user hits the power button. If set to 4-sec., the system will power off when the user presses the power button for 4 seconds or longer. The options are **instant-off** and 4-sec override.

Resume On Modem Ring

Select On to "wake your system up" when an incoming call is received by your modem. The options are On and **Off**.

EFI OS Boot

If enabled, this feature provides support for EFI OS booting. The options are Enabled and **Disabled**.

Keyboard On Now Function

This feature allows the user to determine how to use the keyboard to power on the system from S3~S5 States. Select Space to allow the user to power on the system by pressing the space bar. Select Password to allow the user to enter the password to power on the system. Select **Disabled** to disable this function.

Power Loss Control

This setting allows you to choose how the system will react when power returns after an unexpected loss of power. The options are Stay Off, Power On, and **Last State**.

Watch Dog

If enabled, this option will automatically reset the system if the system is not active for more than a predefined time period. The options are Enabled and **Disabled**.

Summary Screen

This setting allows you to **Enable** or Disable the summary screen which displays the system configuration during bootup.

▶**Memory Cache**

Cache System BIOS Area

This setting allows you to designate a reserve area in the system memory to be used as a System BIOS buffer to allow the BIOS to write (cache) data into this reserved memory area. Select **Write Protect** to enable the function and reserve this area for the Video BIOS ROM access only. Select Uncached to disable this function and make this area available for other devices.

Cache Video BIOS Area

This setting allows you to designate a reserve area in the system memory to be used as a Video BIOS buffer to allow the BIOS to write (cache) data into this reserved memory area. Select **Write Protect** to enable the function and reserve this area for the Video BIOS ROM access only. Select Uncached to disable this function and make this area available for other devices.

Cache Base 0-512K

If enabled, this feature will allow the data stored in the base memory area: block 0-512K to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or to be written into L1, L2 cache inside the CPU to speed up CPU operations. Select Uncached to disable this function. Select Write Through to allow data to be cached into the buffer and written into the system memory at the same time. Select Write Protect to prevent data from being written into the base memory area of Block 0-512K. Select Write Back to allow the CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

Cache Base 512K-640K

If enabled, this feature will allow the data stored in the memory area: 512K-640K to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or written into L1, L2 or L3 cache inside the CPU to speed up CPU operations. Select Uncached to disable this function. Select Write Through to allow data to be cached into the buffer and written into the system memory at the same time. Select Write Protect to prevent data from being written into the base memory area of Block 512-640K. Select Write Back to allow the CPU to write data back directly from the buffer without writing data to the system memory to speed up CPU's operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

Cache Extended Memory

If enabled, this feature will allow the data stored in the extended memory area to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or written into L1, L2, L3 cache inside the CPU to speed up CPU operations. Select Uncached to disable this function. Select Write Through to allow data to be cached into the buffer and written into the system memory at the same time. Select Write Protect to prevent data from being written into the extended memory area above 1 MB. Select Write Back to allow the CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

Discrete MTRR Allocation

If enabled, MTRRs (-Memory Type Range Registers) are configured as distinct, separate units and cannot be overlapped. If enabled, the user can achieve better graphic effects when using a Linux graphic driver that requires the write-combining configuration with 4GB or more memory. The options are Enabled and **Disabled**.

▶PCI Configuration

Access the submenu to make changes to the following settings for PCI devices.

Onboard GLAN1/Onboard GLAN2 (Gigabit- LAN) OPROM Configure

Select Enabled to allow the system to boot from the GLAN1 connection or the GLAN 2 connection. The options are **Enabled** and Disabled.

Onboard Storage OPROM Configure

Select Enabled to allow the system to boot from the IPMI 3rd-LAN connection. The options are Disabled and **Enabled**.

Default Primary Video Adapter

This feature allows the user to specify which video adapter to be used as the default primary video adapter--the onboard video adapter or others. The default setting is **Onboard**.

PCI Fast Delayed Transaction

Enable this function to improve the DMA data transfer rate for a PCI 32-bit multimedia card. The options are Enable and **Disabled**.

Reset Configuration Data

If set to Yes, this setting clears the Extended System Configuration Data- (ESCD) area. The options are Yes and **No**.

▶Slot1 PCI-Exp x16

Access the submenu for each of the settings above to make changes to the following:

Option ROM Scan

When enabled, this setting will initialize the device expansion ROM. The options are **Enabled** and Disabled.

Enable Master

This setting allows you to enable the selected device as the PCI bus master. The options are **Enabled** and Disabled.

Latency Timer

This setting allows you to set the clock rate for Bus Master. A high-priority, high-throughout device may benefit from a greater clock rate. The options are **Default**, 0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, and 00E0h. For Unix, Novell and other Operating Systems, please select the option: other. If a drive fails after the installation of a new software, you might want to change this setting and try again. A different OS requires a different Bus Master clock rate**.**

Large Disk Access Mode

This setting determines how large hard drives are to be accessed. The options are **DOS** or Other (for Unix, Novelle NetWare and other operating systems).

▶Advanced Chipset Control

Access the submenu to make changes to the following settings.

> **Warning**: Take caution when changing the Advanced settings. An Incorrect value, a very high DRAM frequency or an incorrect DRAM timing may cause system to become unstable. When this occurs, reset the setting to the default setting.

SERR Signal Condition

This setting specifies the ECC Error conditions that an SERR# is to be asserted. The options are None, **Single Bit**, Multiple Bit, and Both.

Clock Spectrum Feature

If Enabled, the BIOS will monitor the level of Electromagnetic Interference caused by the components and will attempt to decrease the interference whenever needed. The options are Enabled and **Disabled**.

▶Intel VT for Directed I/O <VT-d>

Select Enabled to bring up the following Intel VT for Directed I/O (VT-d) Configuration submenu. The options are Enabled and **Disabled**.

VT-d for Port 0 (ESI)/VT-d for Port 1/VT-d for Port 5/VT-d for Port 9/VT-d for DMI Port

Select Enabled to enable VT-d support for the port specified through DRHD Structures in the ACPI Tables. The options are Disabled and **Enabled**.

4GB PCI Hole Granularity

This feature allows you to select the granularity of PCI hole for PCI slots. If MTRRs are not enough, this option may be used to reduce MTRR occupation. The options are: **256 MB**, 512 MB, 1GB and 2GB.

Memory Branch Mode

This option determines how the two memory branches operate. System address space can either be interleaved between the two branches or Sequential from one branch to another. Mirror mode allows data correction by maintaining two copies of data in two branches. Single Channel 0 allows a single DIMM population during system manufacturing. The options are **Interleave**, Sequential, Mirroring, and Single Channel 0.

Branch 0 Rank Interleaving/Branch 1 Rank Interleaving

Select enable to enable Interleaved Memory for Memory Bus Branch 0 Rank or Branch 1 Rank. The options for Memory Interleaving are 1:1, 2:1 and **4:1**.

Branch 0 Rank Sparing/Branch 1 Rank Sparing

Select **Enable** to enable the function of memory sparing for Memory Bus Branch 0 or Branch 1. The options are Enabled and **Disabled**.

Enhanced x8 Detection

Select **Enabled** to enable Enhanced x8 DRAM UC Error Detection. The options are Disabled and **Enabled**.

Demand Scrub

Scrubbing is a process that allows the North Bridge to correct correctable memory errors found on an FBD memory module. When the CPU or I/O issues a demand-read command, and the read data from memory turns out to be a correctable ECC, it is corrected and sent to the original source. Memory is updated as well. Select Enabled to use Demand Scrubbing for ECC memory correction. The options are **Enabled** and Disabled.

High Temperature DRAM Operation

When set to Enabled, the BIOS will refer to the SPD table to set the maximum DRAM temperature. If disabled, the BIOS will set the maximum DRAM temperature based on a predefined value. The options are Enabled and **Disabled**.

AMB Thermal Sensor

Select Enabled to enable the thermal sensor embedded in the Advanced Memory Buffer on a fully buffered memory module for thermal monitoring. The options are **Disabled** and Enabled.

Thermal Throttle

Select Enabled to enable closed-loop thermal throttling on a fully buffered (FBD) memory module. In the closed-loop thermal environment, thermal throttling will be activated when the temperature of the FBD DIMM module exceeds a predefined threshold. The options are Enabled and **Disabled.**

Global Activation Throttle

Select Enabled to enable the function of open-loop global thermal throttling on the fully buffered (FBD) memory modules and allow global thermal throttling to become active when the number of activate control exceeds a predefined number. The options are Enabled and **Disabled**.

Force ITK Configuration Clocking

Select Enabled to configure FBD clock settings to support ITK testing. The options are **Disabled** and Enabled.

Reserved Branch for ITK Test

This feature allows the user to specify the memory branch number to be reserved for ITK testing. The default setting is **Branch 1**.

Snoop Filter

Select Enabled to eliminate snoop traffic to the graphics port to greatly improve system performance when running graphics intensive applications. The options are **Enabled** and Disabled.

Crystal Beach Features

Select **Enabled** to use the Intel I/O AT (Acceleration Technology) to accelerate the performance of TOE devices. (**Note**: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card. For this motherboard, the TOE device is built inside the ESB 2 South Bridge chip.) The options are **Enabled** and Disabled.

Route Port 80h Cycles to

This feature allows the user to decide which bus to send debug information to. The options are Disabled, PCI and **LPC**.

High Precision Event Time

Select Yes to activate the High Precision Event Timer (HPET), which is capable of producing periodic interrupts at a much higher frequency than a Real-time Clock (RTC) can in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in a CPU. The High Precision Event Timer is used to replace the 8254 Programmable Interval Timer. The options for this feature are Yes and **No**.

USB Function

Select Enabled to enable the function of USB devices specified. The settings are **Enabled** and Disabled.

Legacy USB Support

This setting allows you to enable support for Legacy USB devices. The settings are **Enabled** and Disabled.

▶Advanced Processor Options

Access the submenu to make changes to the following settings.

CPU Speed

This is a display that indicates the speed of the installed processor.

Frequency Ratio (Available when supported by the CPU)

The feature allows the user to set the internal frequency multiplier for the CPU. The options are: **Default,** x12, x13, x14, x15, x16, x17 and x18.

Core-Multi-Processing

Set to Enabled to use a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are Disabled and **Enabled.**

Machine Checking (Available when supported by the CPU)

Set to Enabled to activate the function of Machine Checking and allow the CPU to detect and report hardware (machine) errors via a set of model-specific registers (MSRs). The options are Disabled and **Enabled**.

Fast String Operations (Available when supported by the CPU)

Set to **Enabled** to enable the fast string operations for special CPU instructions. The options are Disabled and **Enabled**.

Thermal Management 2 (Available when supported by the CPU)

Set to **Enabled** to use Thermal Management 2 (TM2) which will lower CPU voltage and frequency when the CPU temperature reaches a predefined overheat threshold. Set to Disabled to use Thermal Manager 1 (TM1), allowing CPU clocking to be regulated via CPU Internal Clock modulation when the CPU temperature reaches the overheat threshold.

C1/C2 Enhanced Mode (Available when supported by the CPU)

Set to Enabled to enable Enhanced Halt State to lower CPU voltage/frequency to prevent overheat. The options are Enabled and **Disabled**. (**Note:** please refer to Intel's web site for detailed information.)

Execute Disable Bit (Available if supported by the CPU and the OS)

Set to Enabled to enable Execute Disable Bit and allow the processor to classify areas in memory where an application code can execute and where it cannot, and thus preventing a worm or a virus from inserting and creating a flood of codes to overwhelm the processor or damage the system during an attack. **Note**: this feature is available when your OS and your CPU support the function of Execute Disable Bit. The options are **Disabled** and Enabled. For more information, please refer to Intel's and Microsoft's web sites.

Adjacent Cache Line Prefetch (Available if supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The CPU fetches both cache lines for 128 bytes as comprised if Enabled. The options are Disabled and **Enabled**.

Hardware Prefetch (Available if supported by the CPU)

Set to this option to **Enabled** to enable the hardware components that are used in conjunction with software programs to prefetch data in order to speed up data processing. The options are Disabled and **Enabled**.

Set Maximum Ext. CPUID=3

When set to Enabled, the Maximum Extended CPUID will be set to 3. The options are **Disabled** and Enabled.

Direct Cache Access (Available if supported by the CPU)

Set to Enable to route inbound network IO traffic directly into processor caches to reduce memory latency and improve network performance. The options are **Disabled** and Enabled.

DCA Delay Clocks (Available when supported by the CPU)

This feature allows the user to set the clock delay setting from snoop to prefetch for Direct Cache Access. Select a setting from 8 (bus cycles) to 120 (bus cycles) (in 8-cycle increment). The default setting is **32 (bus cycles)**.

Intel <R> Virtualization Technology (Available when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are Enabled and **Disabled**. (Note: If there is any change to this setting, you will need to power off and restart the system for the change to take effect.) Please refer to Intel's web site for detailed information.

Intel EIST Support (Available when supported by the CPU)

Select Enabled to use the Enhanced Intel SpeedStep Technology and allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. The options are Enabled and **Disabled**. **Please refer to Intel's web site for detailed information.**

▶I/O Device Configuration

Access the submenu to make changes to the following settings.

KBC Clock Input

This setting allows you to select clock frequency for KBC. The options are 6MHz, 8MHz, **12MHz,** and 16MHz.

Serial Port A

This setting allows you to assign control of serial port A. The options are **Enabled** (user defined), Disabled, and Auto (BIOS- or OS- controlled).

Base I/O Address

This setting allows you to select the base I/O address for serial port A. The options are **3F8**, 2F8, 3E8, and 2E8.

Interrupt

This setting allows you to select the IRQ (interrupt request) for serial port A. The options are IRQ3 and **IRQ4**.

Serial Port B

This setting allows you to assign control of serial port B. The options are Enabled (user defined), **Disabled,** Auto (BIOS- and OS- Controlled).

Mode

This setting allows you to set the type of device that will be connected to serial port B. The options are **Normal** and IR (for an infrared device).

Base I/O Address

This setting allows you to select the base I/O address for serial port B. The options are 3F8, **2F8**, 3E8 and 2E8.

Interrupt

This setting allows you to select the IRQ (interrupt request) for serial port B. The options are **IRQ3** and IRQ4.

▶DMI Event Logging

Access the submenu to make changes to the following settings.

Event Log Validity

This is a display to inform you of the event log validity. It is not a setting.

Event Log Capacity

This is a display to inform you of the event log capacity. It is not a setting.

View DMI Event Log

Highlight this item and press <Enter> to view the contents of the event log.

Event Logging

This setting allows you to **Enable** or Disable event logging.

ECC Event Logging

This setting allows you to **Enable** or Disable ECC event logging.

Mark DMI Events as Read

Highlight this item and press <Enter> to mark the DMI events as read.

Clear All DMI Event Logs

Select Yes and press <Enter> to clear all DMI event logs. The options are Yes and **No**.

▶Console Redirection

Access the submenu to make changes to the following settings.

COM Port Address

This item allows you to specify which COM port to direct the remote console to: Onboard COM A or Onboard COM B. This setting can also be **Disabled**.

BAUD Rate

This item allows you to set the BAUD rate for console redirection. The options are 300, 1200, 2400, 9600, **19.2K**, 38.4K, 57.6K, and 115.2K.

Console Type

This item allows you to set console redirection type. The options are VT100, VT100,8bit, PC-ANSI, 7bit, **PC ANSI**, VT100+, VT-UTF8 and ASCII.

Flow Control

This item allows you to select the flow control option for the console. The options are: None, XON/XOFF, and **CTS/RTS**.

Console Connection

This item allows you to decide how console redirection is to be connected: either **Direct** or Via Modem.

Continue CR after POST

Select on to continue with console redirection after the POST routine. The options are On and **Off**.

▶Hardware Monitor Logic

CPU Temperature Threshold

This feature displays a predefined CPU overheating temperature threshold that will activate the alarm when the CPU temperature reaches this overheating threshold. The options are 70°C, **75°C**, 80°C and 85°C.

Highlight this and hit <Enter> to see monitor data for the following items:

CPU1 Temperature/CPU1 Second Core

CPU2 Temperature/CPU2 Second Core

System Temperature

Fan1-Fan8 Speeds: If the feature of Auto Fan Control is enabled, the BIOS will automatically display the status of the fans indicated in this item.

Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. Select Server if your system is used as a Server. Select 3-pin if your chassis uses 3-pin fans. Select 4-pin if your chassis uses 4-pin fans. Select "Disable" to disable the fan speed control function and allow the onboard fans to constantly run at the full speed (12V). The Options are: **1. Disable**, 2. Optimized Server w/3-pin, 3. Optimized Workstation w/3-pin, 4. Optimized Server w/4-pin, 5. Optimized Workstation w/4-pin, 6. 4-pin Quite Mode, and 7. 4-pin Super Quite Mode.

Voltage Monitoring

The following items will be monitored and displayed:

VcoreA/VcoreB

+12V/-12V

+5Vsb/+5VDD

+3.3V

P1V5/P_VTT/Vbat

Note: In the Windows OS environment, the Supero Doctor III settings take precedence over the BIOS settings. When first installed, Supero Doctor III adopts the temperature threshold settings previously set in the BIOS. Any subsequent changes to these thresholds must be made within Supero Doctor, since the SD III settings override the BIOS settings. For the Windows OS to adopt the BIOS temperature threshold settings, please change the SDIII settings to be the same as those set in the BIOS.

▶**IPMI (The option is available only when an IPMI card is installed in the system.)**

```
                        PhoenixBIOS Setup Utility
          Advanced

                       IPMI                          Item Specific Help

   IPMI Specification Version    2.0              Enable/Disable IPMI
   Firmware Version              2.1              event logging. Disabling
                                                 will still log events
   System Event Logging          [Enabled]       received via the system
   Clear System Event Log        [Disabled]      interface.
   Existing Event Log number     282
   Event Log Control
     SYS Firmware Progress       [Disabled]
     BIOS POST Errors            [Enabled]

   BIOS POST Watchdog            [Disabled]
   OS boot Watchdog              [Disabled]
     Timer for loading OS (min)  [ 10]
     Time out action             [No Action]
```

IPMI Specification Version: This item displays the current IPMI Version.

Firmware Version: This item displays the current Firmware Version.

System Event Logging

Select Enabled to enable IPMI Event Logging. When this function is set to Disabled, the system will continue to log events received via system interface. The options are **Enabled** and Disabled.

Clear System Event Logging

Enabling this function to force the BIOS to clear the system event logs during the next cold boot. The options are Enabled and **Disabled**.

Existing Event Log Number

This item displays the number of the existing event log.

Event Log Control

System Firmware Progress

Enabling this function to log POST progress. The options are Enabled and **Disabled**.

BIOS POST Errors

Enabling this function to log POST errors. The options are Enabled and **Disabled**.

BIOS POST Watch Dog

Set to Enabled to enable POST Watch Dog. The options are Enabled and **Disabled**.

OS Boot Watch Dog

Set to Enabled to enable OS Boot Watch Dog. The options are Enabled and **Disabled**.

Timer for Loading OS (Minutes)

This feature allows the user to set the time value (in minutes) for the previous item: OS Boot Watch Dog by keying-in a desired number in the blank. The default setting is 10 (minutes.) (Please ignore this option when OS Boot Watch Dog is set to "Disabled".)

Time Out Option

This feature allows the user to determine what action to take in an event of a system boot failure. The options are **No Action**, Reset, Power Off and Power Cycles.

▶**System Event Log/System Event Log (List Mode)**

These options display the System Event (SEL) Log and System Event (SEL) Log in List Mode. Items include: SEL (System Event Log) Entry Number, SEL Record ID, SEL Record Type, Time Stamp, Generator ID, SEL Message Revision, Sensor Type, Sensor Number, SEL Event Type, Event Description, and SEL Event Data.
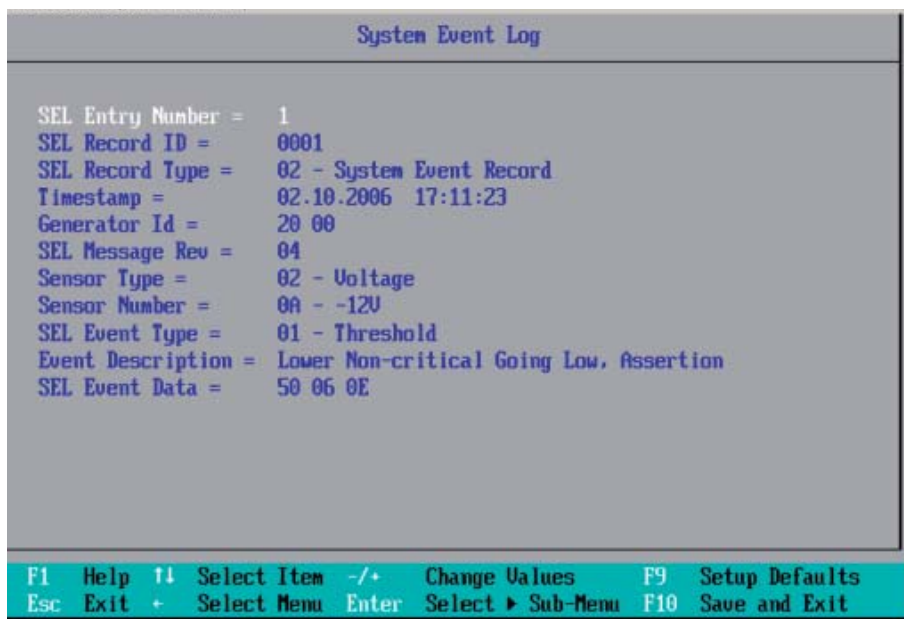
▶**Realtime Sensor Data**

This feature display information from motherboard sensors, such as temperatures, fan speeds and voltages of various components.

```
                        Realtime Sensor Data


   Sensor     Sensor         Sensor     Sensor        Lower    Upper
   Type       Name           Data       Units         Limit    Limit
   --------------------------------------------------------------------
   Temp
              CPU1 CoreA      48.00      degrees C     0.00     75.00
              CPU1 CoreB      54.00      degrees C     0.00     75.00
              CPU2 CoreA      47.00      degrees C     0.00     75.00
              CPU2 CoreB      46.00      degrees C     0.00     75.00
              System          44.00      degrees C     0.00     75.00
   Voltage
              CPU1 Core       1.13       Volts         0.97     1.47
              CPU2 Core       1.16       Volts         0.97     1.47
              3.3V            3.30       Volts         2.95     3.62




   F1   Help  ↑↓  Select Item  -/+   Change Values    F9    Setup Defaults
   Esc  Exit  ←   Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

7-5   Security

Choose Security from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. Security setting options are displayed by highlighting the setting using the arrow keys and pressing <Enter>. All Security BIOS settings are described in this section.

```
        PhoenixBIOS Setup - Copyright 1985-2004 Phoenix Technologies Ltd.
  Main    Advanced    Security    TPM State    Boot    Exit

                                                    Item Specific Help
     Supervisor Password Is:
     User Password Is:

     Set Supervisor Password
     Set User Password

     Password on boot:              [Disabled]














 F1   Help   ↑↓ Select Item   -/+    Change Values     F9   Setup Defaults
 Esc  Exit   ↔ Select Menu    Enter Select ▶ Sub-Menu  F10  Previous Values
```
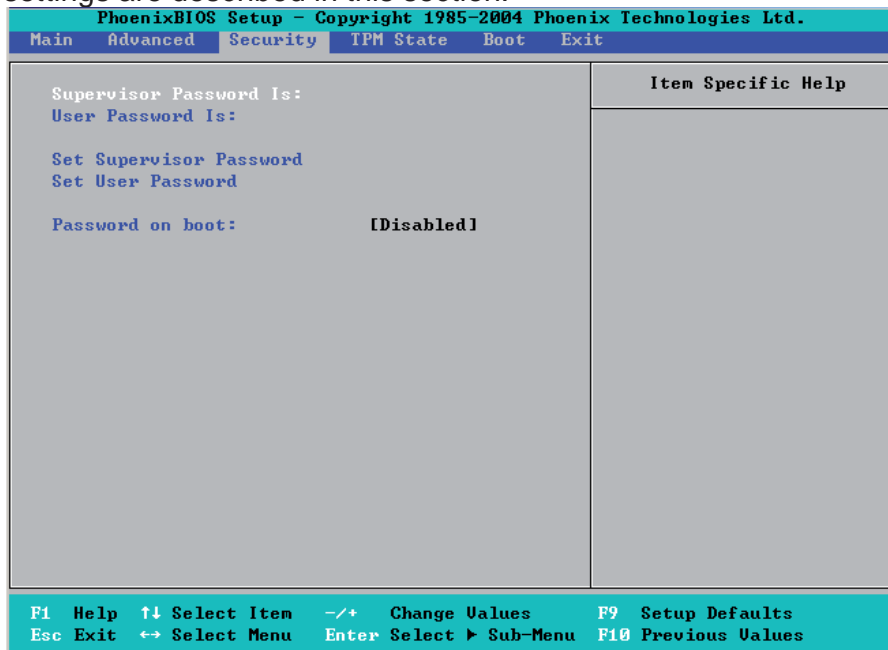
Supervisor Password Is:

This feature indicates if a supervisor password has been entered to the system. Clear means such a password has not been used, and Set means a supervisor password has been entered.

User Password Is:

This feature indicates if a user password has been entered to the system. Clear means such a password has not been used, and Set means a user password has been entered.

Set Supervisor Password

When the item Set "Supervisor Password" is highlighted, hit the <Enter> key. When prompted, type the Supervisor's password in the dialogue box to set or to change supervisor's password, which allows access to the BIOS.

Set User Password

When the item "Set User Password" is highlighted, hit the <Enter> key. When prompted, type the user's password in the dialogue box to set or to change the user's password, which allows access to the system at boot-up.

Password on Boot

If set to Enabled, the user will need to enter a password to enter the system at bootup. The options are **Enabled** and Disabled (password not required).

7-6 Boot

Choose Boot from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. See details on how to change the order and specs of boot devices in the Item Specific Help window. All Boot BIOS settings are described in this section.

Boot List

Candidate List

```
Item Specific Help

1:  USB FDC:
2:  Legacy Floppy Drives
3:  USB KEY:                        Keys used to view or
4:  IDE CD:                         configure devices:
5:  IDE 0:                          Up and Down arrows
6:  IDE 2:                          select a device.
7:  PCI SCSI:                       <+> and <-> moves
8:  PCI BEV:                        the device up or down.
 :  IDE 1:                          <f> and <r> specifies
 :  IDE 3:                          the device fixed or
 :  IDE 4:                          removable.
 :  IDE 5:                          <x> exclude or include
 :  USB HDD:                        the device to boot.
 :  USB CDROM:AMI Virtual CDROM-(USB 1.   <Shift + 1> enables or
 :  USB ZIP:                        disables a device.
 :  USB LS120:                      <1 - 4> Loads default
 :  Other USB:                      boot sequence.

F1   Help   ↑↓  Select Item   -/+   Change Values     F9   Setup Defaults
Esc  Exit   ←   Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

Boot Priority Order/Excluded from Boot Orders

The devices included in the boot list section (above) are bootable devices listed in the sequence of boot order as specified. The boot functions for the devices included in the candidate list (above) are currently disabled. Use a <+> key or a <-> key to move the device up or down. Use the <f> key or the <r> key to specify the type of an USB device, either fixed or removable. You can select one item from the boot list and hit the <x> key to remove it from the list of bootable devices (to make its resource available for other bootable devices). Subsequently, you can select an item from the candidate list and hit the <x> key to remove it from the candidate list and put it in the boot list. This item will then become a bootable device. See details on how to change the priority of boot order of devices in the "Item Specific Help" window.

7-7   Exit

Choose Exit from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. All Exit BIOS settings are described in this section.

```
         PhoenixBIOS Setup - Copyright 1985-2004 Phoenix Technologies Ltd.
  Main   Advanced   Security   TPM State   Boot   Exit

                                                    Item Specific Help
     Exit Saving Changes
     Exit Discarding Changes
                                              Exit System Setup and
     Load Setup Defaults                      save your changes to
     Discard Changes                          CMOS.
     Save Changes












  F1   Help   ↑↓ Select Item   -/+    Change Values    F9   Setup Defaults
  Esc  Exit   ↔  Select Menu   Enter Select ▶ Sub-Menu  F10  Previous Values
```
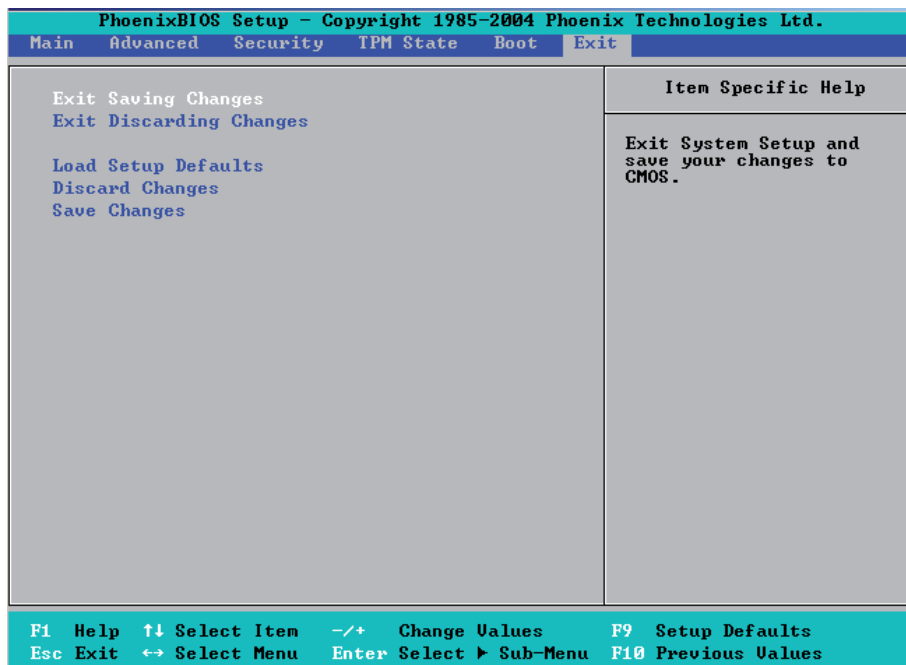
Exit Saving Changes

Highlight this item and hit <Enter> to save any changes you made and to exit the BIOS Setup utility.

Exit Discarding Changes

Highlight this item and hit <Enter> to exit the BIOS Setup utility without saving any changes you may have made.

Load Setup Defaults

Highlight this item and hit <Enter> to load the default settings for all items in the BIOS Setup. These are the safest settings to use.

Discard Changes

Highlight this item and hit <Enter> to discard (cancel) any changes you've made. You will remain in the Setup utility.

Save Changes

Highlight this item and hit <Enter> to save any changes you made. You will remain in the Setup utility.

Appendix A. BIOS POST Messages

During the Power-On Self-Test (POST), the BIOS will check for problems. If a problem is found, the BIOS will activate an alarm or display a message. The following is a list of such BIOS messages.

Failure Fixed Disk
Fixed disk is not working or not configured properly. Check to see if fixed disk is attached properly. Run Setup. Find out if the fixed-disk type is correctly identified.

Stuck key
Stuck key on keyboard.

Keyboard error
Keyboard not working.

Keyboard Controller Failed
Keyboard controller failed test. May require replacing keyboard controller.

Keyboard locked - Unlock key switch
Unlock the system to proceed.

Monitor type does not match CMOS - Run SETUP
Monitor type not correctly identified in Setup

Shadow Ram Failed at offset: nnnn
Shadow RAM failed at offset **nnnn** of the 64k block at which the error was detected.

System RAM Failed at offset: nnnn
System RAM failed at offset **nnnn** of in the 64k block at which the error was detected.

Extended RAM Failed at offset: nnnn Extended memory not working or not configured properly at offset **nnnn.**

System battery is dead - Replace and run SETUP
The CMOS clock battery indicator shows the battery is dead. Replace the battery and run Setup to reconfigure the system.

System CMOS checksum bad - Default configuration used

System CMOS has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. The BIOS installed Default Setup Values. If you do not want these values, enter Setup and enter your own values. If the error persists, check the system battery or contact your dealer.

System timer error

The timer test failed. Requires repair of system board.

Real time clock error

Real-Time Clock fails BIOS hardware test. May require board repair.

Check date and time settings

BIOS found date or time out of range and reset the Real-Time Clock. May require setting legal date (1991-2099).

Previous boot incomplete - Default configuration used

Previous POST did not complete successfully. POST loads default values and offers to run Setup. If the failure was caused by incorrect values and they are not corrected, the next boot will likely fail. On systems with control of **wait states**, improper Setup settings can also terminate POST and cause this error on the next boot. Run Setup and verify that the waitstate configuration is correct. This error is cleared the next time the system is booted.

Memory Size found by POST differed from CMOS

Memory size found by POST differed from CMOS.

Diskette drive A error
Diskette drive B error

Drive A: or B: is present but fails the BIOS POST diskette tests. Check to see that the drive is defined with the proper diskette type in Setup and that the diskette drive is attached correctly.

Incorrect Drive A type - run SETUP

Type of floppy drive A: not correctly identified in Setup.

Incorrect Drive B type - run SETUP

Type of floppy drive B: not correctly identified in Setup.

System cache error - Cache disabled

RAM cache failed and BIOS disabled the cache. On older boards, check the cache jumpers. You may have to replace the cache. See your dealer. A disabled cache

slows system performance considerably.

CPU ID:
CPU socket number for Multi-Processor error.

EISA CMOS not writeable
ServerBIOS2 test error: Cannot write to EISA CMOS.

DMA Test Failed
ServerBIOS2 test error: Cannot write to extended **DMA** (Direct Memory Access) registers.

Software NMI Failed
ServerBIOS2 test error: Cannot generate software NMI (Non-Maskable Interrupt).

Fail-Safe Timer NMI Failed
ServerBIOS2 test error: Fail-Safe Timer takes too long.

device Address Conflict
Address conflict for specified **device.**

Allocation Error for: device
Run ISA or EISA Configuration Utility to resolve resource conflict for the specified **device**.

CD ROM Drive
CD ROM Drive identified.

Entering SETUP ...
Starting Setup program

Failing Bits: nnnn
The hex number **nnnn** is a map of the bits at the RAM address which failed the memory test. Each 1 (one) in the map indicates a failed bit. See errors 230, 231, or 232 above for offset address of the failure in System, Extended, or Shadow memory.

Fixed Disk n
Fixed disk **n** (0-3) identified.

Invalid System Configuration Data
Problem with NVRAM (CMOS) data.

I/O device IRQ conflict

I/O device IRQ conflict error.

PS/2 Mouse Boot Summary Screen:

PS/2 Mouse installed.

nnnn kB Extended RAM Passed

Where **nnnn** is the amount of RAM in kilobytes successfully tested.

nnnn Cache SRAM Passed

Where **nnnn** is the amount of system cache in kilobytes successfully tested.

nnnn kB Shadow RAM Passed

Where **nnnn** is the amount of shadow RAM in kilobytes successfully tested.

nnnn kB System RAM Passed

Where **nnnn** is the amount of system RAM in kilobytes successfully tested.

One or more I2O Block Storage Devices were excluded from the Setup Boot Menu

There was not enough room in the IPL table to display all installed I2O block-storage devices.

Operating system not found

Operating system cannot be located on either drive A: or drive C:. Enter Setup and see if fixed disk and drive A: are properly identified.

Parity Check 1 nnnn

Parity error found in the system bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays **????.** Parity is a method for checking errors in binary data. A parity error indicates that some data has been corrupted.

Parity Check 2 nnnn

Parity error found in the I/O bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays **????.**

Press <F1> to resume, <F2> to Setup, <F3> for previous

Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change the settings. Press <F3> to display the previous screen (usually an initialization error of an **Option ROM**, i.e., an add-on card). Write down and follow the information shown on the screen.

Press <F2> to enter Setup

Optional message displayed during POST. Can be turned off in Setup.

PS/2 Mouse:

PS/2 mouse identified.

Run the I2O Configuration Utility

One or more unclaimed block storage devices have the Configuration Request bit set in the LCT. Run an I2O Configuration Utility (e.g. the SAC utility).

System BIOS shadowed

System BIOS copied to shadow RAM.

UMB upper limit segment address: *nnnn*

Displays the address *nnnn* of the upper limit of **Upper Memory Blocks**, indicating released segments of the BIOS which can be reclaimed by a virtual memory manager.

Video BIOS shadowed

Video BIOS successfully copied to shadow RAM.

Notes

A-6

Appendix B. BIOS POST Codes

This section lists the POST (Power On Self Test) codes for the PhoenixBIOS. POST codes are divided into two categories: recoverable and terminal.

Recoverable POST Errors

When a recoverable type of error occurs, BIOS will display an POST code that describes the problem. BIOS may also issue one of the following beep codes:

1 long and two short beeps - video configuration error

1 repetitive long beep - no memory detected

Terminal POST Errors

If a terminal type of error occurs, BIOS will shut down the system but before doing so, will write the error to port 80h, attempt to initialize video and write the error in the top left corner of the screen. The following is a list of codes that may be written to port 80h.

POST Code	Description
01h	IPMI Initialization
02h	Verify Real Mode
03h	Disable Non-Maskable Interrupt (NMI)
04h	Get CPU type
06h	Initialize system hardware
07h	Disable shadow and execute code from the ROM.
08h	Initialize chipset with initial POST values
09h	Set IN POST flag
0Ah	Initialize CPU registers
0Bh	Enable CPU cache
0Ch	Initialize caches to initial POST values
0Eh	Initialize I/O component
0Fh	Initialize the local bus IDE
10h	Initialize Power Management
11h	Load alternate registers with initial POST values
12h	Restore CPU control word during warm boot
13h	Reset PCI Bus Mastering devices
14h	Initialize keyboard controller
16h	1-2-2-3 BIOS ROM checksum

POST Code	Description
17h	Initialize cache before memory Auto size
18h	8254 timer initialization
1Ah	8237 DMA controller initialization
1Ch	Reset Programmable Interrupt Controller
20h	1-3-1-1 Test DRAM refresh
22h	1-3-1-3 Test 8742 Keyboard Controller
24h	Set ES segment register to 4 GB
28h	Auto size DRAM
29h	Initialize POST Memory Manager
2Ah	Clear 512 kB base RAM
2Ch	1-3-4-1 RAM failure on address line *xxxx**
2Eh	1-3-4-3 RAM failure on data bits *xxxx** of low byte of memory bus
2Fh	Enable cache before system BIOS shadow
32h	Test CPU bus-clock frequency
33h	Initialize Phoenix Dispatch Manager
36h	Warm start shut down
38h	Shadow system BIOS ROM
3Ah	Auto size cache
3Ch	Advanced configuration of chipset registers
3Dh	Load alternate registers with CMOS values
41h	Initialize extended memory for RomPilot (optional)
42h	Initialize interrupt vectors
45h	POST device initialization
46h	2-1-2-3 Check ROM copyright notice
48h	Check video configuration against CMOS
49h	Initialize PCI bus and devices
4Ah	Initialize all video adapters in system
4Bh	QuietBoot start (optional)
4Ch	Shadow video BIOS ROM
4Eh	Display BIOS copyright notice
4Fh	Initialize MultiBoot
50h	Display CPU type and speed
51h	Initialize EISA board (optional)
52h	Test keyboard
54h	Set key click if enabled
55h	Enable USB devices
58h	2-2-3-1 Test for unexpected interrupts
59h	Initialize POST display service
5Ah	Display prompt "Press <ESC> to enter SETUP"
5Bh	Disable CPU cache

POST Code **Description**

POST Code	Description
5Ch	Test RAM between 512 and 640 kB
60h	Test extended memory
62h	Test extended memory address lines
64h	Jump to UserPatch1
66h	Configure advanced cache registers
67h	Initialize Multi Processor APIC
68h	Enable external and CPU caches
69h	Setup System Management Mode (SMM) area
6Ah	Display external L2 cache size
6Bh	Load custom defaults (optional)
6Ch	Display shadow-area message
70h	Display error messages
72h	Check for configuration errors
76h	Check for keyboard errors
7Ch	Set up hardware interrupt vectors
7Dh	Initialize Intelligent System Monitoring (optional)
7Eh	Initialize coprocessor if present
80h	Disable onboard Super I/O ports and IRQs (optional)
81h	Late POST device initialization
82h	Detect and install external RS232 ports
83h	Configure non-MCD IDE controllers
84h	Detect and install external parallel ports
85h	Initialize PC-compatible PnP ISA devices
86h	Re-initialize onboard I/O ports.
87h	Configure Motherboard Configurable Devices (optional)
88h	Initialize BIOS Data Area
89h	Enable Non-Maskable Interrupts (NMIs)
8Ah	Initialize Extended BIOS Data Area
8Bh	Test and initialize PS/2 mouse
8Ch	Initialize floppy controller
8Fh	Determine number of ATA drives (optional)
90h	Initialize hard-disk controllers
91h	Initialize local-bus hard-disk controllers
92h	Jump to UserPatch2
93h	Build MPTABLE for multi-processor boards
95h	Install CD ROM for boot
96h	Clear huge ES segment register
97h	Fix up Multi Processor table
98h	1-2 Search for option ROMs and shadow if successful. One long, two short beeps on checksum failure

POST Code	Description
99h	Check for SMART Drive (optional)
9Ch	Set up Power Management
9Dh	Initialize security engine (optional)
9Eh	Enable hardware interrupts
9Fh	Determine number of ATA and SCSI drives
A0h	Set time of day
A2h	Check key lock
A4h	Initialize typematic rate
A8h	Erase <ESC> prompt
AAh	Scan for <ESC> key stroke
ACh	Enter SETUP
AEh	Clear Boot flag
B0h	Check for errors
B1h	Inform RomPilot about the end of POST (optional)
B2h	POST done - prepare to boot operating system
B4h	1 One short beep before boot
B5h	Terminate QuietBoot (optional)
B6h	Check password (optional)
B7h	Initialize ACPI BIOS and PPM Structures
B9h	Prepare Boot
BAh	Initialize SMBIOS
BCh	Clear parity checkers
BDh	Display MultiBoot menu
BEh	Clear screen (optional)
BFh	Check virus and backup reminders
C0h	Try to boot with INT 19
C1h	Initialize POST Error Manager (PEM)
C2h	Initialize error logging
C3h	Initialize error display function
C4h	Initialize system error flags
C6h	Console redirection init.
C7h	Unhook INT 10h if console redirection enabled
C8h	Force check (optional)
C9h	Extended ROM checksum (optional)
CDh	Reclaim console redirection vector
D2h	Unknown interrupt
D4h	Check Intel Branding string
D8h	Alert Standard Format initialization
D9h	Late init for IPMI
DEh	Log error if micro-code not updated properly

The following are for the boot block in Flash ROM

POST Code	Description
E0h	Initialize the chipset
E1h	Initialize the bridge
E2h	Initialize the CPU
E3h	Initialize system timer
E4h	Initialize system I/O
E5h	Check force recovery boot
E6h	Checksum BIOS ROM
E7h	Go to BIOS
E8h	Set Huge Segment
E9h	Initialize Multi Processor
EAh	Initialize OEM special code
EBh	Initialize PIC and DMA
ECh	Initialize Memory type
EDh	Initialize Memory size
EEh	Shadow Boot Block
EFh	System memory test
F0h	Initialize interrupt vectors
F1h	Initialize Run Time Clock
F2h	Initialize video
F3h	Initialize System Management Manager
F4h	Output one beep
F5h	Clear Huge Segment
F6h	Boot to Mini DOS
F7h	Boot to Full DOS

If the BIOS detects errors on 2C, 2E, or 30 (base 512K RAM error), it displays an additional word-bitmap (*xxxx*) indicating the address line or bits that have failed. For example, "2C 0002" means address line 1 (bit one set) has failed. "2E 1020" means data bits 12 and 5 (bits 12 and 5 set) have failed in the lower 16 bits. The BIOS also sends the bitmap to the port-80 LED display. It first displays the checkpoint code, followed by a delay, the high-order byte, another delay, and then the loworder byte of the error. It repeats this sequence continuously.

Notes

Appendix C. Intel HostRAID Setup Guidelines

After all the hardware has been installed, you must first configure Intel's ESB2 SATA RAID before you install the Windows Operating System and other software drivers.

Important Notes to the User

- If you do not wish to configure onboard SATA RAID functions, please go directly to Section C-3 and Appendix D for OS and other software installation instructions.

- This chapter describes RAID Configuration Instructions for the Intel ESB2 RAID controller designed for the Windows OS.

C-1   Introduction to Serial ATA and Parallel ATA

To configure the SATA RAID functions, you must first use the Intel ESB2 SATA RAID Utility program to configure the RAID Level that you desire before installing the Windows XP/2000/2003 operating system and other software drivers. (The necessary drivers are all included on the CD that came packaged with your motherboard.) Note that the current version of the ESB2 SATA RAID Utility can only support Windows XP/2000/2003 Operating Systems.

Serial ATA (SATA)

Serial ATA (SATA) is a physical storage interface that uses a single cable with a minimum of four wires to create a point-to-point connection between devices. It is a serial link, which supports transfer rates up to 3.0 Gbps. Because the serial cables used in SATA are thinner than the traditional cables used in Parallel ATA (PATA), SATA systems have better airflow and can be installed in smaller chassis than Parallel ATA. In addition, the cables used in PATA are limited to a length of 40cm, while Serial ATA cables can be up to one meter in length. Overall, SATA provides better functionality than PATA.

Introduction to the Intel ESB2 Serial RAID

Located in the South Bridge of the 5000P chipset, the I/O Controller Hub (ESB2) provides the I/O subsystem with access to the rest of the system. It supports an 1-channel UltraATA/100 Bus Master IDE controller (PATA) and six Serial ATA (SATA) ports. The ESB2 supports the following PATA and SATA device configurations: Legacy mode and Native mode.

The Intel HostRAID Configurations

The following RAID levels are supported:

RAID 0 (Data Striping): this writes data in parallel, interleaved ("striped") sections of two hard drives. Data transfer rate is doubled over using a single disk.

RAID1 (Data Mirroring): an identical data image from one drive is copied to another drive. The second drive must be the same size or larger than the first drive.

RAID 10 (Striping & Mirroring): RAID 0 and 1 schemes are combined (without parity information) to get the benefits of both.

RAID 5: both data and parity information are striped and mirrored across three or more hard drives.

The Intel Matrix Storage

The Intel Matrix Storage, supported by the ESB2, allows the user to create RAID 0, RAID 1, RAID 10 and RAID 5 sets by using only six identical hard disk drives. The Intel Matrix Storage Technology creates two partitions on each hard disk drive and generate a virtual RAID 0, RAID 1, RAID 10 and RAID 5 sets. It also allows you the change the HDD partition size without any data.

Configuring BIOS Settings for SATA RAID Functions (Native Mode)

1. Press the <Del> key during system bootup to enter the BIOS Setup Utility. Note: If it is the first time powering on the system, we recommend you load the Optimized Default Settings. If you have already done so, please skip to Step 3.

2. Use the arrow keys to select the "Exit" Settings. Once in the "Exit" settings, Scroll down to select "Load Optimized Default Settings" and press the <Enter> key. Select "OK" to confirm the selection. Press the <Enter> key to load the default settings for the BIOS.

3. Use the arrow keys to select the "Main" section in BIOS.

4. Scroll down to "SATA Controller Mode" and press the <Enter> key to select "Enhanced"

5. Scroll down to "SATA RAID Enabled" and press <Enter>. Then, select "Enabled."

6. Go to "Exit". Select "Exit Saving Changes" from the "Exit" menu. Press the <Enter> key to save the changes and exit the BIOS.

7. Once you've exited the BIOS Utility, the system will re-boot.

8. During the system boot-up, press the <Ctrl> and <I> keys simultaneously to run the Intel RAID Configuration Utility when prompted by the following message: *Press <Ctrl> <I> for the* Intel *RAID Configuration Utility*.

Note: The Intel RAID Configuration Utility is only available for systems with two or more drives installed. The Intel RAID Utility screen will not display in systems with one drive installed. Due to each serverboard controlling two of the four SATA

Using the Intel ESB2 SATA RAID Utility Program

Creating, Deleting and Resetting RAID Volumes:

a. After the system exits from the BIOS Setup Utility, the system will automatically reboot. The following screen appears after Power-On Self Test.

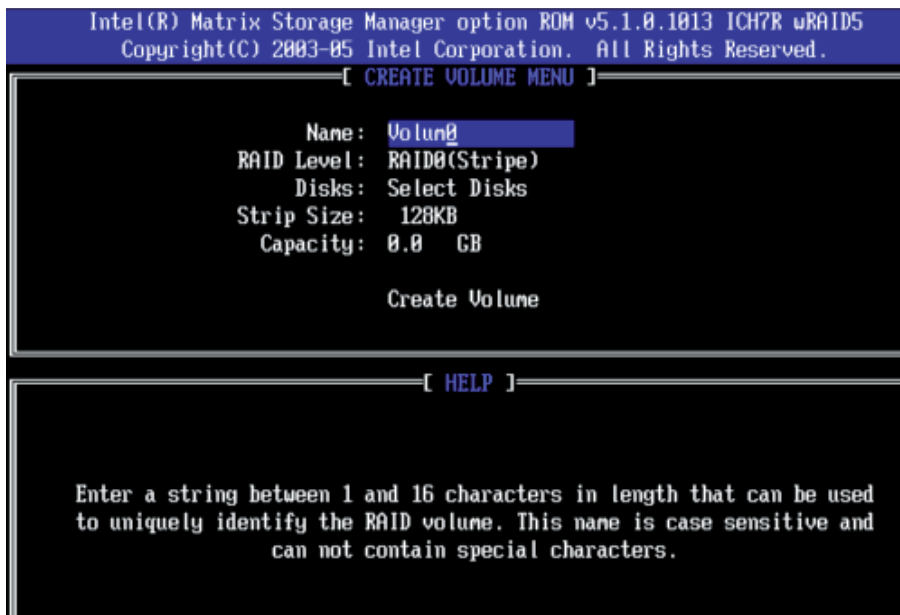b. When you see the above screen, press the <Ctrl> and the <I> keys simultaneously to have the main menu of the SATA RAID Utility appear:
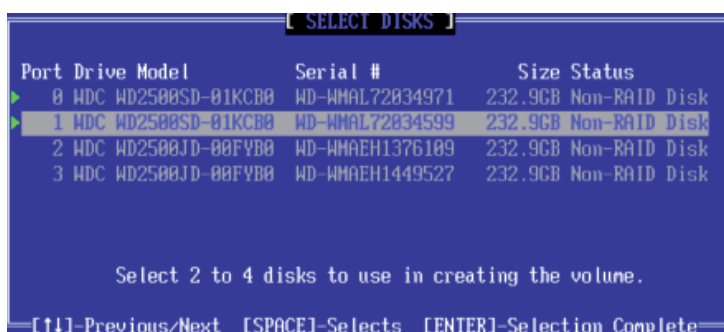
Note: All graphics and screen shots shown in the manual are for reference only. The screen shots shown in the manual do not imply Supernicro's endorsement or non-endorsement on any 3rd party's product. Your screens may or many not look exactly the same as the graphics shown in this manual.

Creating a RAID 0 Volume

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

```
      Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
         Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
                          [ CREATE VOLUME MENU ]

                        Name:  Volum0
                  RAID Level:  RAID0(Stripe)
                       Disks:  Select Disks
                  Strip Size:  128KB
                    Capacity:  0.0   GB

                           Create Volume


                             [ HELP ]



            Enter a string between 1 and 16 characters in length that can be used
            to uniquely identify the RAID volume. This name is case sensitive and
                         can not contain special characters.
```

b. Specify a name for the **RAID 0** set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)

c. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select **RAID 0 (Stripe)** and hit <Enter>.

d. When the Disks item is highlighted, press <Enter> to select the HDD to configure as RAID. The following pop-up screen displays (see note on page C-3) :

```
                          [ SELECT DISKS ]

   Port Drive Model          Serial #              Size Status
 ▶    0 WDC WD2500SD-01KCB0   WD-WMAL72034971     232.9GB Non-RAID Disk
 ▶    1 WDC WD2500SD-01KCB0   WD-WMAL72034599     232.9GB Non-RAID Disk
      2 WDC WD2500JD-00FYB0   WD-WMAEH1376109     232.9GB Non-RAID Disk
      3 WDC WD2500JD-00FYB0   WD-WMAEH1449527     232.9GB Non-RAID Disk


               Select 2 to 4 disks to use in creating the volume.

   [↑↓]-Previous/Next  [SPACE]-Selects  [ENTER]-Selection Complete
```

e. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to confirm the selection of the drive.

f. Use the <Up Arrow>, <Down Arrow> keys to select the stripe size, ranged from 4 KB to 128 KB for the RAID 0 array, and hit <Enter>. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.)

g. Press <Enter> when the Create Volume item is highlighted. A warning message displays.

h. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.
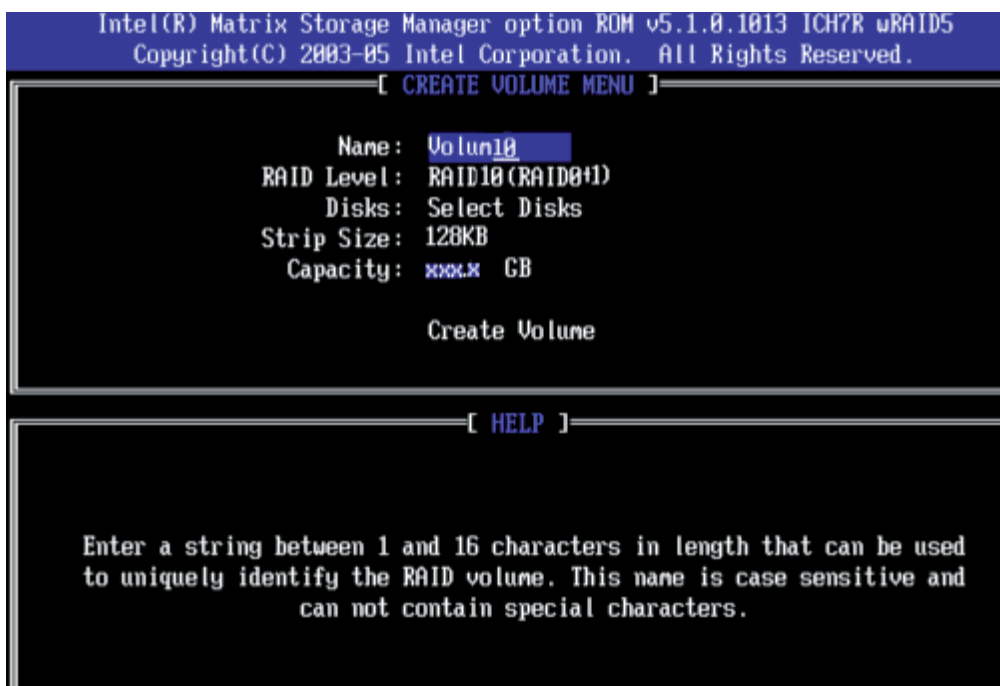
Creating a RAID 1 Volume

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

```
   Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
        Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
  ┌──────────────────────────[ CREATE VOLUME MENU ]──────────────────────────┐
  │                                                                          │
  │                      Name:  Volun1                                       │
  │                RAID Level:  RAID1(Mirror)                                │
  │                     Disks:  Select Disks                                 │
  │                Strip Size:  N/A                                          │
  │                  Capacity:  0.0    GB                                    │
  │                                                                          │
  │                              Create Volume                               │
  │                                                                          │
  └──────────────────────────────────────────────────────────────────────────┘

  ┌───────────────────────────────[ HELP ]───────────────────────────────────┐
  │                                                                          │
  │                                                                          │
  │                                                                          │
  │      Enter a string between 1 and 16 characters in length that can be used │
  │      to uniquely identify the RAID volume. This name is case sensitive and │
  │                    can not contain special characters.                    │
  │                                                                          │
  └───────────────────────────────────────────────────────────────────────────┘
```

b. Specify a name for the **RAID 1** set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)

c. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select **RAID 1 (Mirror)** and hit <Enter>.

d. When the Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.

e. Press <Enter> when the Create Volume item is highlighted. A warning message displays.

f. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.
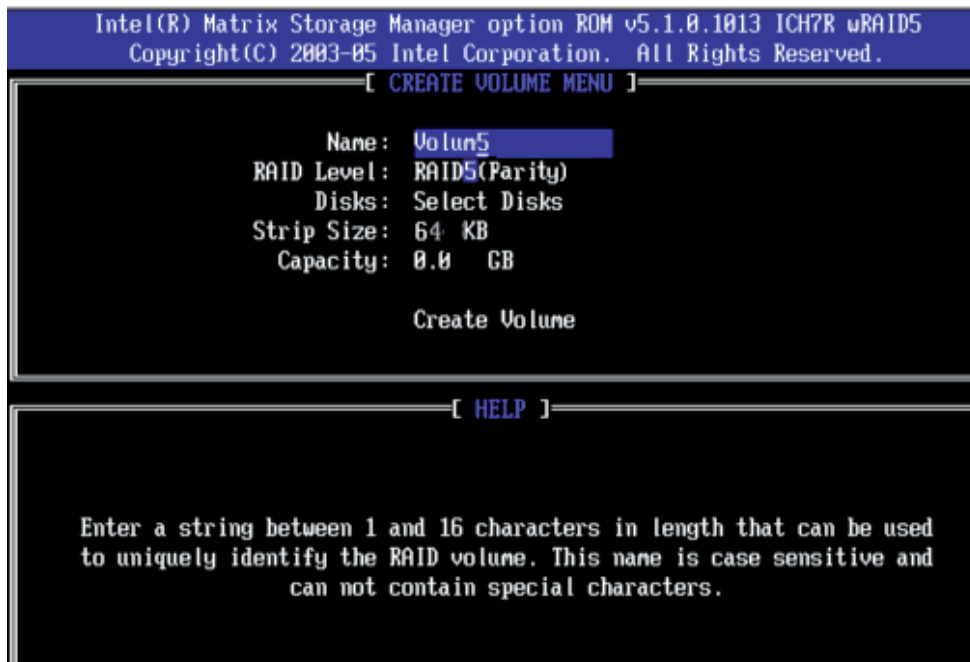
Creating a RAID 10 (RAID 1+ RAID 0)

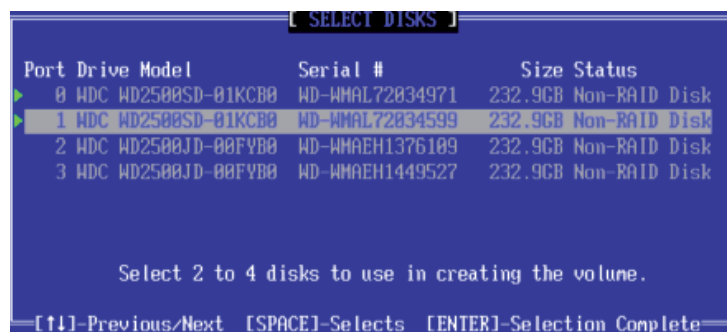a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

```
Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
      Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
                    [ CREATE VOLUME MENU ]

                    Name:  Volum10
              RAID Level:  RAID10(RAID0+1)
                   Disks:  Select Disks
              Strip Size:  128KB
                Capacity:  xxx.x  GB

                          Create Volume

                        [ HELP ]

      Enter a string between 1 and 16 characters in length that can be used
      to uniquely identify the RAID volume. This name is case sensitive and
                        can not contain special characters.
```

b. Specify a name for the **RAID 10** set and press <Enter>.

c. When RAID Level item is highlighted, use the <Up Arrow>, <Down Arrow> keys to select **RAID 10 (RAID1 + RAID0)** and hit <Enter>.

d. When the Stripe Size is highlighted, use the <Up Arrow>, <Down Arrow> keys to select the stripe size from 4 KB to 128 KB for your RAID 10 and hit <Enter>. The default setting is 64 KB. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size.)

e. When the RAID Volume Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.

f. Press <Enter> when the Create Volume item is highlighted. A warning message displays.

g. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

Creating a RAID 5 Set (Parity)

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

```
Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
         Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
===============================[ CREATE VOLUME MENU ]===============================


                          Name:  Volum5
                    RAID Level:  RAID5(Parity)
                         Disks:  Select Disks
                    Strip Size:  64 KB
                      Capacity:  0.0   GB


                              Create Volume


===================================[ HELP ]===================================




        Enter a string between 1 and 16 characters in length that can be used
         to uniquely identify the RAID volume. This name is case sensitive and
                           can not contain special characters.
```

b. Specify a name for the **RAID 5** set and press <Enter>.

c. When the Raid Level is highlighted, use the <Up Arrow>, <Down Arrow> keys to select **RAID 5 (Parity)** and hit <Enter>.

d. When the Disk item is highlighted, press <Enter> to select the HDD to configure as RAID. The following pop-up screen displays (see note on page C-3):

```
===============================[ SELECT DISKS ]===============================

 Port Drive Model           Serial #              Size Status
►   0 WDC WD2500SD-01KCB0  WD-WMAL72034971   232.9GB Non-RAID Disk
►   1 WDC WD2500SD-01KCB0  WD-WMAL72034599   232.9GB Non-RAID Disk
    2 WDC WD2500JD-00FYB0  WD-WMAEH1376109   232.9GB Non-RAID Disk
    3 WDC WD2500JD-00FYB0  WD-WMAEH1449527   232.9GB Non-RAID Disk



              Select 2 to 4 disks to use in creating the volume.

===[↑↓]-Previous/Next  [SPACE]-Selects  [ENTER]-Selection Complete===
```

e. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to confirm the selection of the drive.

f. Use the <Up Arrow>, <Down Arrow> keys to select the stripe size, ranged from 4 KB to 128 KB for the RAID 5 array, and hit <Enter>. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.)

g. Enter your desired RAID volume capacity and press <Enter> when the capacity item is highlighted. The default setting is the maximum capacity allowed.

h Press Enter when the Create Volume item is highlighted. A warning message displays.

i. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

Deleting a RAID Volume

Warning: Make sure you back up your data before deleting a RAID set. You will lose all data on the disk drives when deleting a RAID set.

a. From the main menu, select item2-Delete RAID Volume, and press <Enter>.

b. Use the <Up Arrow>, <Down Arrow> keys to select the RAID set you want to delete and press <Del>. A warning message displays.

c. When asked "Are you sure you want to delete this volume (Y/N), press "Y" to delete the RAID volume, or type "N" to go back to the Delete Volume menu.

Resetting to Non-RAID and Resetting a RAID HDD

> ⚠️ **Warning:** Be cautious when you reset a RAID volume HDD to non-RAID or Resetting a RAID HDD. Resetting a RAID volume HDD or Resetting a RAID HDD will reformat the HDD and delete the internal RAID structure on the drive.

a. From the main menu, select item3-Reset Disks to Non- RAID, and press <Enter>. The following screen will appear:

b. Use the <Up Arrow>, <Down Arrow> keys to highlight the RAID set drive to reset and press <Space> to select.

c. Press <Enter> to reset the RAID set drive. A Warning message displays.

d. Press "Y" to reset the drive, or type "N" to go back to the main menu.

Exiting the Intel Matrix Storage Manager Utility

a. From the main menu, select item4-Exit, and press <Enter>. A warning message will appear.

b. Press "Y" to reset the drive, or type "N" to go back to the main menu.

C-2 Installing Windows XP/2000/2003 for RAID Systems

Note: If you wish to have SATA RAID functions on the server, you must first set up the RAID drives as described in section C-1.

a. Insert a Microsoft Windows XP/2000/2003 Setup CD in the CD drive and the system will start booting up from CD.

b. Press the <F6> key when the message "Press F6 if you need to install a third party SCSI or RAID driver" displays.

c. When the Windows XP/2000/2003 Setup screen appears, press "S" to specify additional device(s).

d. Insert the driver diskette "Intel AA RAID XP/2000/2003 Driver for ESB2" into drive A: and press the <Enter> key.

e. Choose the Intel(R) ESB2 *SATA RAID Controller* from the list indicated in the XP/2000/2003 setup screen and press the <Enter> key.

f. Press the <Enter> key to continue the installation process. (If you need to specify any additional devices to be installed, do it at this time.) Once all devices are specified, press the <Enter> key to continue with the installation.

g. From the Windows XP/2000/2003 setup screen, press the <Enter> key. The XP/2000/2003 Setup will automatically load all device files and then continue the installation.

h. After the Windows XP/2000/2003 installation is completed, the system will automatically reboot.

Note: the current version of the ESB2 SATA RAID Utility can only support Windows XP/2000/2003 Operating Systems.

Appendix D. Adaptec HostRAID Setup Guidelines

After all the hardware has been installed, you must first configure the Adaptec Embedded Serial ATA RAID before you install the Windows operating system. The necessary drivers are all included on the bootable CDs that came packaged with your motherboard. Note: The following section provides information on the Adaptec SATA RAID Driver based on the Intel Enterprise South Bridge 2 (ESB2) controller.

D-1   Adaptec Embedded SATA Controller

Serial ATA (SATA)

Serial ATA (SATA) is a physical storage interface. It uses a single cable with a minimum of four wires to create a point-to-point connection between devices. It is a serial link which supports SATA Transfer rates up to 3.0 Gbps. Because the serial cables used in SATA are thinner than the traditional cables used in Parallel ATA (PATA), SATA systems have better airflow and can be installed in smaller chassis than PATA. In addition, the cables used in PATA can only extend to 40cm long, while SATA cables can extend up to one meter. Overall, SATA provides better functionality than PATA.

Introduction to the Intel ESB2 I/O Controller Hub

Located in the South Bridge of the Intel 5400 Chipset, the ESB2 I/O controller Hub provides the I/O subsystem with access to the rest of the system. It supports 1-channel Ultra ATA/100 Bus Master IDE controller (PATA) and one Adaptec SATA Host Controller, which support up to six SATA drives, up to two RAID volumes and up to four drives in RAID configurations. (See the table below for details.)

* Adaptec's SATA HostRAID Controller Firmware supports:	
Drives supported	Six
Number of RAID Volumes supported	Two
Total Drives in RAID Configurations	Four
Examples of Valid RAID Configurations:	
Two drives of RAID 1 + two drives of RAID 0	
Two drives of RAID 1 + two drives of RAID 1	
Three drives of RAID 0	
Four drives of RAID 0	
Examples of Invalid RAID Configurations:	
Three drives of RAID 0 + two drives of RAID 1	
(***Note**: this table is applicable to Adaptec's HostRAID Controller Firmware only.)	

Configuring SATA RAID

1. Press the <Del> key during system bootup to enter the BIOS Setup Utility.

Note: If it is the first time powering on the system, we recommend you load the Optimized Default Settings. If you have already done so, please skip to Step 3.

2. Use the arrow keys to select the "Exit" Settings. Once in the "Exit" settings, Scroll down to select "Load Optimized Default Settings" and press the <Enter> key. Select "OK" to confirm the selection. Press the <Enter> key to load the default settings for the BIOS.

3. Use the arrow keys to select the "Main" section in BIOS.

4. Scroll down to "SATA Control Mode" and press the <Enter> key to select "Enhanced"

5. Scroll down to "SATA RAID Enabled" and press <Enter>. Then, select "Enabled."

6. Scroll down to "ICH RAID Codebase" and select "Adaptec". Then press <Enter>. (For ICH RAID Codebase: Change the setting from Intel to Adaptec.)

7. Go to "Exit". Select "Exit Saving Changes" from the "Exit" menu. Press the <Enter> key to save the changes and exit the BIOS.

8. Once you've exited the BIOS Utility, the system will re-boot.

9. During the system boot-up, press the <Ctrl> and <A> keys simultaneously to run the Intel RAID Configuration Utility when prompted by the following message: Press <Ctrl> <A> for Intel RAID Configuration Utility.

Adaptec SATA with HostRAID

The Adaptec Embedded Serial ATA RAID Controller adds SATA/RAID functionality and performance enhancements to a motherboard. RAID striping (RAID 0) allows data to be written across multiple drives, greatly improving hard disk I/O performance. RAID mirroring (RAID 1) allows data to be simultaneously written to two drives, improving data security even if a single hard disk fails. A Stripe of Mirrors (RAID 10) provides multiple RAID 1 mirrors and a RAID 0 stripe, maximizing data security and system efficiency. By incorporating the Adaptec Embedded Serial ATA into the motherboard design, NovaScale R422-E1/R422-INF-E1 serverboard offers the user the benefits of SATARAID without the high costs associated with hardware RAID applications.

Using the Adaptec RAID Configuration Utility (ARC)

The Adaptec RAID Configuration Utility, an embedded BIOS Utility, includes the following:

Array Configuration Utility: Use this utility to create, configure and manage arrays.

Disk Utilities: Use this option to format or verify disks.

To run the Adaptec RAID Configuration Utility, you will need to do the following:

1. Enable RAID functions in the system BIOS (refer to Chapter 4 for System BIOS Configurations).

2. Press the <Ctrl> and <A> keys simultaneously when prompted to do so during system boot. (Refer to the previous page for detailed instructions.)

Using the Array Configuration Utility (ACU)

When you press <Ctrl> and <A> keys simultaneously at the prompt during system bootup, the main menu will appear.

Note: To select an option, use the arrow keys to highlight the item and then press the <Enter> key to select it. To return to the previous menu, press the <ESC> key. Press the <Insert> key to select a drive. When a drive is highlighted (selected), press the <Delete> key to de-select it.
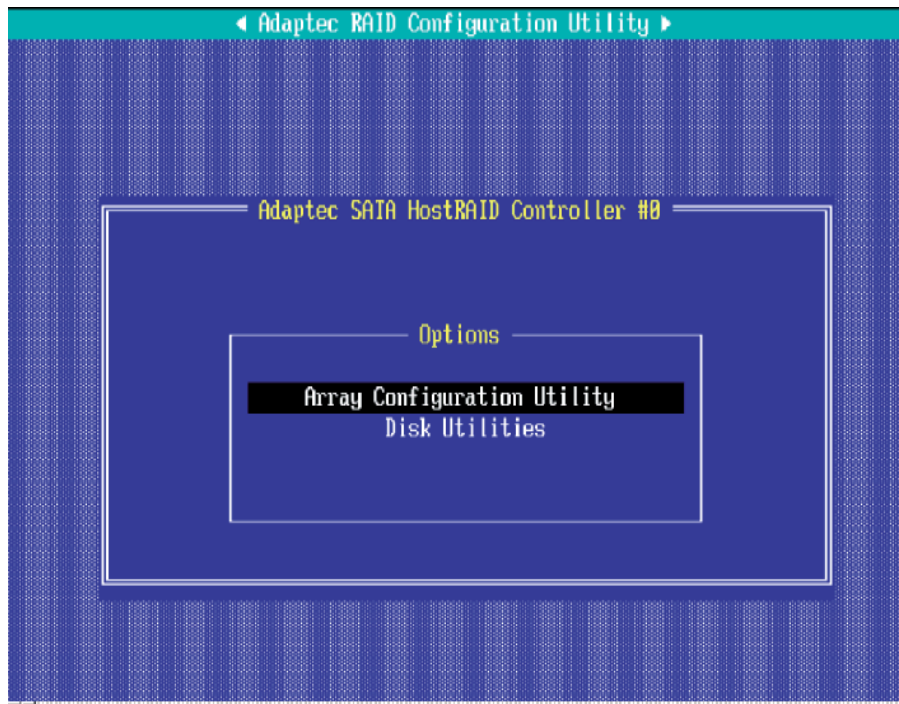
Managing Arrays

Select this option to view array properties, and configure array settings.

To select this option, using the arrow keys and the <enter> key, select "Managing Arrays" from the main menu as shown above.
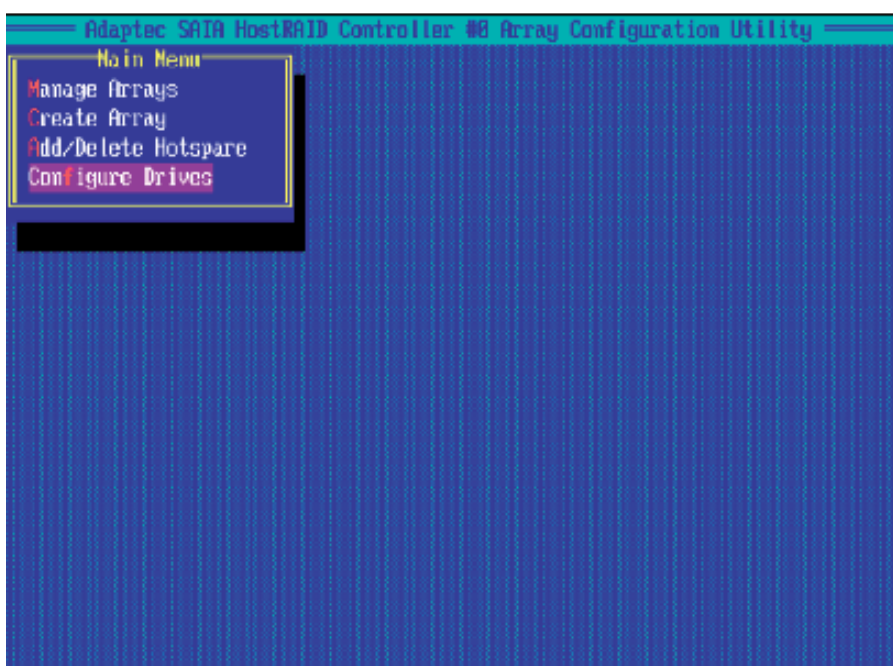
Configuring Disk Drives

You may need to configure a disk drive before you can use it.

Caution: Configuring a disk may overwrite the partition table on the disk and may make any data on the disk inaccessible. If the drive is used in an array, you may not be able to use the array again.

<u>Do not configure</u> a disk that is part of a boot array. To determine which disks are associated with a particular array, please refer to Viewing Array Properties.

To configure a disk drive:

1. From the main menu (shown on Page D-4), select Configure Drives and hit <Enter> (as shown below.)

2. From the "Select Drives for Configuring" List (shown below,) select the drives you want to configure and press <Insert>.
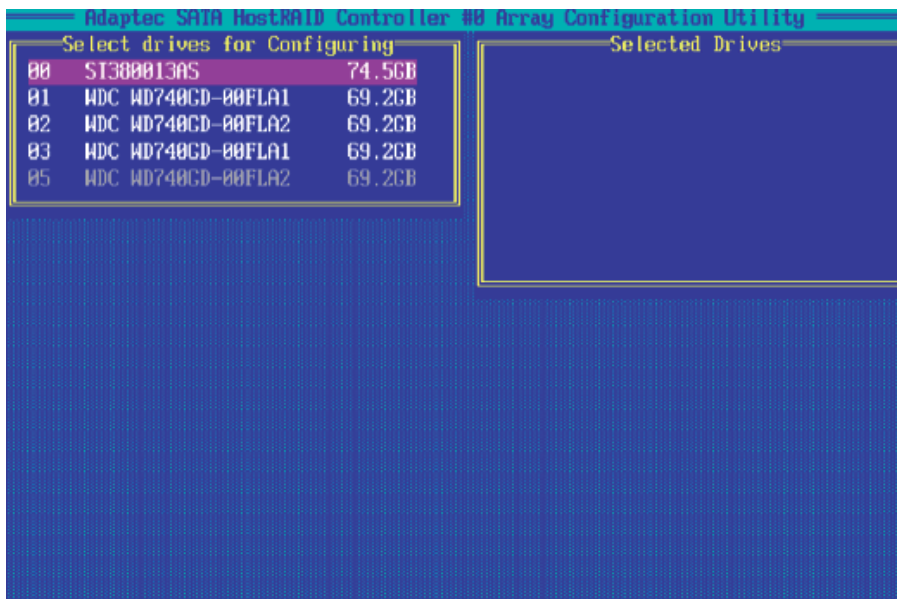
3. The drive you've selected will appear in the "Selected Drives Dialog Box" on the right (as shown below.) Repeat the same steps until all drives that you want to configure appear in the selected drives box.
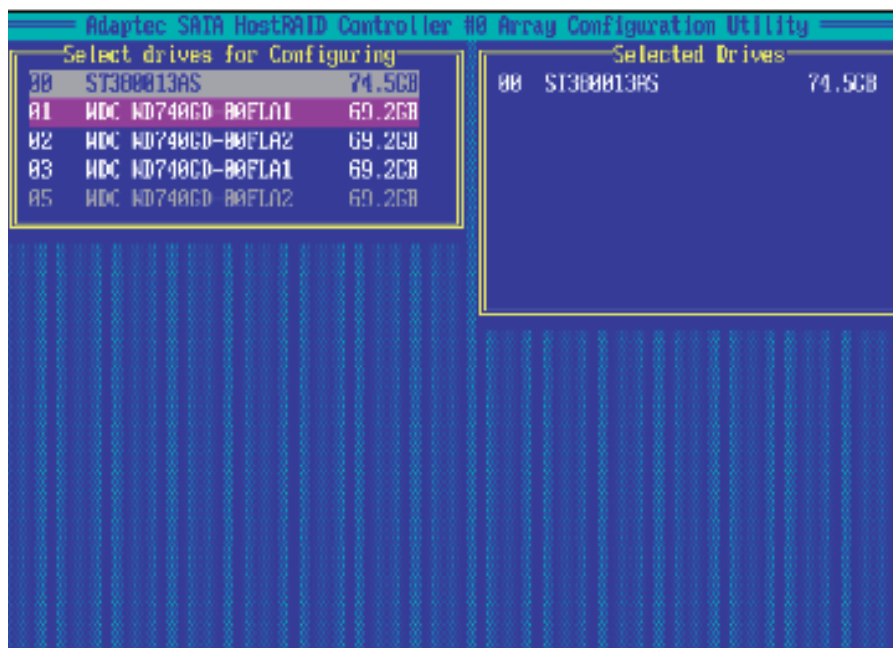
4. Once both drives display in the selected drive box, press <Enter>.

5. Read the warning message as shown in the screen below.
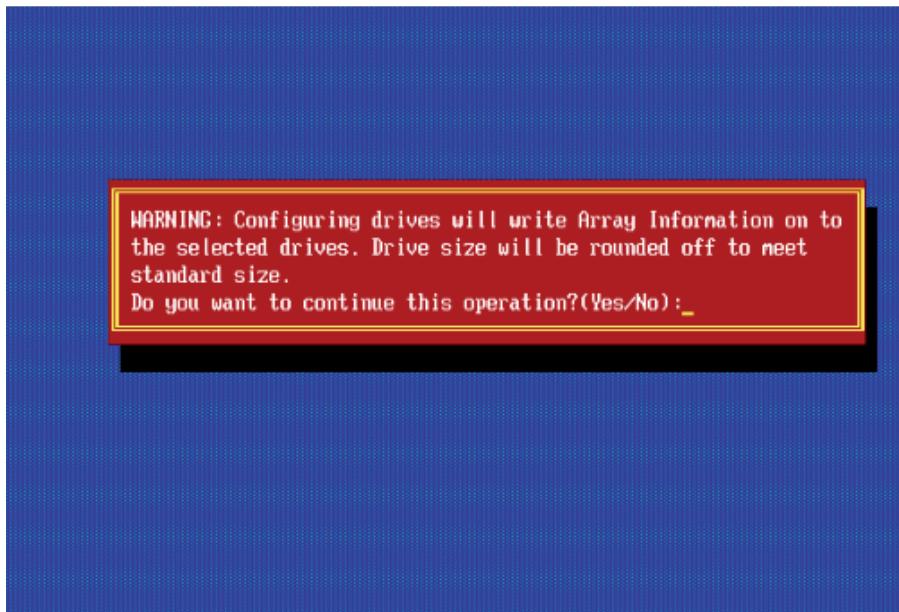
6. Make sure that you have selected the correct disk drives to configure. If cor-rect, type Y to continue.

Creating Arrays

Before you create arrays, make sure that the disks for the array are connected and installed in your system. Note that disks with no usable space, or disks that are un-initialized or not formatted are shown in gray and cannot be used. (**Note**: It is recommended that you configure devices before you create arrays.)

To create an array:

1. From the main menu (shown on page D-4), select Create Array.

2. Select the disks for the new array and press Insert (as the screen shown below). (Note: To de-select any disk, highlight the disk and press Delete.)
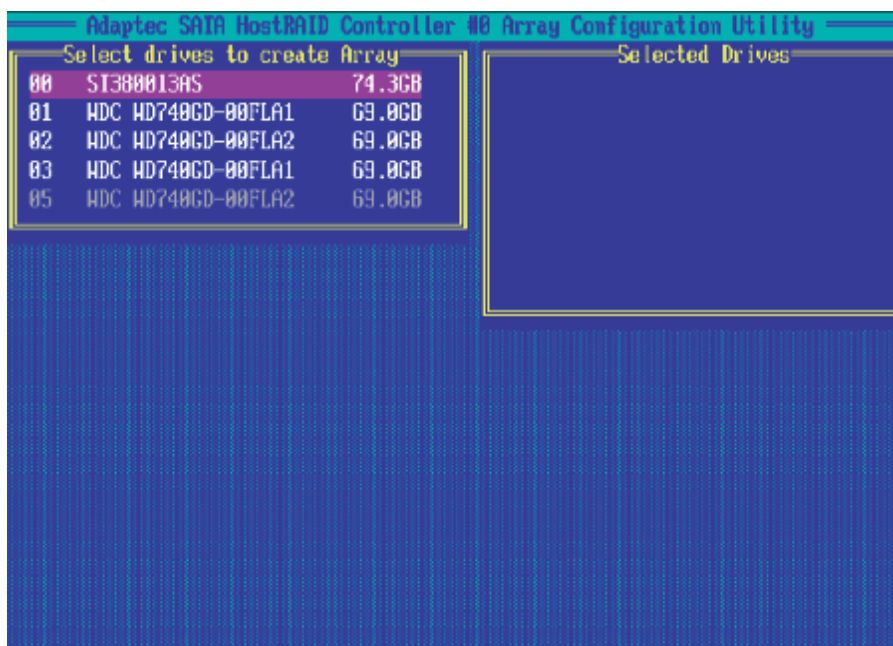
3. The arrays you have selected will appear on the Selected Drives dialog box on the right (as shown below.)

4 Press Enter when both disks for the new array are selected. The Array Properties menu displays.
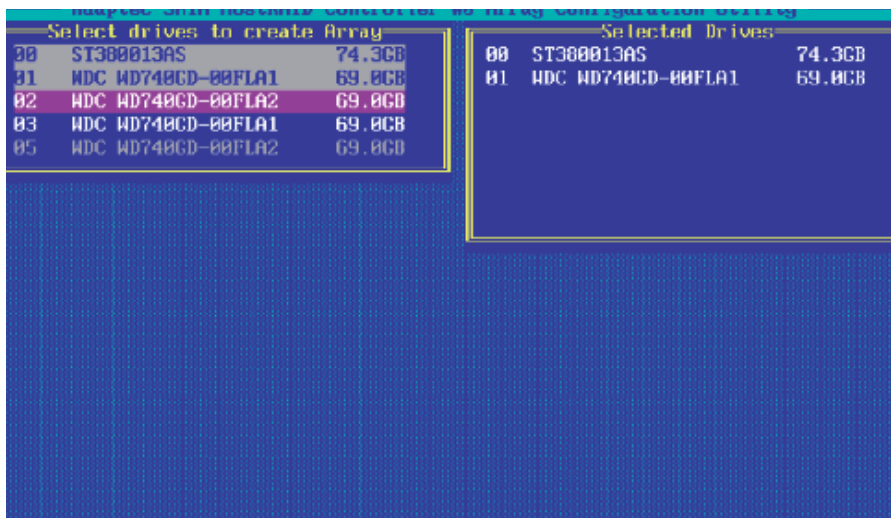
Assigning Array Properties

Once a new array is completed, you can assign properties to the array.

Caution: Once the array is created and its properties are assigned, and you cannot change the array properties using this utility.

To assign properties to the new array:

1. In the Array Properties menu (as shown in the screen below), select an array type and press Enter. Only the available array types will be displayed on the screen. (RAID 0 or RAID 1 requires two drives.)
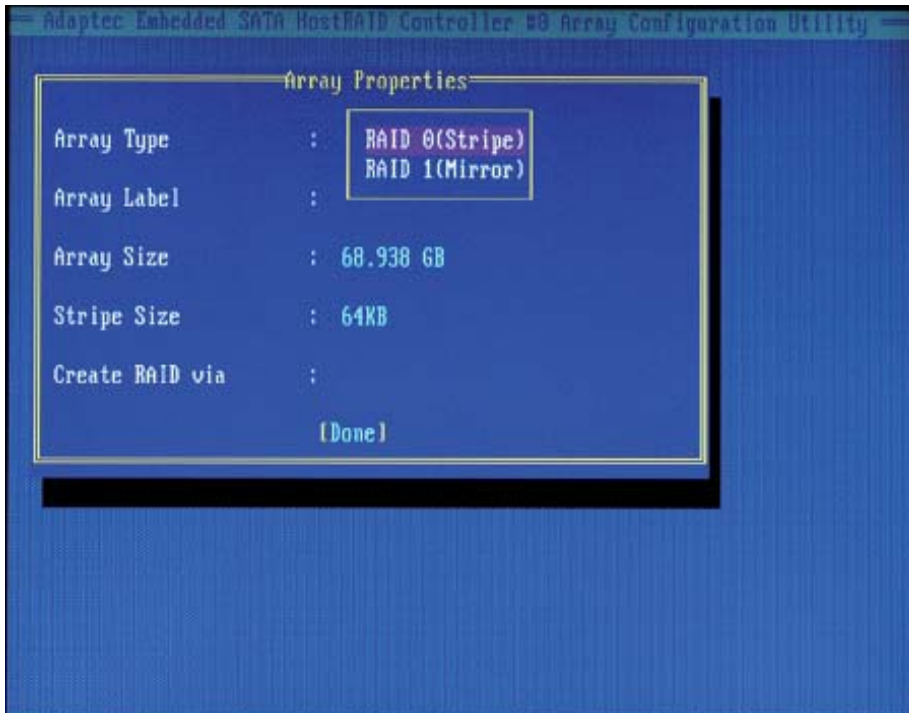
2. Under the item "Arrays Label", type in a label and press <Enter>. (Note: The label shall not be more than 15 characters.)

3. For RAID 0, select the desired stripe size. (Note: Available stripe sizes are 16, 32, and 64 KB. 64K is default. Please do not change the default setting.)
4. The item: "Create RAID via" allows you to select between the different ways of creating methods for RAID 0 and RAID 1.

The following table gives examples of when each is appropriate.

Raid Level	Create Via	When Appropriate
RAID 0	Quick Init	Creating a RAID 0 on new drives
RAID 0	Migrate*	Creating a RAID 0 from one new drive and one drive with data you wish to preserve
RAID 1	Build*	Any time you wish to create a RAID 1, but especially if you have data on one drive that you wish to preserve
RAID 1, RAID 10	Clear	Creating a RAID 1 or RAID 10 on new drives, or when you want to ensure that the array contains no data after creation.
RAID 1, RAID 10	Quick Init	Fastest way to create a RAID 1 or RAID 10 Appropriate when using new drives

(Note: If you select Migrate for RAID 0, or Build for RAID 1, you will be asked to select the source drive. The contents of the source drive will be preserved. However, the data on the new drive will be lost.)

5. When you are finished, press **<Done>** (as the screen shown below).

Notes:

1. Before adding a new drive to an array, be sure to back up any data stored on the new drive; otherwise, all data will be lost.

2. If you stop the Build or Clear process on a RAID 1, you can restart it by pressing <Ctrl> and <R>.

3. If you've used the Quick Init option to create a RAID1, it may return some data mis-comparison when you run a consistency check at a later time. This is normal.

4. The Adaptec Host RAID allows you to use drives of different sizes in a RAID. However, you can only select a smaller drive as the source or first drive during a build operation.

5. When migrating from single volume to RAID 0, migrating from a larger drive to a smaller drive is allowed. However, the destination drive must be at least half the capacity of the source drive.

6. It is not recommended that you migrate or build an array on Windows dynamic disks (volumes) because it will result in data loss.

Warning: Do not interrupt the process when you create a RAID 0 using the Migrate option. If you do, you will not be able to restart the system, or to recover the data that was on the source drive.

Adding a Bootable Array

To make an array bootable:

1. From the Main menu, select Manage Arrays.

2. From the List of Arrays, select the array you want to make bootable, and press <Ctrl> and <B>.

3. Enter Y to create a bootable array when the following message is displayed: "This will make all other existing bootable array non-bootable. Do you want to make this array bootable? (Yes/No):" Then, a bootable array will be created. An asterisk () will appear next to the bootable array (as shown in the picture below:)
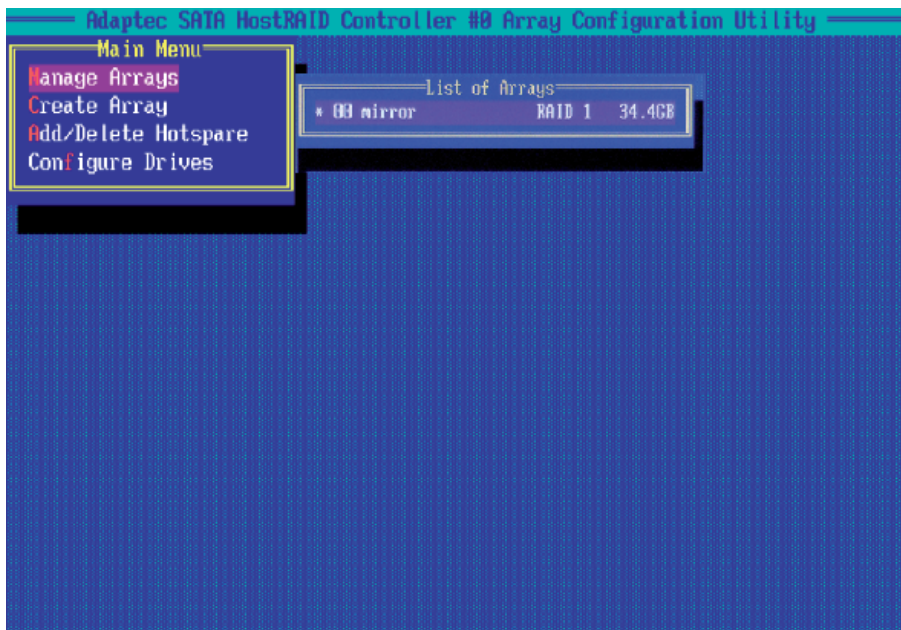
Deleting a Bootable Array

To delete a bootable array:

1. From the Main menu, select Manage Arrays.

2. From the List of Arrays, select the bootable array you want to delete, and press <Ctrl> and <B>. Note: a bootable array is the array marked with an asterisk   (as shown in the picture above.)

3. When the following message is displayed: "The array is already marked bootable. Do you want to make this array as not bootable? (Yes/No)," Enter Y to delete a bootable array. The bootable array will be deleted and the asterisk will disappear.

Note: Do not use the delete key to delete the bootable array.

Adding/Deleting Hotspares

To add a Hotspare:

(**Note**: In order to rebuild a RAID (RAID 0 or RAID 1), you would need to add a new HDD as a hotspare.)

1. From the main menu (shown on Page D-4), select Add/Delete Hotspares.

2. Use the up and down arrow keys to highlight and select the disk you want to designate as a hotspare, and press <Insert>, and then, press <Enter>.

3. Press Yes when the following prompt is displayed:

"Do you want to create spare?" (Yes/No?)

The spare you have selected will appear in the Selected drives Menu.

To delete a Hotspare:

1. From the main menu (shown on Page D-4), select Add/Delete Hotspares.

2. Use the up and down arrow keys to highlight and select the Hotspare you want to delete, and press <delete>, and then, press <Enter>.

3. When the following warning is displayed: "Do you want to delete the hot spare?" (Yes/No?), press Yes to delete the hotspare you have selected.
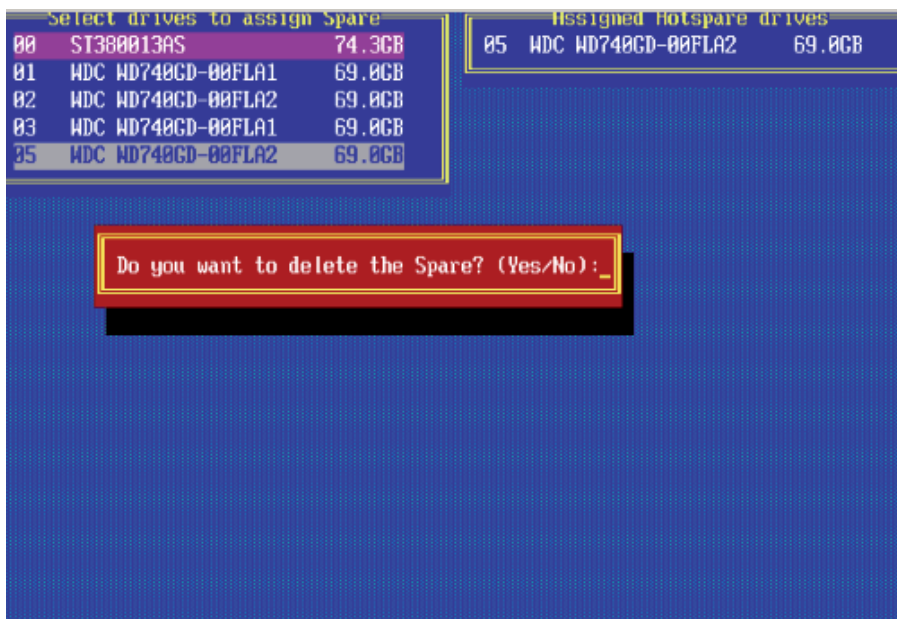
<u>Viewing Array Properties</u>

To view the properties of an existing array:

1. From the main menu, select Manage Arrays and hit <Enter> (as shown on the previous page.)

2. From the List of Arrays dialog box (shown below), select the array you want to view and press Enter.

The Array Properties dialog box appears (as shown below), showing detailed information on the array. The physical disks associated with the array are displayed here.
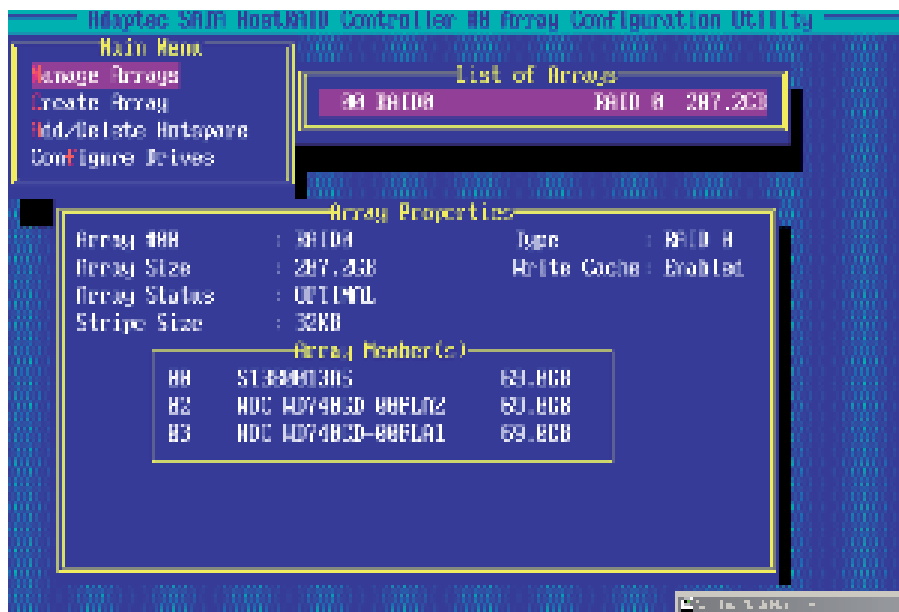
3. Press Esc to return to the previous menu.

Rebuilding Arrays

**Note 1:** Rebuilding applies to Fault Tolerant array (RAID 1) only.

If an array Build process is interrupted or when one critical member is missing, you must perform a Rebuild to restore its functionality. For a critical array rebuild operation, the optimal drive is the source drive.

Note 2: If no spare array exists and a hard disk drive fails, you need to create a spare before you can rebuild an array.

To Rebuild an array:

1 From the Main Menu, select Manage Arrays (as shown in the screen below). From the List of Arrays, select the array you want to Rebuild.

2 Press <Ctrl> and <R> to Rebuild.
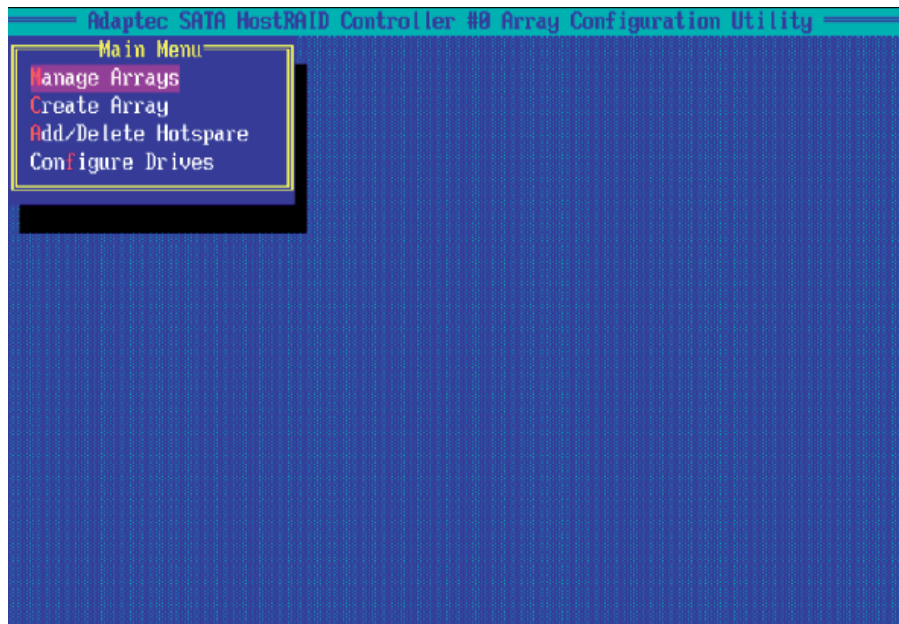
Deleting Arrays

Warning!! Back up the data on an array before you delete it to prevent data loss Deleted arrays cannot be restored.

To delete an existing array:

1. From the main menu (shown on Page D-4), select Manage Arrays.

2. Select the array you wish to delete and press <delete>.

3. In the Array Properties dialog box, select Delete and press <Enter>. The following prompt is displayed:

Warning!! Deleting the array will render array unusable. Do you want to delete the array? (Yes/No):

RAID 1 only—the following prompt is also displayed:

Deleting the partition will result in data loss! Do you also want to delete the partition? (Yes/No):

4. Press Yes to delete the array and partition or No to return to the previous menu.
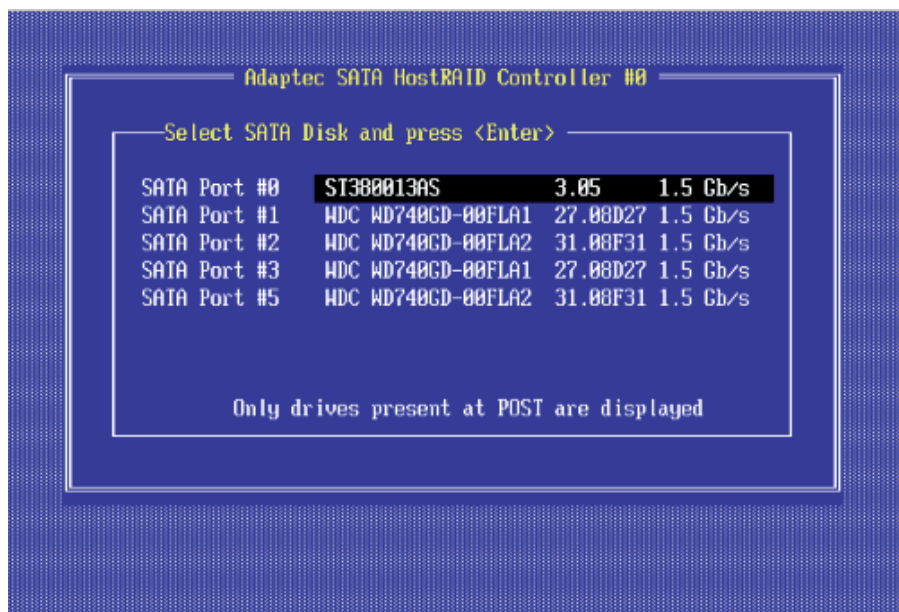
5. Press Esc to return to the previous menu.

Using the Disk Utilities

The Disk Utilities enable you to format or verify the media of your Serial ATA hard disks.

<u>To access the disk utilities:</u>
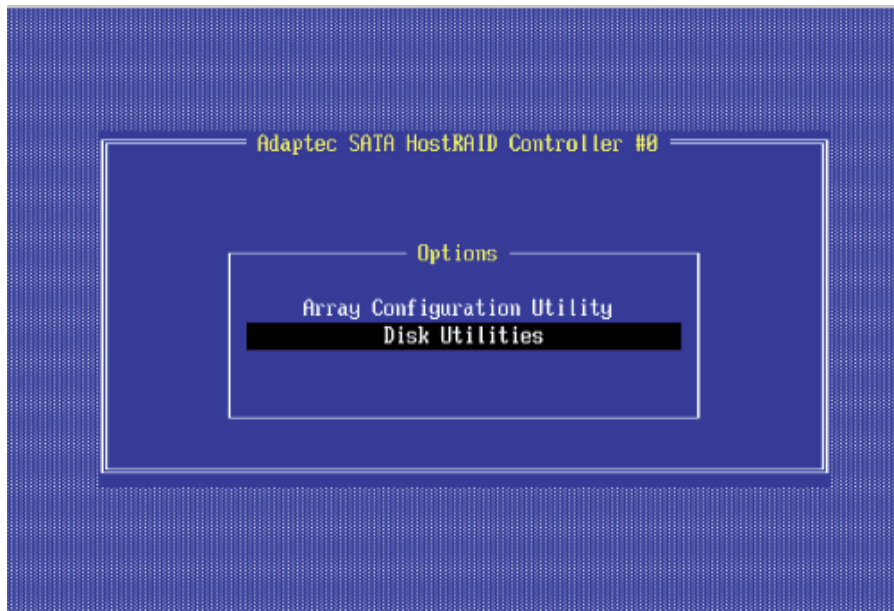
1. From the Adaptec RAID Configuration Utility Menu, select Disk Utilities (as shown above) and press <Enter>. The following screen appears.


2. Select the desired disk and press <Enter>. The following screen appears:

To format a disk:

Note: The operation of Formatting Disk allows you to perform a low-level formatting of a hard drive by writing zeros to the entire disk. Serial ATA drives are low-level formatted at the factory and do not need to be low-level formatted again.

3. When the screen shown below displays, select Format Disk and press <Enter>. The following screen appears:
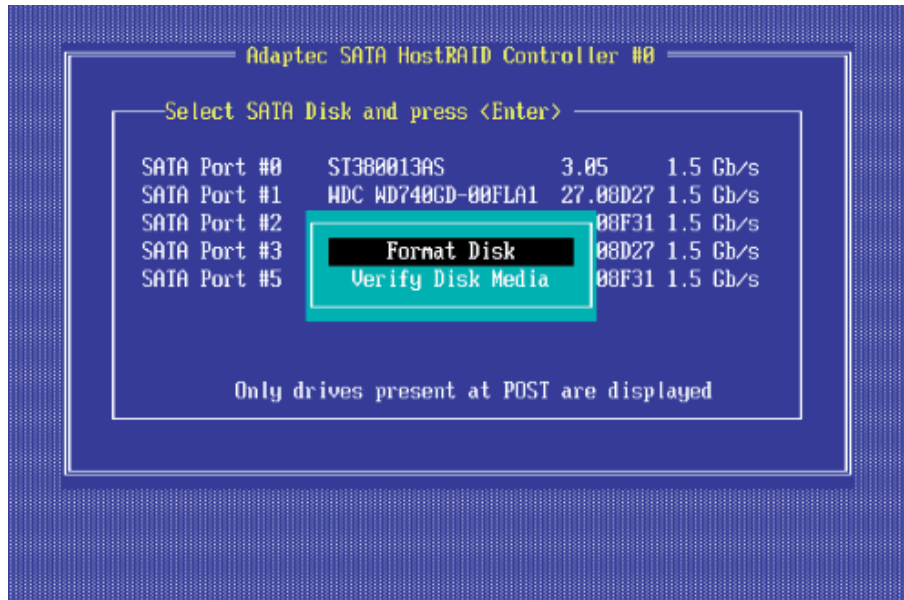
4. Read the warning message when it appears in the screen as shown below. To continue with disk formatting, select Yes and hit <Enter>. Otherwise, select No and press <Enter>.

(**Caution**: Formatting a disk destroys all data on the drive. Be sure to back up your data before formatting a disk.)
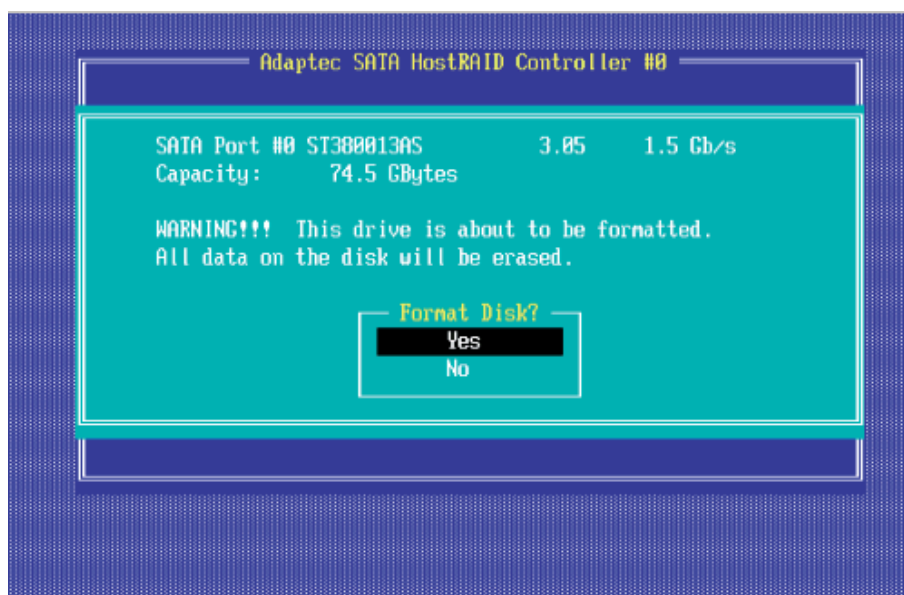
To verify disk media:
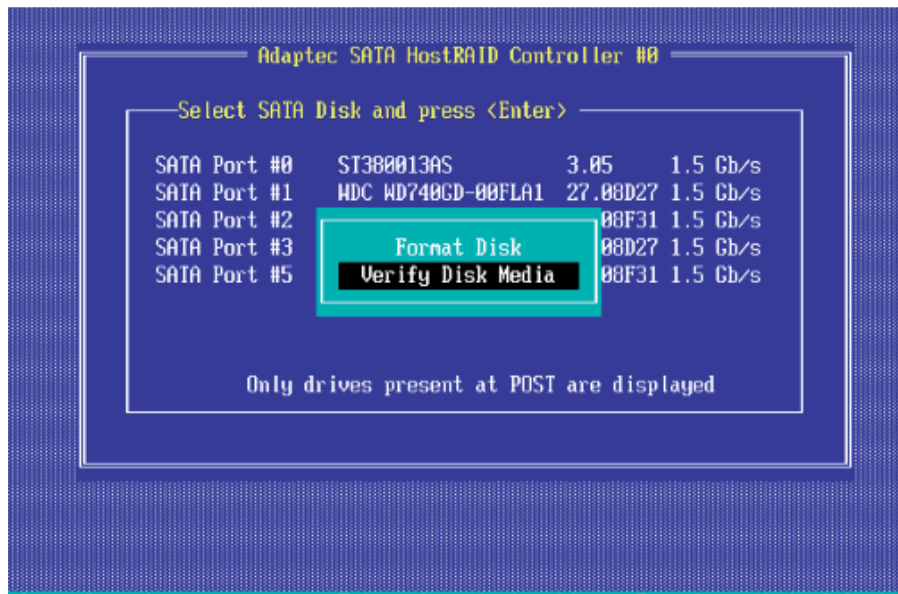
3. When the screen shown above displays, select Verify Disk Media and press <Enter>.

4. A message will display, indicating that the selected drive will be scanned for media defects. Select Yes and hit <Enter> to proceed with disk verifying; otherwise, select No and hit <Enter>.
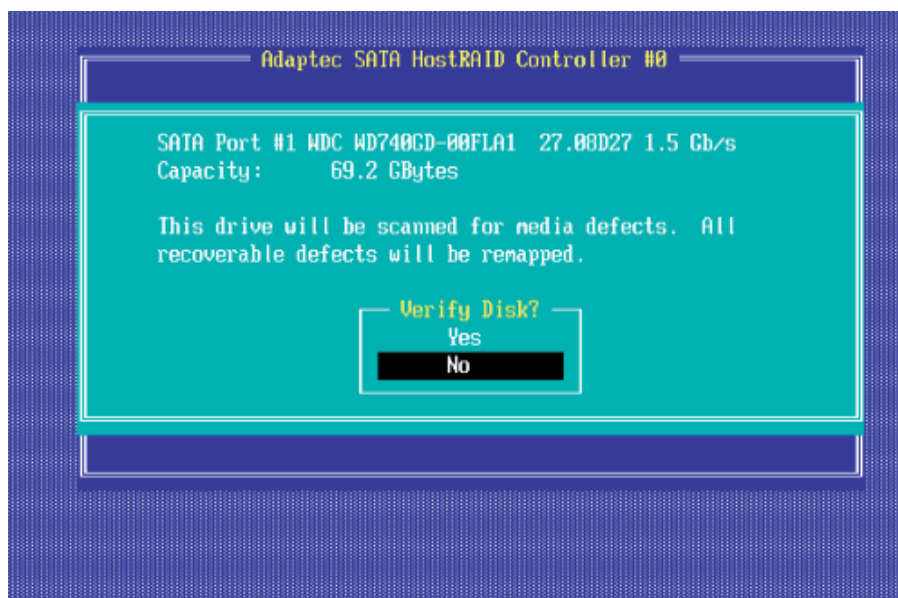
To Exit Adaptec RAID Configuration Utility

1. Once you have completed RAID array configurations, press ESC to exit. The following screen will appear.

2. Press Yes to exit the Utility.

D-20

Appendix E. System Specifications

Note: <u>unless noted specifications apply to a complete system (both server-boards</u>).

Processors

Four Intel® Xeon® 5400/5300LV/5200/5100LV Series processors in LGA771 sockets

Note: please refer to our website for details on supported processors.

Chipset

Intel 5400

BIOS

Phoenix BIOS in 8 Mb Flash EEPROM (each serverboard)

Memory Capacity

Sixteen (16) DIMM slots to support a maximum up to 128 GB of ECC FBD (Fully Buffered DIMM) DDR2-800/667/533 SDRAM

Serial ATA Controller

Intel ESB2 on-chip controller to support four 3 Gb/s Serial ATA (RAID 0, 1)

SATA Drive Bays

Four (4) hot-swap drive bays to house four (4) standard SATA drives

PCI Expansion

Two (2) low-profile PCI-Express 2.0 x16 slots (with pre-installed riser cards)

Serverboard

NovaScale R422-E1

NovaScale R422-INF-E1

Dimensions (both): 6.5 x 16.4 in (165 x 417 mm)

Chassis

Dimensions: (WxHxD) 17.2 x 1.7 x 27.75 in. (437 x 43 x 705 mm)

Weight

Gross Weight: 40 lbs. (18.2 kg.)

System Cooling

Six (6) high performance 4-cm fans

System Input Requirements

AC Input Voltage: 100 - 240V AC auto-range

Rated Input Current: 12A - 5A max

Rated Input Frequency: 50 to 60 Hz

Power Supply

Rated Output Power: 980W (Part# PWS-981-1S)

Rated Output Voltages: +12V (81A), +5Vsb (4A)

BTU Rating

5173 BTUs/hr (for rated output power of 980W)

Operating Environment

Operating Temperature: 10º to 35º C (50º to 95º F)

Non-operating Temperature: -40º to 70º C (-40º to 158º F)

Operating Relative Humidity: 8% to 90% (non-condensing)

Non-operating Relative Humidity: 5 to 95% (non-condensing)

Regulatory Compliance

Electromagnetic Emissions:

FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity:

EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4,

EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety:

EN 60950/IEC 60950-Compliant

UL Listed (USA)

CUL Listed (Canada)

TUV Certified (Germany)

CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials:

This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate"

Note: please visit our web site for information on supported operating systems.

E-3

Notes

E-4

Technical publication remarks form

Title:	NovaScale R422-E1/R422-INF-E1 Installation and User's Guide

Reference:	86 A1 93EW 01		Date: September 2008

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