

R422

Installation and User's Guide

NOVASCALÉ



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NOVASCALE

R422

Installation and User's Guide

Hardware

July 2007

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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/R422-INF servers. Installation and maintenance should be performed by experienced technicians only.

NovaScale R422/R422-INF servers are 1U Twin (two server boards in a 1U chassis) rackmount servers based in the NovaScale R422/R422-INF box (CSE-808T-980B) and two (twin) X7DBT or two X7DBT-INF server boards. The NovaScale R422 X7DBT/X7DBT-INF server boards support dual Intel® 5300/5100 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 Super NovaScale R422 X7DBT/X7DBT-INF serverboard and the NovaScale R422/R422-INF box (CSE-808T-980B).

Chapter 2: Server Installation

This chapter describes the steps necessary to install the NovaScale R422/R422-INF server 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 this 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/R422-INF server.

Chapter 5: Advanced Serverboard Setup

Chapter 5 provides detailed information on the NovaScale R422 X7DBT/X7DBT-INF server boards, 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 NovaScale R422/R422-INF box (CSE-808T-980B) 1U rackmount. 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 and Regulatory Information

Bibliography

- Bull *NovaScale R42x AOC-SIMSO/SIMSO+ Installation and User's Guide* (86 A1 96 ET 00)
- Bull *NovaScale Master User's Guide* (86 A2 49 EG)

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Chapter 1. Introduction

1.1 Overview

The NovaScale R422/R422-INF is a "1U Twin" server comprised of the NovaScale R422/R422-INF (CSE-808T-980B) 1U box and two (twin) NovaScale R422 X7DBT or two X7DBT-INF server boards.

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

- Four (4) CPU heatsinks (SNK-P0017)
- SATA Accessories:
 - Four (4) SATA hard drive carriers [MCP-220-00001-01]
 - One (1) internal SATA backplane (BPN-SAS-808)
 - One (1) SATA cable set (CBL-0201L)
- Two (2) PCI-E x8 riser cards (RSC-R1U-E8R)
- 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

1.2 Serverboard Features

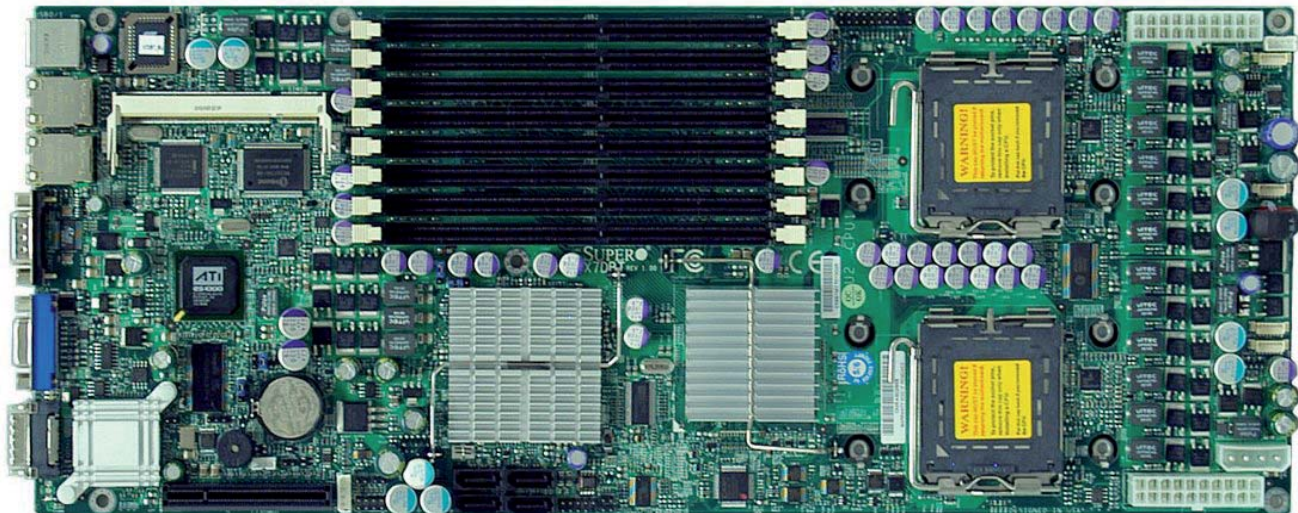


Figure 1-1 NovaScale R422 Motherboard (X7DBT/X7DBT-INF)

At the heart of the NovaScale R422/R422-INF server lies two (twin) NovaScale R422 X7DBT or two NovaScale X7DBT-INF dual processor server boards, which are based on Intel's 5000P chipset. Below are the main features of the NovaScale R422 X7DBT/X7DBT-INF motherboard. Note that the features on each board are doubled for the server.

Processors

Each NovaScale R422 X7DBT/X7DBT-INF motherboard supports dual Intel® 5300/5100 Series processors.

Memory

The NovaScale R422 X7DBT/X7DBT-INF motherboard has eight 240-pin DIMM sockets that can support up to 32 GB of ECC FBD (Fully Buffered DIMM) DDR2-667/533 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 5000P 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 X7DBT/X7DBT-INF motherboard has one PCI-Express x8 slot, so two PCI-Express x8 slots are provided in the server. In the NovaScale R422/R422-INF server configuration, riser cards have been pre-installed to support two low-profile PCI-Express x8 add-on cards.

Ethernet Ports

Two Intel® 82563EB network controllers are integrated into the 5000P chipset on each

of the server boards to support a total of four Gigabit LAN ports (100/1000 Base-T/1000BaseTX, RJ45 output).

Onboard Controllers/Ports

An onboard IDE controller supports Ultra ATA 100 hard drives or ATAPI devices. Onboard I/O back panel ports include one COM port, a VGA port, two USB ports, two Gigabit LAN (NIC) ports and (on the NovaScale R422-INF only) an InfiniBand® port. There are two sets of I/O ports included in the server (one set for each server board).



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 X7DBT/X7DBT-INF motherboard 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.

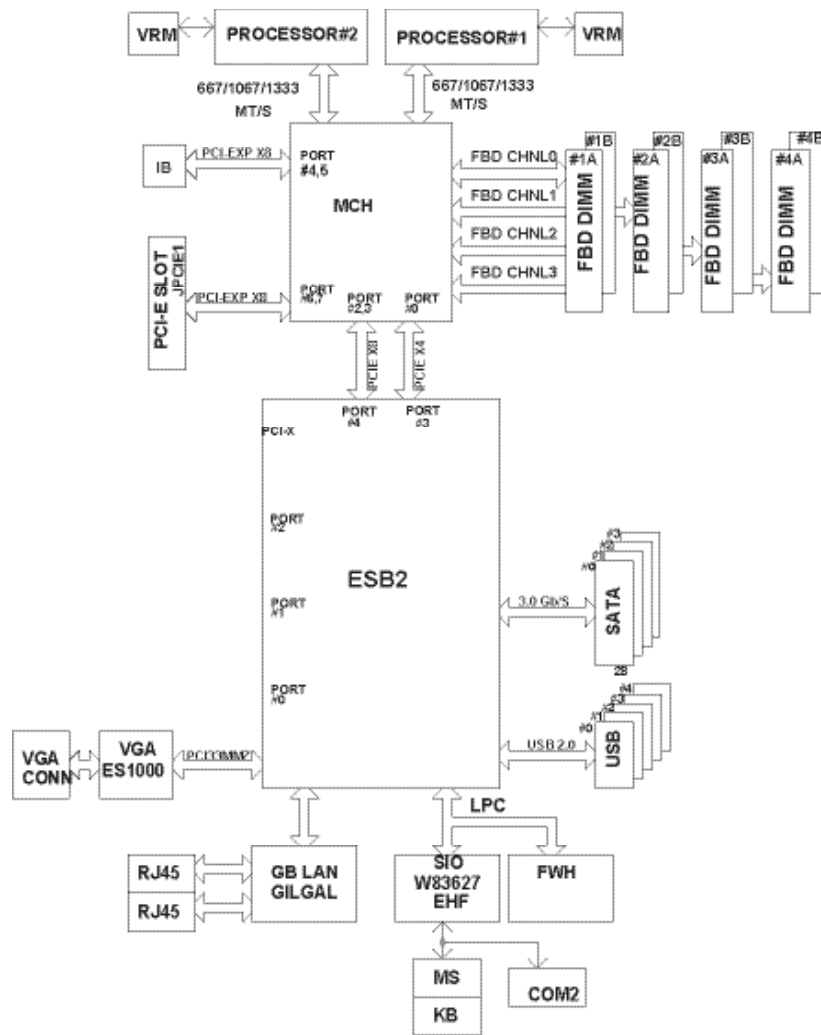


Figure 1-2. Intel 5000P Chipset: System Block Diagram



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 NovaScale R422/R422-INF (CSE-808T-980B) 1U chassis. Details on the chassis can be found in Chapter 6.

System Power

When configured as a NovaScale R422/R422-INF server, the NovaScale R422/R422-INF (CSE-808T-980B) box includes a single 980 W cold-swap power supply, which provides the power to both server boards housed in the chassis.

SATA Subsystem

The NovaScale R422/R422-INF (CSE-808T-980B) chassis was designed to support four SATA hard drives, which are hot-swappable units.

Control Panel

The NovaScale R422/R422-INF (CSE-808T-980B) box features two independent 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/R422-INF (CSE-808T-980B) is a 1U rackmount chassis. Its I/O panel provides a slots for two low-profile PCI-E x8 expansion cards, two COM ports, four USB ports, two VGA ports and four Gb Ethernet ports. The NovaScale R422-INF also provides two InfiniBand ports. See Chapter 6 for details.

Cooling System

The NovaScale R422/R422-INF (CSE-808T-980B) 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/R422-INF 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 server boards. 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 I²C 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/R422-INF 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).

1-5 Contacting Bull S.A.S.

For details on contacting Bull S.A.S go to <http://support.bull.com>

Chapter 2 Server Installation

2-1 Overview

This chapter provides a quick setup checklist to get your NovaScale R422/R422-INF server 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 pre-installed. 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/R422-INF 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/R422-INF. 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 Mounting Considerations* in the next section.

2-3 Preparing for Setup

The box the NovaScale R422/R422-INF server 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 63,5 cm (~25 inches).
- Leave approximately 76,2 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).



Warnings and Precautions!

Rack 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 rail.
- 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.

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 (T_{mra}), see Appendix D.

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/R422-INF server 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.

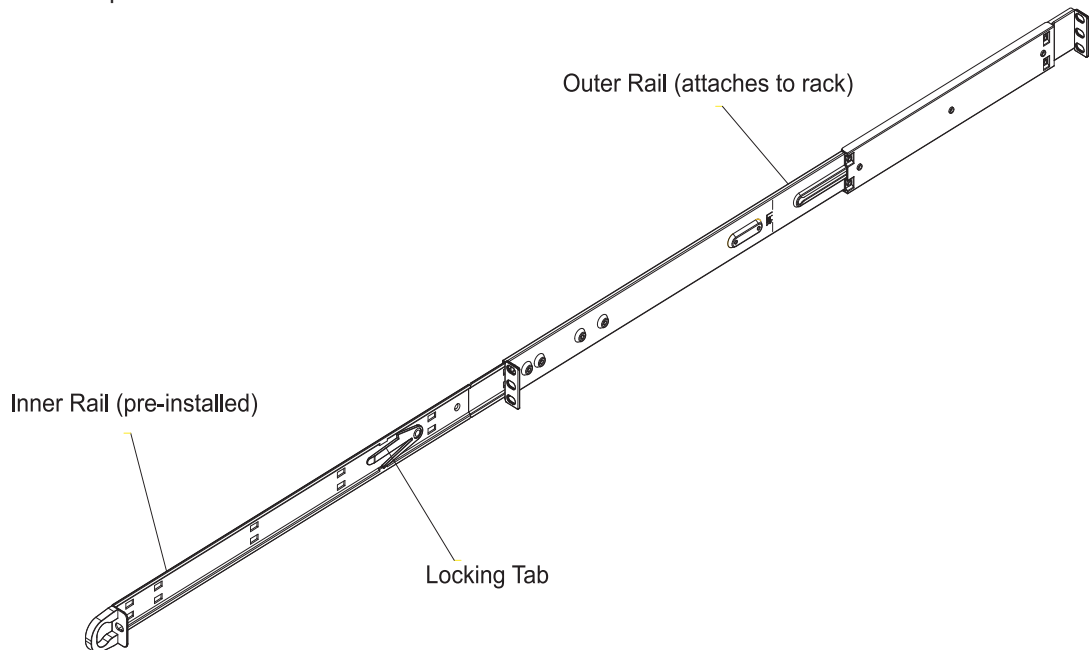


Figure 2-1. Identifying the Sections of the Rack Rails (right side rail shown)

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. Secondly, these tabs also lock the server in place when fully extended from the rack, This prevents the server from coming completely out of the rack when you pull it out for servicing.

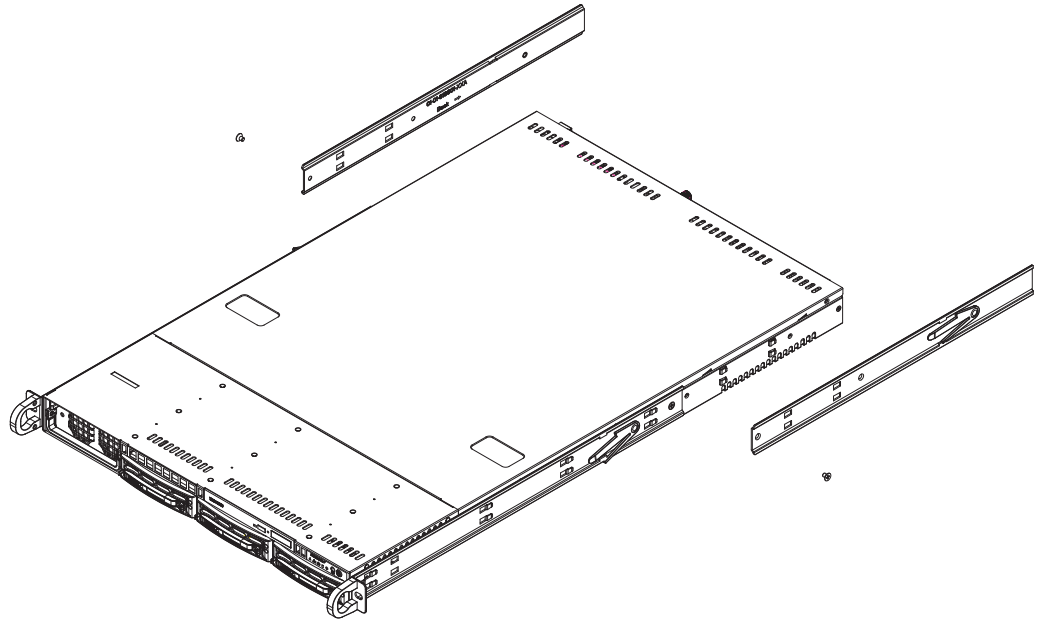


Figure 2-2. Installing the Rack Rails

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.

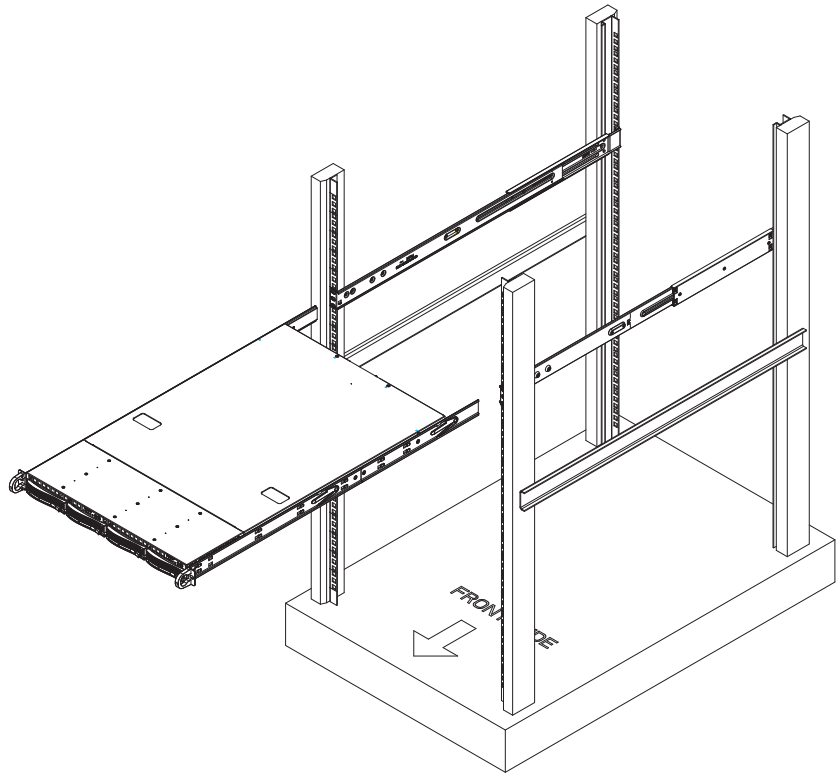


Figure 2-3. Installing the Server into a Rack

2-5 Checking the Serverboard Setup

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

1. Accessing the inside of the System (see Figure 2-4)

First, release the retention screws that secure the system to the rack. Grasp the two handles on either side and pull the system straight out until it locks (you will hear a "click"). Next, 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.

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.

2. Check the CPUs (processors)

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.

3. Check the system memory

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*.

4. Installing add-on cards

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

5. Check all cable connections and airflow

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

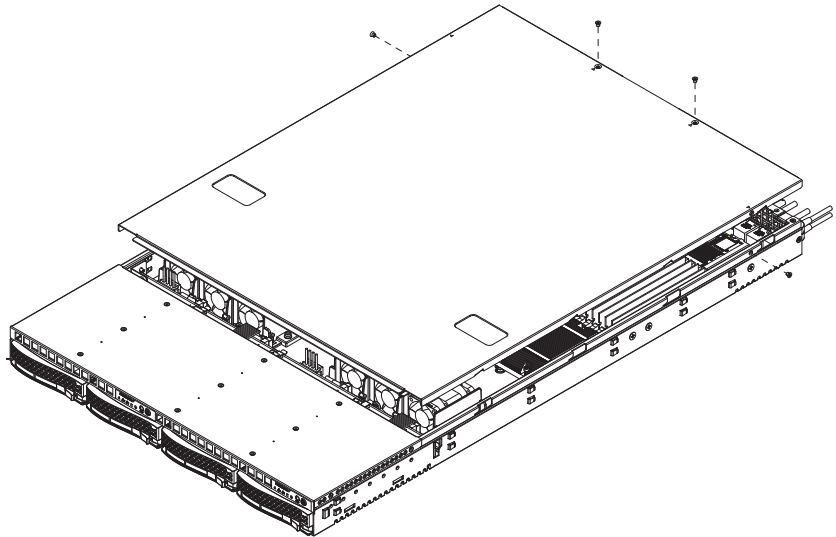


Figure 2-4. Accessing the Inside of the System

2-6 Checking the Drive Bay Setup

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.

1. Check the SATA drives

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

2. Check the airflow

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

3. Supplying power to the system

The last thing you must do is to provide input power to the system. Plug the power cord from the power supply module into a high-quality power strip that offers protection from electrical noise and power surges. It is recommended that you use an uninterruptible power supply (UPS) source.

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 : 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-button 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 **for the serverboard it is connected to only**. 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/R422-INF box (CSE-808T-980B) 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/R422-INF server 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** : The red LED indicates two states. When blinking, it indicates the drive is rebuilding. When solid, it indicates a drive failure. If a SATA drive fails, you should be notified by your system management software. Please refer to *Chapter 6* for instructions on replacing failed SATA drives.

Chapter 4 System Safety

4-1 Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the NovaScale R422/R422-INF server 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 server boards, memory modules and processors (not SATA drives). When disconnecting power, you should first power down the system with the operating system first and then unplug the power cord from the power supply unit.
- 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 cord must include a grounding plug and must be plugged into a grounded electrical outlet.
- Serverboard Battery: **CAUTION** - There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarities (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.

4-2 General Safety Precautions

Follow these rules to ensure general safety:



- Keep the area around the NovaScale R422/R422-INF server clean and free of clutter.
- The NovaScale R422/R422-INF server weighs approximately 18.2 kg (~ 40 lbs) 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:



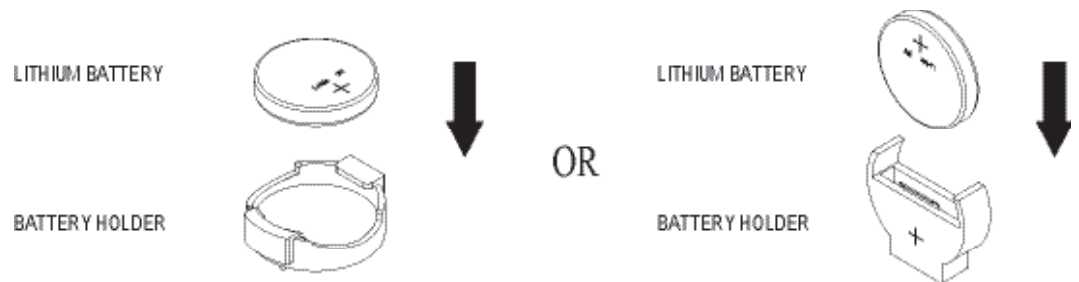
- Use a grounded wrist strap designed to prevent static discharge.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Do not let components or PCBs come into contact 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 NovaScale R422/R422-INF server is operating to assure proper cooling. Out of warranty damage to the NovaScale R422/R422-INF system can occur if this practice is not strictly followed.

Figure 4-1. Installing the Onboard Battery



The voltage of the Onboard Battery (For example : CR-2032) is 3.3v

Chapter 5 Advanced Serverboard Setup

This chapter covers the steps required to install the NovaScale R422 X7DBT/X7DBT-INF motherboard into the NovaScale R422/R422-INF box (NovaScale R422/R422-INF box (CSE-808T-980B) , 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. Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.

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 NovaScale R422 NovaScale R422 X7DBT/X7DBT-INF motherboard 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 NovaScale R422 X7DBT/X7DBT-INF motherboard into the NovaScale R422/R422-INF box (NovaScale R422/R422-INF box (CSE-808T-980B)). 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.

1. Accessing the inside of the system (see Figure 2-5)

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. You can then 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.)

2. Check compatibility of serverboard ports and I/O shield

The NovaScale R422 X7DBT/X7DBT-INF motherboard in a Twin 1U configuration requires the use of Bull's specially designed 1U Twin chassis: the NovaScale R422/R422-INF box (CSE-808T-980B). Make sure that the I/O ports on the server boards align properly with their respective holes in the I/O shield at the back of the chassis when installing.

3. Mounting the serverboard onto the serverboard tray

Carefully mount the server boards by aligning the board holes with the raised metal standoffs that are visible in the chassis. Insert screws into all the mounting holes on your server boards that line up with the standoffs and tighten until snug (if you screw them in too tight, you might strip the threads). 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 server boards 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 layout on [page 5-9](#) for connector locations.)



NOTE: Each connection listed should be made for both server boards in the chassis.

- **SATA drive cables (SATA1)**
- **Control Panel cable (JF1)**

Connecting Power Cables

The NovaScale R422 X7DBT/X7DBT-INF motherboard 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.

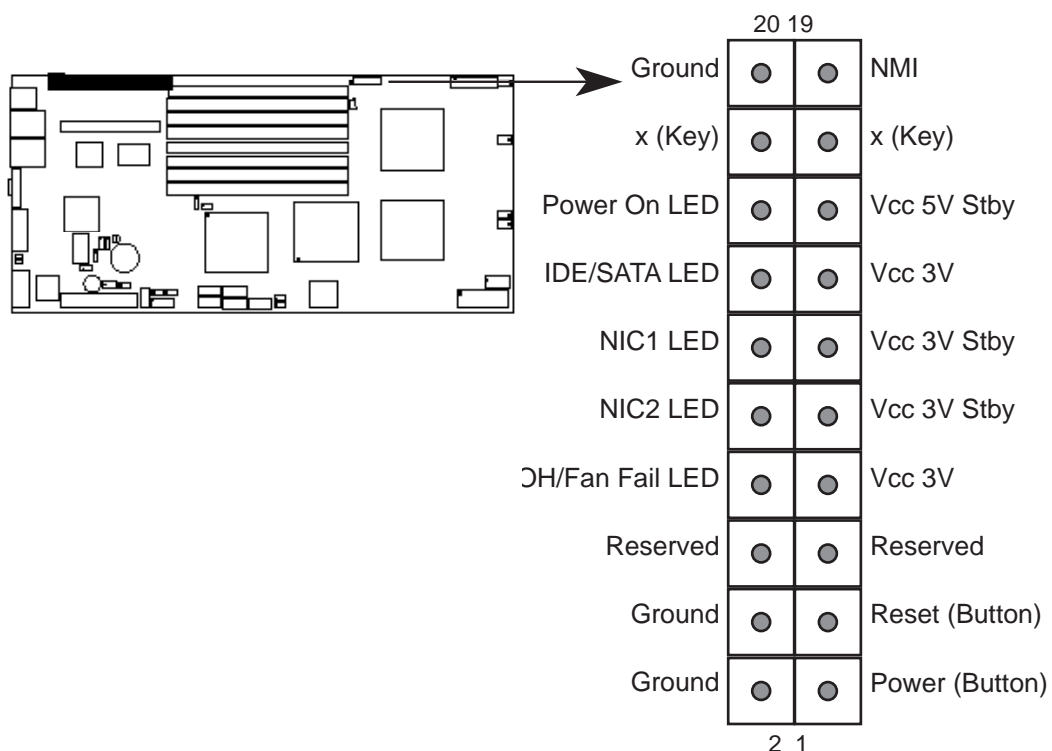


Figure 5-1. Control Panel Header Pins

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.

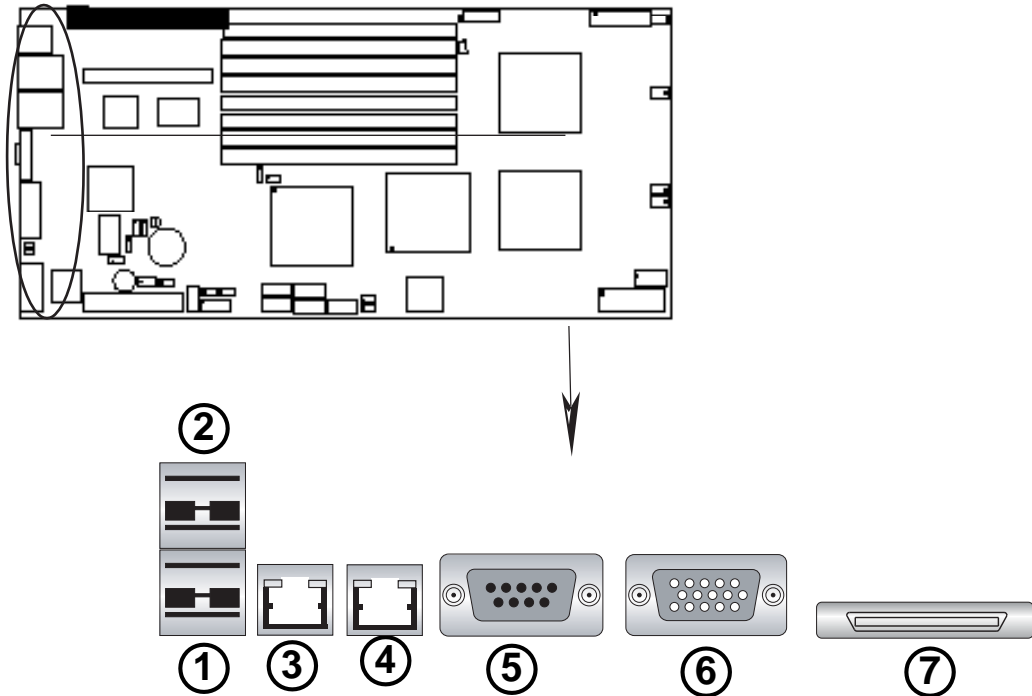


Figure 2-3. Back Panel I/O Port Locations and Definitions

Back Panel Connectors

1. Back Panel USB Port 0
2. Back Panel USB Port 1
3. Gigabit LAN 1
4. Gigabit LAN 2
5. COM Port 1 (Turquoise)
6. VGA Port (Blue)
7. InfiniBand Connector (for X7DBT-INF only)



NOTE : InfiniBand ports are included on the NovaScale R422-INF 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 Heatsink 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.

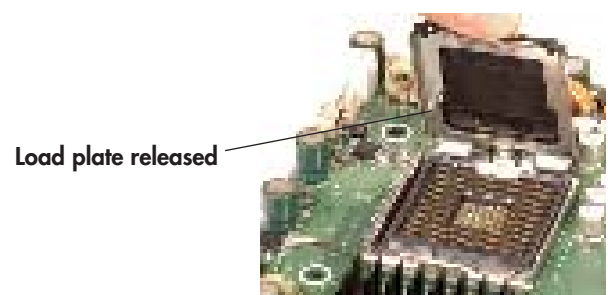
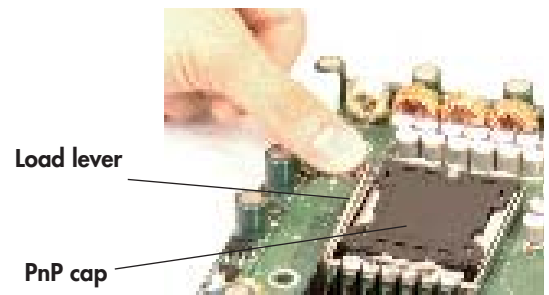
IMPORTANT! Always connect the power cord last and remove it first before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the heatsink and fan. The NovaScale R422 X7DBT/X7DBT-INF motherboard can support either one or two Xeon 5300/5100 type processors. If installing one processor only, install it into CPU socket #1.

NOTES:

1. Intel's boxed Xeon CPU package contains a CPU fan and heatsink 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 5300/5100 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.
2. Gently lift the load lever to open the load plate.



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.

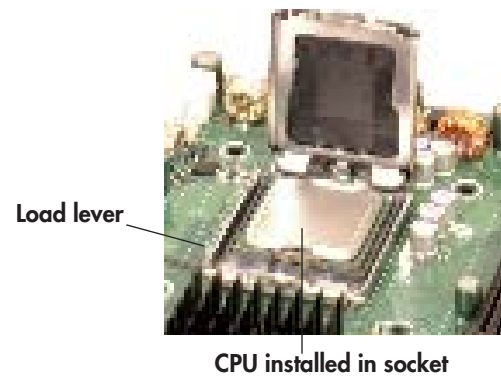
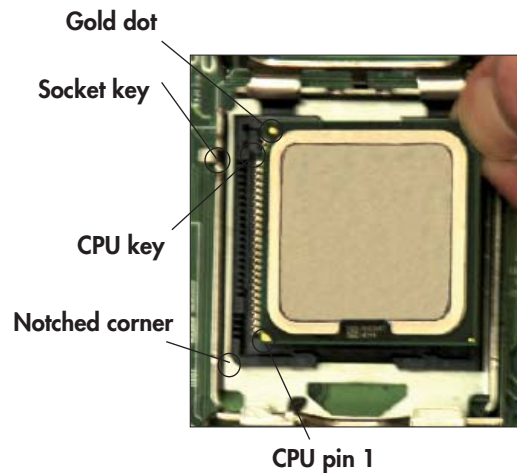
5. Find the corner of the CPU that has a semi-circle cutout below a gold dot (CPU key). This corner should be aligned with the cutout on the socket (socket key).

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. Repeat steps to install a second CPU if desired.



CPU installed in socket



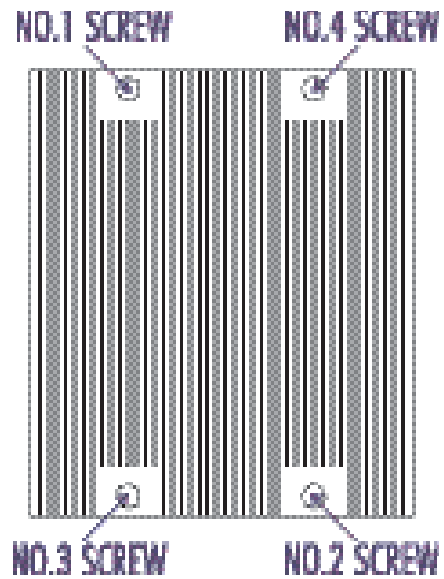
PnP cap released from load plate



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.

Installing the Heatsink

1. Do not apply any thermal grease to the heatsink or the CPU die; the required amount has already been applied.
2. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the (pre-installed) heatsink 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 Heatsink



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

1. Unscrew and remove the heatsink screws from the serverboard in the sequence as show in the picture above.
2. Hold the heatsink and **gently** wriggle the heatsink to loosen it from the CPU. (Do not use excessive force when wriggling the heatsink!!)
3. Once the heatsink is loose, remove it from the CPU.
4. Clean the surface of the CPU and the heatsink to get rid of the old thermal grease. Reapply the proper amount of thermal grease on the surface before you re-install the heatsink.

5-6 Installing Memory



CAUTION

Exercise extreme care when installing or removing DIMM modules to prevent any possible damage. Also note that the memory is interleaved to improve performance (see step 1).

DIMM Installation (See Figure 2-2)

1. Insert the desired number of DIMMs into the memory slots, starting with DIMM #1A. The memory scheme is interleaved so you must install two modules at a time, beginning with DIMM #1A, then DIMM #2A and so on. For optimal performance, please install four modules of the same type and same speed in Branch 0 and Branch 1 at a time (up to 8 modules maximum). (See the Memory Installation Table Below.)
2. Insert each DIMM module vertically into its slot. Pay attention to the notch along the bottom of the module to prevent inserting the DIMM module incorrectly.
3. Gently press down on the DIMM module until it snaps into place in the slot. Repeat for all modules (see step 1 above).

Memory Support

The NovaScale R422 X7DBT/X7DBT-INF motherboard supports up to 32 GB fully buffered (FBD) ECC DDR2 533/667 in 8 DIMMs. **Populating DIMM modules with pairs of memory modules of the same size and same type will result in Interleaved Memory which will increase memory performance.**



NOTE : Due to OS limitations, some operating systems may not show more than 4 GB of memory.

Optimized DIMM Population Configurations

Number of DIMMs	Branch 0				Branch 1			
	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

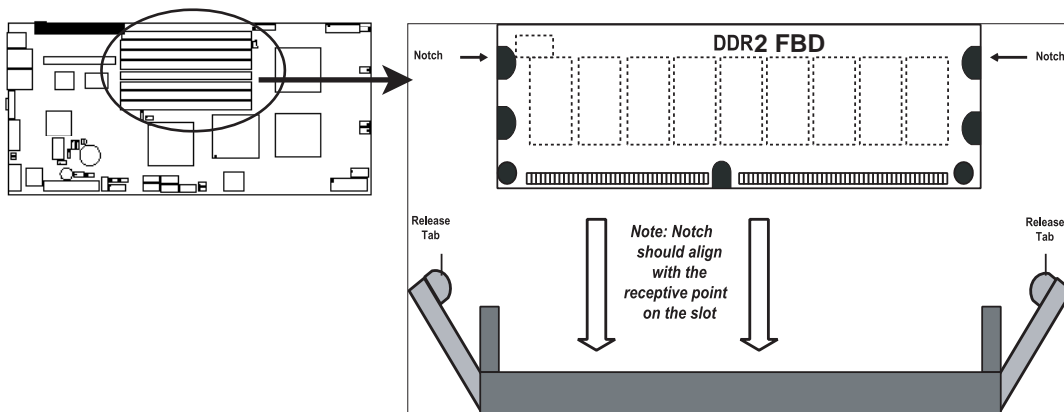
NOTES

- i. DIMM slot# specified: DIMM slot to be populated; “–”: DIMM slot not to be populated.
- ii. Both FBD 533 MHz and 667 MHz DIMMs are supported; however, you need to use the memory modules of the same speed and of the same 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.

NOTE : Due to memory allocation to system devices, memory remaining available for operational use will be reduced when 4 GB of RAM is used. The reduction in memory availability is disproportional. (Refer to the Memory Availability Table below for details.)

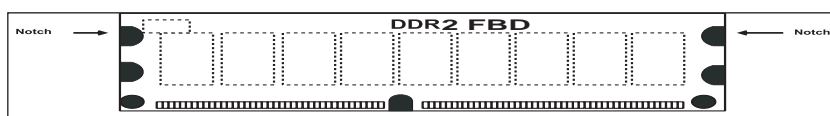
Possible System Memory Allocation & Availability			
System Device	Size	Physical Memory Remaining (-Available) (3 GB Total System Memory)	Physical Memory Remaining (-Available) (4 GB Total System Memory)
Firmware Hub flash memory (System BIOS)	1 MB	3.00	3.99
Local APIC	4 KB	3.00	3.99
Area Reserved for 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

Figure 5-3. Installing and Removing DIMMs



To Install

Insert module vertically and press down until it snaps into place. Pay attention to the alignment notch at the bottom.



To Remove

Use your thumbs to gently push the release tabs near both ends of the module. This should release it from the slot.

5-7 Adding PCI Cards

64-bit PCI-X slot

The NovaScale R422/R422-INF includes two pre-installed riser cards designed specifically for use in the NovaScale R422/R422-INF box (CSE-808T-980B) 1U rackmount chassis. These riser cards support two low-profile PCI-Express x8 cards to fit inside the chassis.

PCI card installation

The riser card has already been pre-installed 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

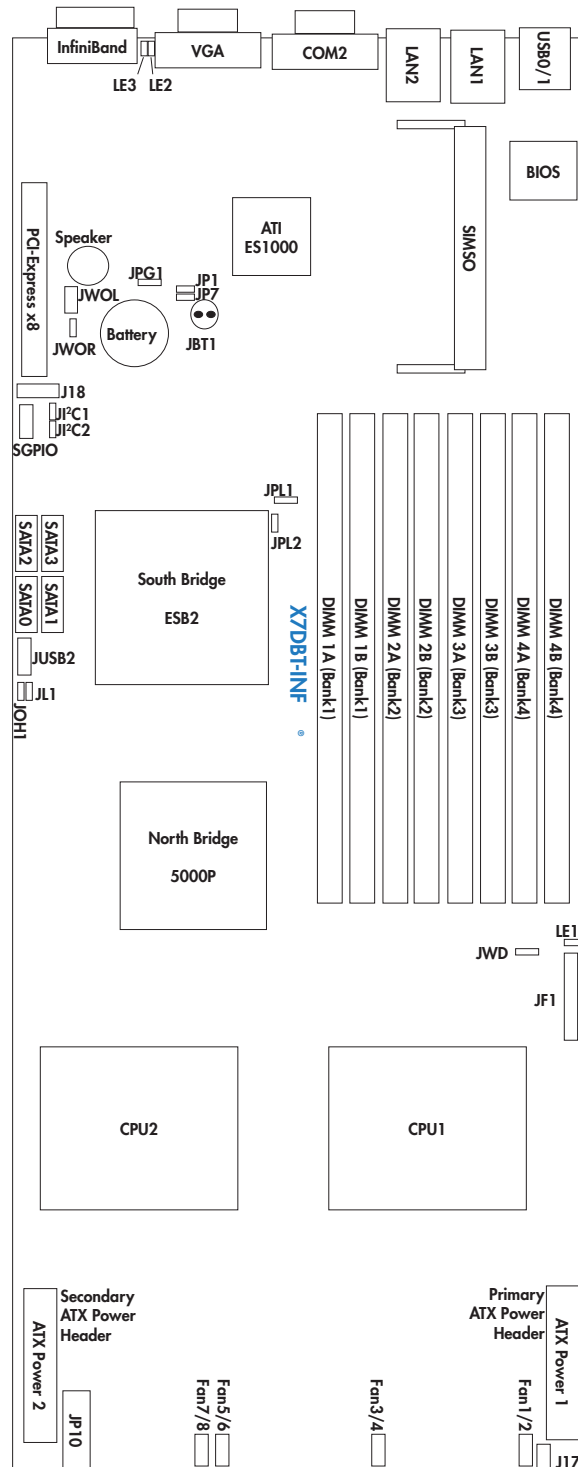


Figure 5-4. NovaScale R422 X7DBT/X7DBT-INF motherboard Layout (not drawn to scale)

Notes

Jumpers not indicated are for test purposes only.

The InfiniBand port is included on the X7DBT-INF only.

NovaScale R422 X7DBT/X7DBT-INF Motherboard Quick Reference details

Jumper	Description	Default Setting
JBT1	CMOS Clear	See Section 5-10
J12C1/J12C2	I ² C to PCI-Express Slot	Open (Disabled)
JPG1	VGA Enable	Pins 1-2 (Enabled)
JPL1/JPL2	LAN1/LAN2 Enable/Disable	Pins 1-2 (Enabled)
JWD (JWD)	Watch Dog	Pins 1-2 (Reset)

Connector	Description
ATX Power 1	20-Pin ATX PWR Connector (for Primary Board)
ATX Power 2	20-Pin ATX PWR Connector (for Secondary Board)
COM2	COM2 Serial Port/Header
FAN 1-6	Chassis and CPU Fan Headers
InfiniBand*	InfiniBand Connector
J17	System Management Power (I2C) Header
J18	System Management Bus Header
JF1	Front Control Panel Connector
JL1	Chassis Intrusion Header
JOH1	Overheat LED Header
JPI2C	System Management Power (I2C) Header
JP10	4-pin Auxiliary Power Connector (for HDDs)
JWOL	Wake-on-LAN Header
JWOR	Wake-on-Ring Header
LAN1/2	Gigabit Ethernet Ports
SATA0-SATA3	Intel SATA 0-3 Ports
SGPIO	Serial ATA General Purpose Input/Output Header
SIMSO IPMI	SIMSO IPMI Socket
USB0/1	USB0/1 Ports
USB2/3	USB0/1 Headers

LED Indicator	Description
LE1	Onboard Power LED Indicator
LE2*	InfiniBand Link LED (green)
LE3*	InfiniBand Activity LED (yellow)

*X7DBT-INF only



NOTE: 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).

5-9 Motherboard detailed features

CPU

- Dual Intel® 64-bit Xeon LGA 771 dual core/quad core processors at a front side bus speed of 1333 MHz, 1066 MHz or 667 MHz

Memory

- Eight 240-pin DIMM sockets with support up to 32 GB DDR2 Fully Buffered (FBD) ECC 667/533 Memory.

Chipset

- For the X7DBT/X7DBT-INF: Intel 5000P chipset, including: the 5000P Memory Control Hub (MCH), and the Enterprise South Bridge 2 (ESB2).

Expansion Slots

- One PCI-Express slot (*one PCI-E slot x8: JPCIE1)

BIOS

- 8 Mb Phoenix® Flash ROM
- DMI 2.3, PCI 2.2, ACPI 1.0/2.0, Plug and Play (PnP), USB Keyboard Support, SMBIOS 2.3

PC Health Monitoring

- Onboard voltage monitors for CPU cores, chipset voltage (+1.5V), memory voltage, +3.3V, +5V, +12V, -12V, +3.3V Standby, +5V standby, HT and VBAT
- Fan status monitor with firmware control
- CPU/chassis environment monitoring
- Platform Environment Control Interface (PECI) ready
- CPU fan auto-off in sleep mode
- CPU slow-down on temperature overheat
- CPU thermal trip support for processor protection, power LED
- Power-up mode control for recovery from AC power loss
- Auto-switching voltage regulator for CPU cores
- System overheat/Fan Fail LED Indicator and control
- Chassis intrusion detection
- I²C temperature sensing logic
- Thermal Monitor 2 (TM) support

ACPI Features

- Slow blinking LED for suspend state indicator
- Main switch override mechanism
- ACPI Power Management

Onboard I/O

- Four SATA2 ports (supporting RAID0, 1, 10 and 5)
- One SIMSO IPMI slot
- One Intel Gigabit Ethernet 82563EB controller supports two Giga-bit LAN ports
- One COM port
- Up to four USB 2.0 (Universal Serial Bus) (2 ports, 2 Headers)
- ATI ES1000 Graphic Controller with 16MB Video Memory
- Super I/O: Winbond W83627HF
- Mellanox MT25204A0-FCC-D InfiniBand Controller supports one InfiniBand connector (Only on Novascale R422-INF (X7DBT-INF) motherboard)

Other

- External modem ring-on
- Wake-on-LAN (WOL)
- Wake-on-Ring (WOR)
- Console redirection
- Onboard Fan Speed Control by Thermal Management via BIOS

Dimensions

- Proprietary 16.0" x 6.5" (406.4 mm x 165.1 mm)

Chipset Overview

The Intel 5000P Chipset (for the X7DBT/X7DBT-INF) is built upon the functionality and the capability of the 5000P chipset, the X7DBT/X7DBT-INF motherboard provides the performance and feature set required for dual processor-based servers with configuration options optimized for communications, presentation, storage, computation or database applications. The 5000P chipset supports single or dual Xeon 64-bit dual core processor(s) with front side bus speeds of up to 1.333 GHz. The chipset consists of the 5000P Memory Controller Hub (MCH) and the Enterprise South Bridge 2 (ESB2).

The 5000P MCH chipset is designed for symmetric multiprocessing across two independent front side bus interfaces. Each front side bus uses a 64-bit wide, 1333 MHz data bus that transfers data at 10.7 GB/sec. The MCH chipset connects up to eight Fully Buffered DIMM modules, providing a total memory of up to 32.0 GB for DDR2 667/533 MHz. The MCH chipset also provides one x8 PCI-Express and one x4 ESI interfaces to the ESB2. In addition, the 5000P chipset offers a wide range of RAS features, including memory interface ECC, x4/x8 Single Device Data Correction, CRC, parity protection, memory mirroring and memory sparing.

The Xeon Dual Core Processor Features

Designed to be used with conjunction of the 5000P chipset, the Xeon dual core Processor provides a feature set as follows:

- L1 Cache Size: Instruction Cache (32KB/16KB), Data Cache (32KB/24KB)
- L2 Cache Size: 4MB/2MB (per core)

- Data Bus Transfer Rate: 8.5 GB/s
- Package: FC-LGA6/FC-LGA4, 771 Lands

Special Features

Recovery from AC Power Loss

The feature allows the user to set the power state after a power outage. You can select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before the power loss. The default setting is Last State.

5-10 PC Health Monitoring

 **NOTE:** For more information on monitoring the performance and health of your server see the *Bull NovaScale R42x AOC-SIMSO/SIMSO+ Installation and User's Guide* and the *Bull NovaScale Master User's Guide*

This section describes the PC health monitoring features of the X7DBT/X7DBT-INF. All models have an onboard System Hardware Monitor chip that supports PC health monitoring.

An onboard voltage monitor will scan voltages, listed below, continuously. Once a voltage becomes unstable, a warning is given or an error message is sent to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

Monitored Voltages

Onboard Voltage Monitors for CPU Cores, Memory Voltage, Chipset Voltage (+1.5V), +1.8V, +3.3V, +5V, +12V, -12V, +3.3V Standby, +5V standby, HT and VBAT

Fan Status Monitor with Firmware Control

The PC health monitor can check the RPM status of the cooling fans. The onboard CPU and chassis fans are controlled by Thermal Management 2 (TM2) via BIOS (under Hardware Monitoring in the Advanced Setting).

Environmental Temperature Control

The thermal control sensor monitors the CPU temperature in real time and will turn on the thermal control fan whenever the CPU temperature exceeds a user-defined threshold. The overheat circuitry runs independently from the CPU. Once it detects that the CPU temperature is too high, it will automatically turn on the thermal fan control to prevent any overheating damage to the CPU. The onboard chassis thermal circuitry can monitor the overall system temperature and alert users when the chassis temperature is too high.

CPU Fan Auto-Off in Sleep Mode

The CPU fan is activated when the power is turned on. It continues to operate when the system enters Standby mode. When in sleep mode, the CPU will not run at full power, thereby generating less heat.

CPU Overheat LED and Control

This feature is available when the user enables the CPU overheating warning function in the BIOS. This allows the user to define an overheat temperature. When the temperature exceeds a user pre-defined threshold, both overheat fan and warning LED are triggered.

5-11 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a PC system, including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as CD-ROMs, network cards, hard disk drives and printers. This also includes consumer devices connected to the PC such as VCRs, TVs, telephones and stereos.

In addition to enabling operating system-directed power management, ACPI provides a generic system event mechanism for Plug and Play and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures while providing a processor architecture-independent implementation that is compatible with both Windows 2000 and Windows NT 5.0.

Slow Blinking LED for Suspend-State Indicator

When the CPU goes into a suspend state, the chassis power LED will start blinking to indicate that the CPU is in suspend mode. When the user presses any key, the CPU will wake up and the LED will automatically stop blinking and remain on.

Main Switch Override Mechanism

When a power supply is used, the power button can function as a system suspend button to make the system enter a SoftOff state. The monitor will be suspended and the hard drive will spin down. Pressing the power button again will cause the whole system to wake up. During the SoftOff state, the power supply provides power to keep the required circuitry in the system alive. In case the system malfunctions and you want to turn off the power, just press and hold the power button for 4 seconds. This option can be set in the Boot Features Section under Advanced Setup in the BIOS.

External Modem Ring-On

Wake-up events can be triggered by a device such as the external modem ringing when the system is in the SoftOff state. Note that external modem ring-on can only be used with an ATX 2.01 (or above) compliant power supply.

Wake-On-LAN (WOL)

Wake-On-LAN is defined as the ability of a management application to remotely power up a computer that is powered off. Remote PC setup, updates and asset tracking can occur after hours and on weekends so that daily LAN traffic is kept to a minimum and users are not interrupted. The motherboard has a 3-pin header (WOL) to connect to the 3-pin header on a Network Interface Card (NIC) that has WOL capability. In addition, an onboard LAN controller can also support WOL without any connection to the WOL header. The 3-pin WOL header is to be used with a LAN add-on card only.

5-12 Connector Definitions

ATX Power Connector

The main ATX power supply connectors on the NovaScale R422 X7DBT/ X7DBT-INF motherboard meets the SSI (Superset ATX) 24-pin specification. 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.**

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

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

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.

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 chassis. 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 X7DBT/X7DBT-INF motherboard 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 (Fan 1/2 - 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

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

USB Headers Pin Definitions (USB1, USB2)			
USB3/5		USB2/4	
Pin #	Definition	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.



LAN1



LAN2

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

Wake-On-Ring

The Wake-On-Ring header is designated JWOR. This function allows your computer to receive and be "awakened" by an incoming call when in the suspend state. See the table on the right for pin definitions. You must also have a WOR card and cable to use this feature.

Wake-On-Ring Pin Definitions (JWOR)	
Pin#	Definition
1	Ground (Black)
2	Wake-up

Serial Ports

One serial port is included on the serverboard: COM2 is a port located beside the VGA port. See the table on the right for pin definitions.

Serial Port Pin Definitions (COM2)			
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. SGPIO is used to monitor SATA activity. See the table on the right for pin definitions.

SGPIO Headers 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 J12C 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 (I ² C) Pin Definitions (J17)	
Pin#	Definition
1	Clock
2	Data
3	Power Fail
4	Ground
5	+3.3V

SMB

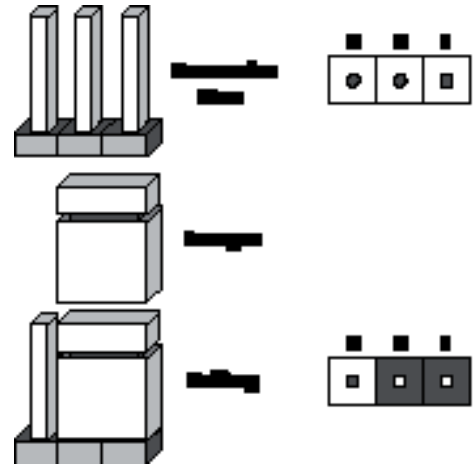
A System Management Bus header is located at J18. Connect the appropriate cable here to utilize SMB on your system.

SMB Header Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

5-13 Jumper Settings

Explanation of Jumpers

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.

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
Pins 1-2	Enabled
Pins 2-3	Disabled

I²C to PCI-Express Slot

J12C1/J12C2 allows you to enable the I2C 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.

I ² C to PCI-Express Slot Jumper Settings (J12C1/J12C2)	
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. Watch Dog must also be enabled in BIOS.

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.

5-14 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 connector. 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

Chapter 6 Advanced Chassis Setup

This chapter covers the steps required to install components and perform maintenance on the NovaScale R422/422-INF (CSE-808T-980B) 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.

Tools Required

The only tool you will need to install components and perform maintenance is a Phillips 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.

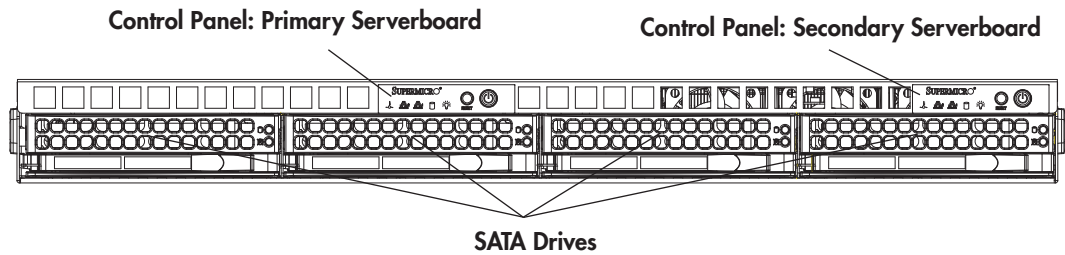
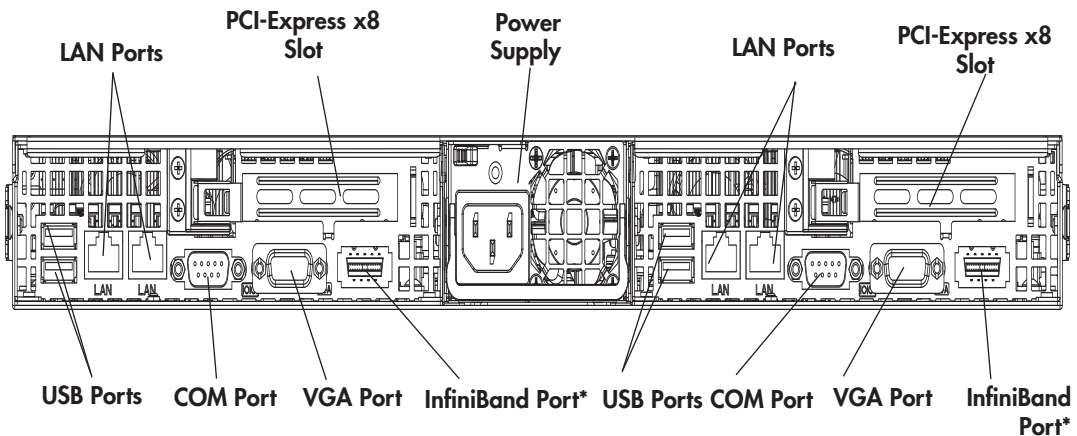


Figure 6-1. Chassis Front View



*The InfiniBand ports are included on the the NovaScale R422-INF only.

Figure 6-2. Chassis Rear View

6-2 Control Panel

Each control panel on the front of the chassis must be connected to the JF1 connector on its associated 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/R422-INF. 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 ribbon 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

1. Mounting a SATA drive in a drive carrier

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. To add a new drive, install it into the carrier with the printed circuit board side facing down so that the mounting holes align with those in the carrier. Secure the drive to the carrier with four screws, as shown in *Figure 6-3*.

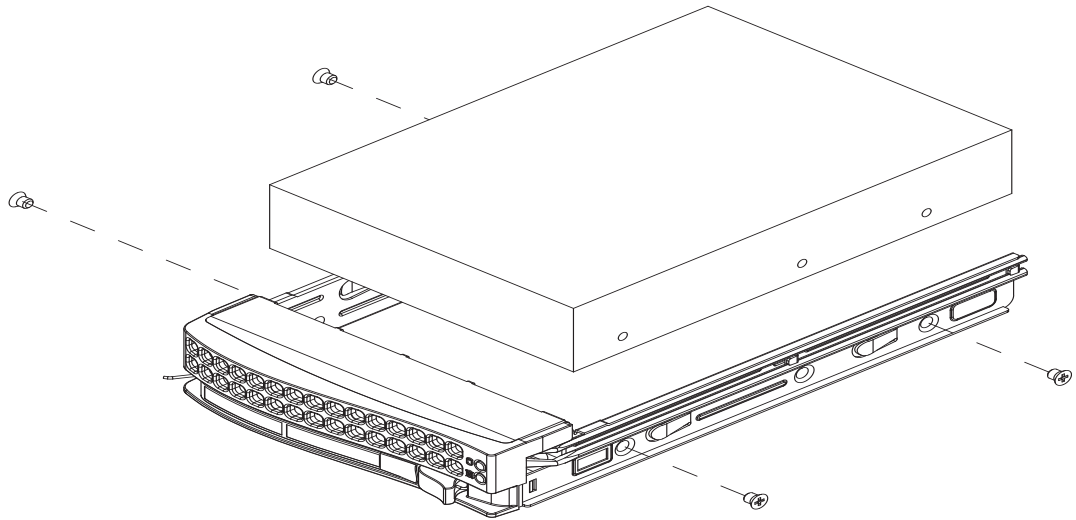


Figure 6-3. Mounting a Drive in a Carrier

2. Installing/removing hot-swap SATA drives

The drive carriers are all easily accessible at the front of the chassis. These are (with RAID enabled) hot-swap drives. To remove a carrier, push the release button located beside the drive LEDs. Then swing the handle fully out and use it to pull the unit straight out (see *Figure 6-4*).

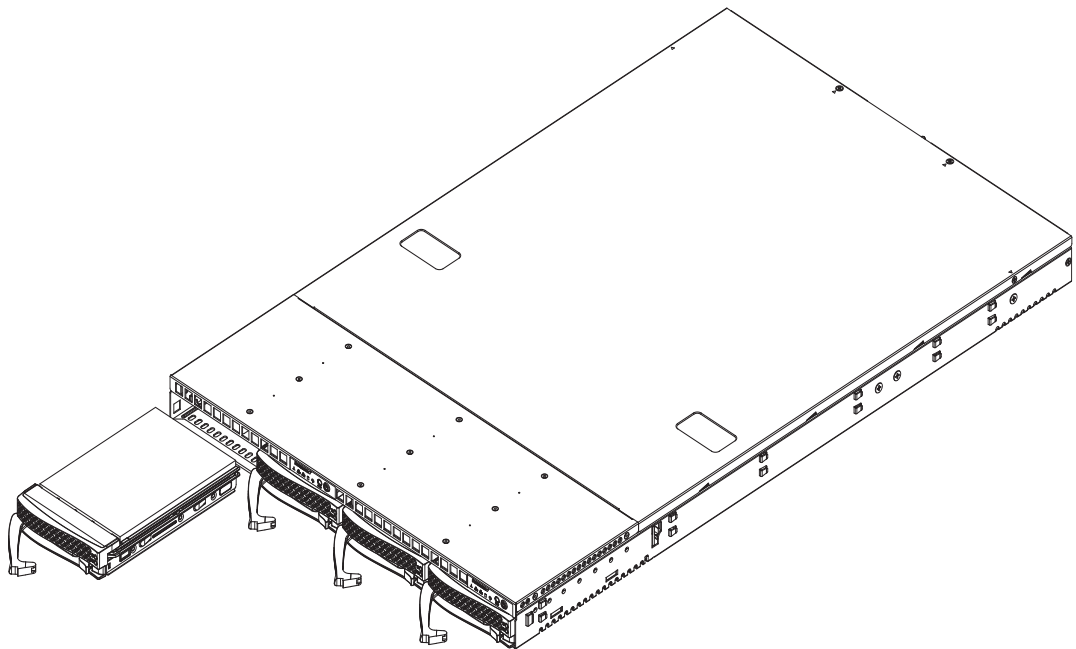


Figure 6-4. Removing a SATA Drive

6-5 Power Supply

The NovaScale R422/R422-INF server has a single 980 watt power supply. This power supply has the capability of operating at 100 - 240 input volts. Depress both 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. Support (PWS-981-1S - see contact information in *Chapter 1*).

Replacing the Power Supply

1. Accessing the inside of the system

To replace a power supply, you must first remove the top chassis cover. To do so, first release the retention screws that secure the unit to the rack. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click"). 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. You can then lift the top cover from the chassis to gain full access to the inside of the server.

2. Removing the power supply

First unplug the power cord from the system. To remove the failed power unit, remove the two screws on the back of the power supply, which secure it to the chassis. You can then lift the unit straight out of the chassis. (See *Figure 6-5*.)

3. Installing a new power supply

Replace the failed unit with another unit of the same wattage. You must replace it with the exact same power supply. Carefully insert the new unit into position in the chassis and secure it with the two screws at the rear of the unit. Before reconnecting the power cord, make sure the power switch on the power supply is in the off position. Then reconnect the power cord, replace the chassis top cover and push the unit back into the rack. Finish by turning the power switch on the power supply on, and then depress the power buttons on the front of the chassis.

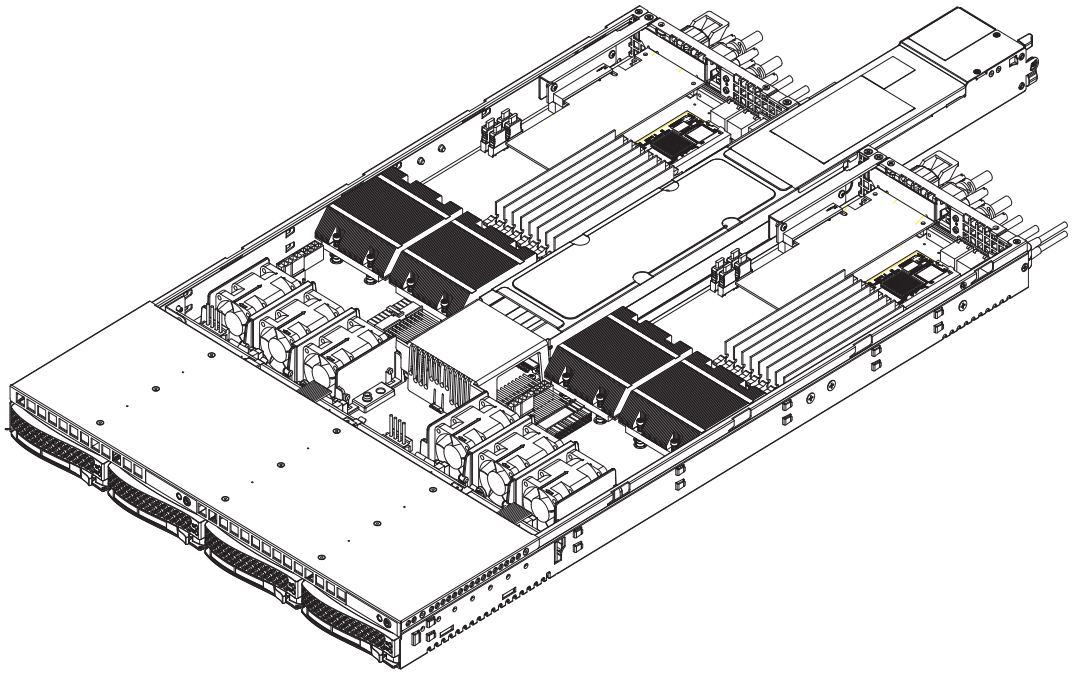


Figure 6-5. Removing the Power Supply

Chapter 7 BIOS

7-1 Introduction

This chapter describes the Phoenix BIOS™ Setup utility for the NovaScale R422 X7DBT/ X7DBT-INF motherboard. 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.

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. Each time 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. (See below.)

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:

To prevent possible boot failure, do not shut down or reset the system while updating BIOS.

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 (See the next 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

Main Setup Features

System Time

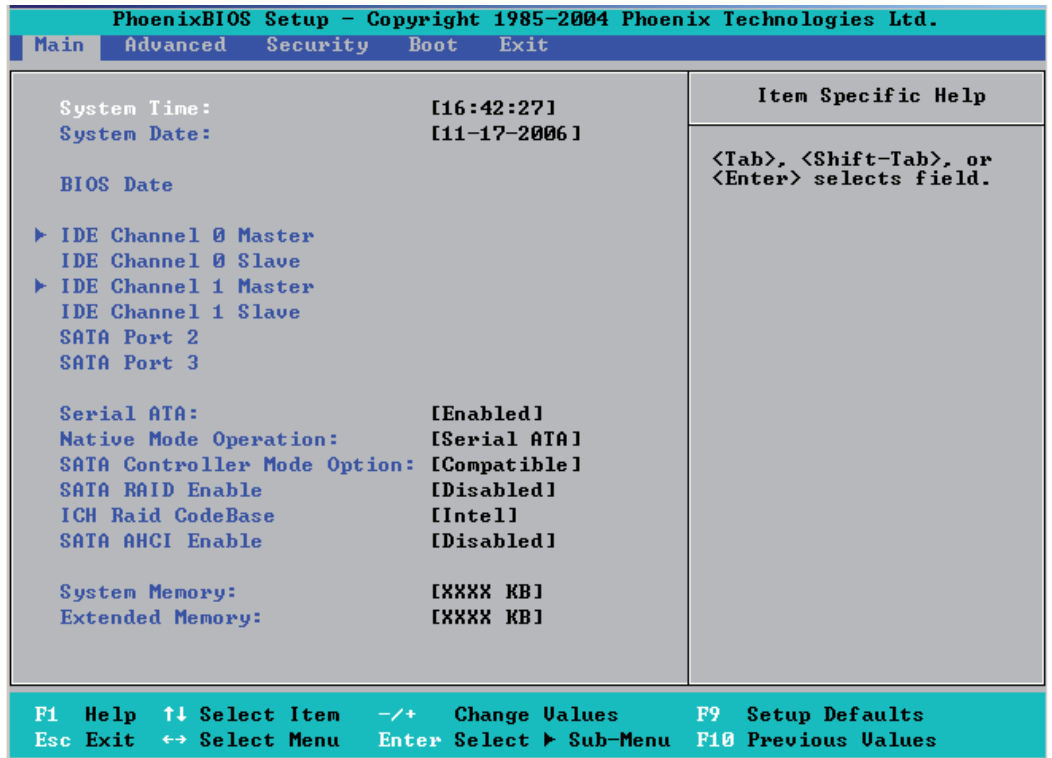
To set the system date and time, key in the correct information in the appropriate fields. Then press the <Enter> key to save the data.

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.

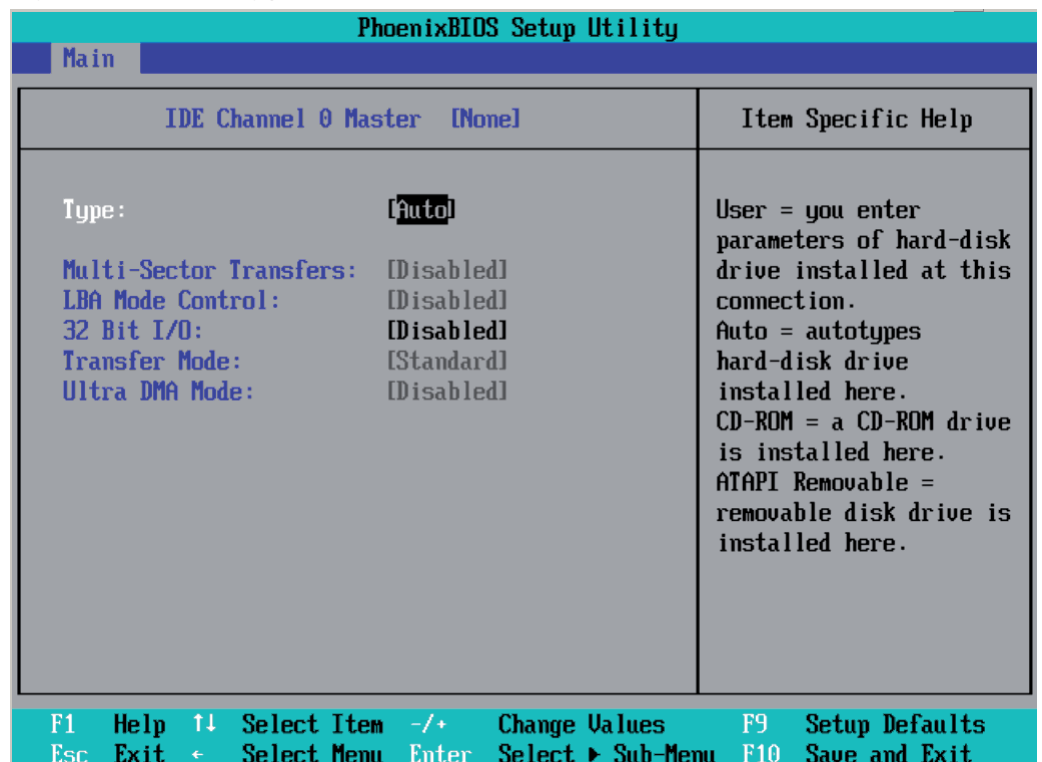
BIOS Date

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



▶ IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave, SATA Port2 and SATA Port3

These settings allow the user to set the parameters of IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave, IDE Channel 2 Master, IDE Channel 3 Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu 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.

Native Mode Operation

Select the native mode for ATA. The options are: Serial ATA and **Auto**.

SATA Controller Mode

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: 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 Intel or Adaptec Host RAID firmware to be activated. If this item is set to **Disabled**, the item-SATA AHCI Enable will be available.) The options are Enabled and

Disabled.

ICH RAID Code Base (Available when SATA RAID is Enabled)

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 (Available when SATA RAID is Disabled)

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

System Memory

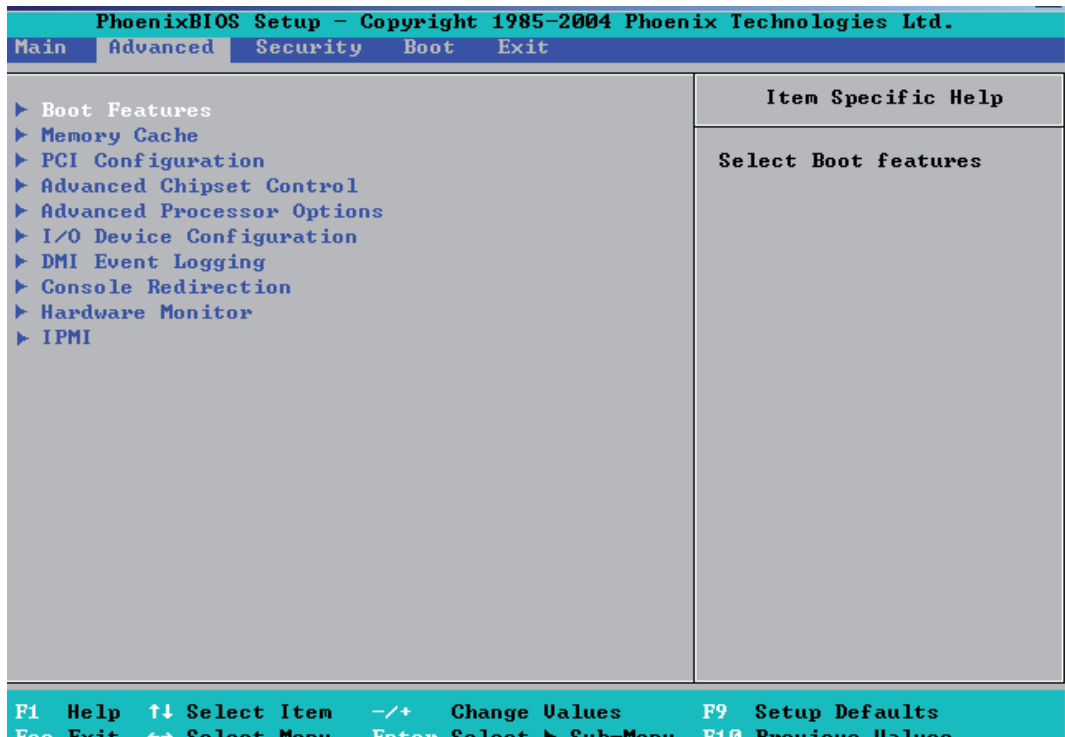
This display informs you how much system memory is recognized as being present in the system.

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 submenus that can be accessed by highlighting the item and pressing <Enter>.



▶ 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 this 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**.

Power Loss Control

The feature allows the user to set the power state after a power outage. You can select Stay Off for the system power to remain off after a power loss. Select Power On for the system power to be turned on after a power loss. Select **Last State** to allow the system to resume its last state before the power loss.

Watch Dog

If enabled, this option will automatically reset the system if the system is not active for more than 5 minutes. 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 BIOS to write (cache) its data into it. Select **Write Protect** to enable the function and reserve this area for system 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 BIOS to write (cache) its data into it. Select **Write Protect** to enable the function and reserve this area for the Video BIOS ROM access only. Select Uncached to disable this function.

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 or L2 cache inside the CPU to speed up CPU's 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 in order to speed up CPU's 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 or L3 cache inside the CPU to speed up CPU's 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 to speed up CPU's 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

Enabling this option provides the capability to boot from GLAN Port 1 or GLAN Port 2. The options are **Disabled** and Enabled.

Default Primary Video Adapter

This feature allows the user to specify which video adapter is to be used as the default primary video adapter: the onboard video adapter or others. The options are Other and **Onboard Video**.

Emulated IRQ Solutions

The options are **Disabled** and Enabled.

PCI-Exp. I/O Performance

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128 Bytes, while others perform faster with a payload size of 256 bytes, which inhibits coalesce features. **Please refer to your add-on card user guide for the desired setting.** The options are Payload (256 Bytes) and **Coalesce Enabled (128 Bytes)**.

PCI Parity Error Forwarding

The feature allows SERR and PERR errors detected in PCI slots to be sent (forwarded) to the BIOS DMI Event Log for the user to review. The options are Enabled and **Disabled**.

ROM Scan Ordering

This feature allows the user to decide which Option ROM to be activated first. The options are **Onboard first** and Add-On first.

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 x8

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-throughput 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 a hard drive is 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:

Use caution when changing the Advanced settings. Incorrect values entered may cause system to malfunction. Also, a very high DRAM frequency or incorrect DRAM timing may cause system to become unstable. When this occurs, revert the item 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.

4GB PCI Hole Granularity

This feature allows you to specify the size of PCI hole granularity for a PCI slot. 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 0/1 Rank Interleaving

Select enable to enable the feature of memory Interleaving for Branch 0 Rank/Branch 1 Rank. The options are 1:1, 1:2 and **1:4**.

Branch 0/1 Rank Sparing

Select enable to enable the sparing feature for Branch 0 Rank/Branch 1 Rank. 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**.

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 the function of 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 device exceeds a predefined threshold. The options are Enabled and **Disabled**.

Global Activation Throttle

Select Enabled to enable open-loop global thermal throttling on a fully buffered (FBD) memory module to make it active whenever the number of activate control exceeds a predefined number. The options are Enabled and **Disabled**.

Snoop Filter

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

Crystal Beach Features

This feature was designed to implement Intel's 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 the 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**.

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**.

Enabling Multi-Media Timer

Select Yes to activate a set of timers that are alternative to the traditional 8254 timers for the OS use. The options 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 Legacy USB device support. 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.

Hyper-threading (Available when supported by the CPU)

Set to Enabled to use the Hyper-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled**.

Core-Multi-Processing (Available when supported by the CPU)

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**.

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 Enhanced Mode (Available when supported by the CPU)

Select **Disable** to disable the Standard C1 Halt State which will partially turn off the CPU internal clocks to conserve energy and prevent system overheating when the OS is idle. Select Enable to use the Enhanced C1 Halt State to lower the CPU clock frequency and the supply voltage before turning off the clocks.

Execute Disable Bit (Available when 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 be executed 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.

The options are **Disabled** and Enabled.



NOTE: For more information regarding hardware/software support for this function, please refer to Intel's and Microsoft's web sites.

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

Set this option to Enabled to enable the hardware components that are used in conjunction with software programs to prefetch data in order to shorten execution cycles and maximize data processing efficiency. The options are Disabled and **Enabled**.

Direct Cache Access (Available when 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 Intel's Virtualization Technology and 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 allow 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.

Serial Port B

This setting allows you to assign control of serial port B. The options are **Enabled** (user defined), Disabled, Auto (BIOS controlled) 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**, IR (for an infrared device) and ASK_IR.

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 console redirection. 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

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

► Hardware Monitor Logic



NOTE: Phoenix BIOS will automatically detect the type of CPU(s) and hardware monitoring chip used on the motherboard and will display the Hardware Monitoring Screen accordingly.

CPU Temperature Threshold

This option allows the user to set a CPU temperature threshold that will activate the alarm system when the CPU temperature reaches this pre-set temperature threshold. The hardcode default setting is 80°C.

Temperature Monitoring

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

CPU1 Temperature/CPU1 Second Core Temperature

CPU2 Temperature/CPU2 Second Core Temperature

PECI Agent 1 Temperature/PECI Agent 2 Temperature/PECI Agent 3 Temperature/PECI Agent 4 Temperature

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

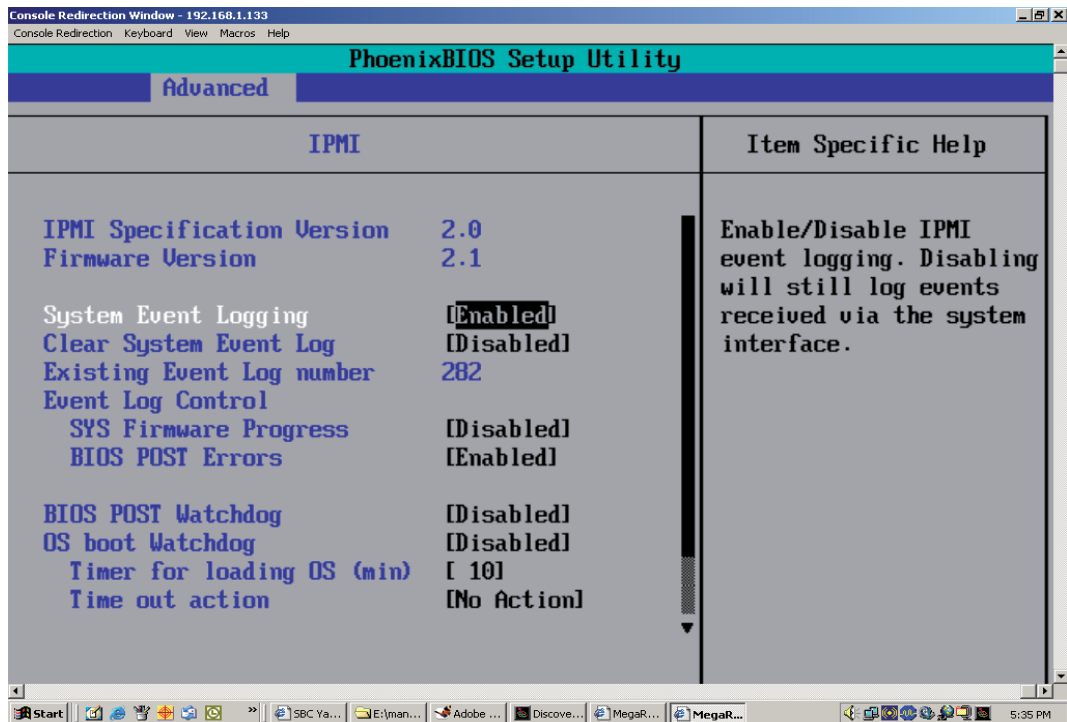
This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. 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, and 5. Optimized Workstation w/4-pin.

Voltage Monitoring

The following items will be monitored and displayed:

Vcore A:	+12V
Vcore B:	5Vsb
-12V	5VDD
P1V2_NIC_SEN	P_VTT
+3.3V	Vbat

► IPMI (Available only when an IPMI card is installed)



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

Enable this function to log POST progress. Options are Enabled and Disabled.

BIOS POST Errors

Enable this function to log POST errors. Options are Enabled and Disabled.

BIOS POST Watch Dog

Set to Enabled to enable POST Watch Dog. 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)

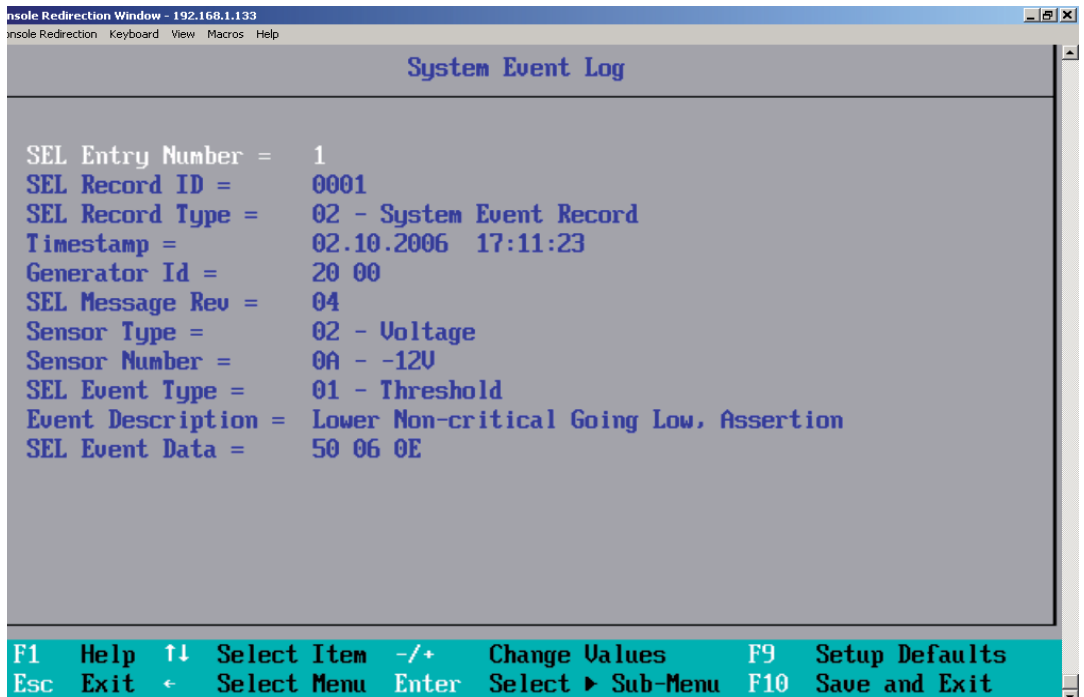
This feature allows the user to set the time value (in minutes) for the previous item: OS Boot Watch Dog by keying-in a desired number in the blank. The default setting is 10 (minutes.) (Please ignore this option when OS Boot Watch Dog is set to Disabled.)

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

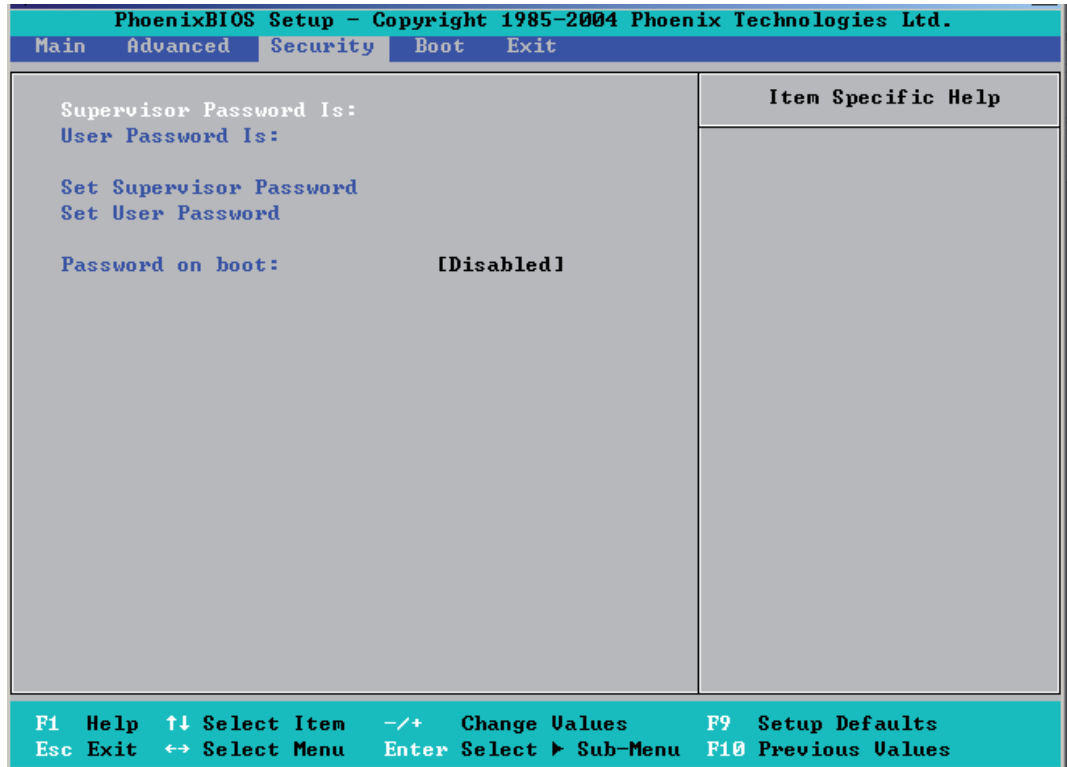
This feature display information from motherboard sensors, such as temperatures, fan speeds and voltages of various components.

Sensor Name	Sensor Data	Sensor Units	Lower Limit	Upper 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

Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults
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.



Supervisor Password Is:

This displays whether a supervisor password has been entered for the system. Clear means such a password has not been used and Set means a supervisor password has been entered for the system.

User Password Is:

This displays whether a user password has been entered for the system. Clear means such a password has not been used and Set means a user password has been entered for the system.

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

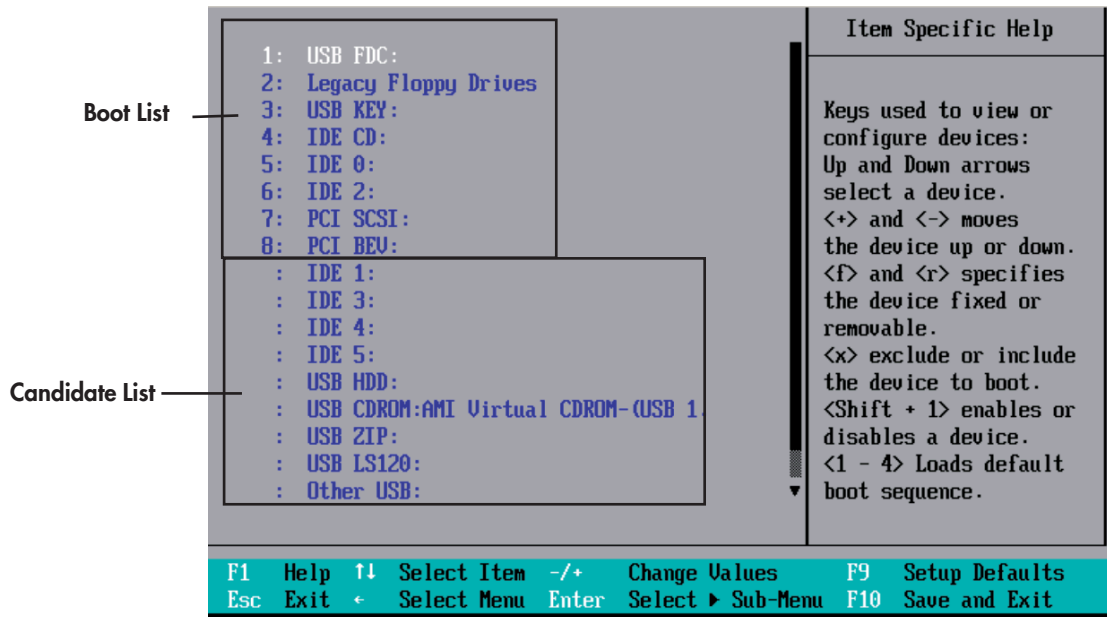
When the item "Set User Password" is highlighted, hit the <Enter> key. When prompted, type the user's password in the dialogue box to set or to change the user's password, which allows access to the system at boot-up.

Password on Boot

This setting allows you to require a password to be entered when the system boots up. The options are **Enabled** (password required) 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.

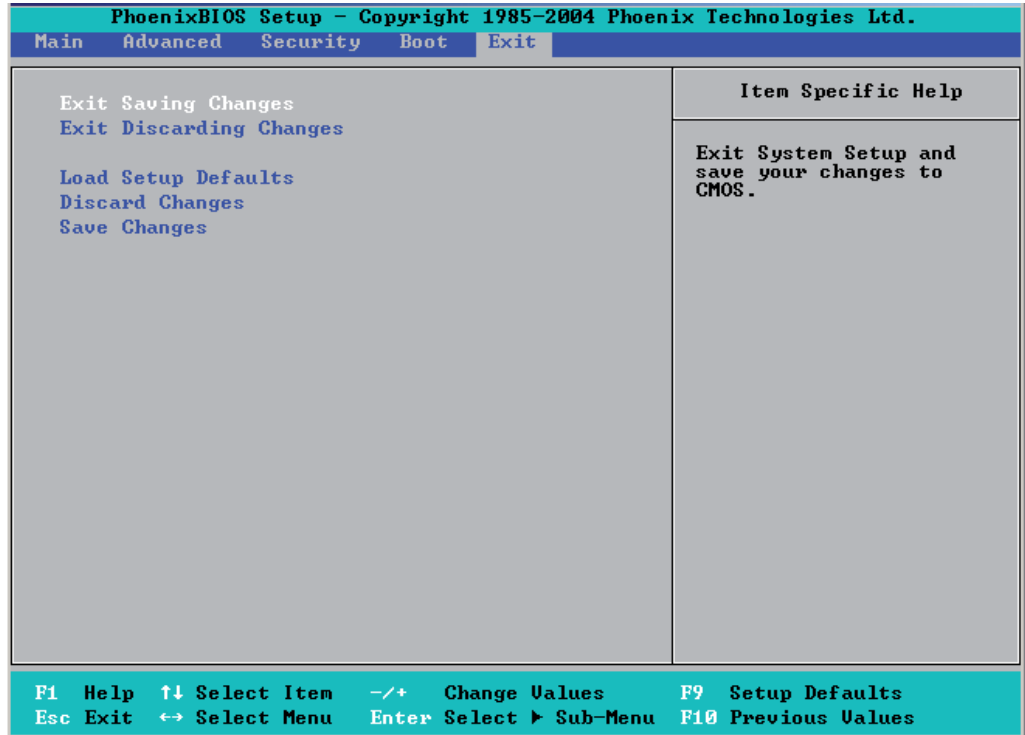


Boot Priority Order/Excluded from Boot Orders

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 changing the boot priority order of a device 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.



Exit Saving Changes

Highlight this item and hit <Enter> to save any changes you've 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've 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.

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.

B-1 Recoverable POST Errors

When a recoverable type of error occurs during POST, the 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

B-2 Terminal POST Errors

If a terminal type of error occurs, BIOS will shut down the system. Before doing so, BIOS 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
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

POST Code	Description
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
5Ch	Test RAM between 512 and 640 kB
60h	Test extended memory
62h	Test extended memory address lines
64h	Jump to UserPatch 1
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

POST Code	Description
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
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
A Eh	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)

POST Code	Description
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

POST Code	Description
F4h	Output one beep
F5h	Clear Huge Segment
F6h	Boot to Mini DOS
F7h	Boot to Full DOS

If BIOS detects error 2C, 2E, or 30 (base 512K RAM error), it displays an additional word-bitmap (xxxx) indicating the address line or bits that 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.

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 Note for the User

1. 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.

 **NOTE:** 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.

RAID 1 (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 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.*

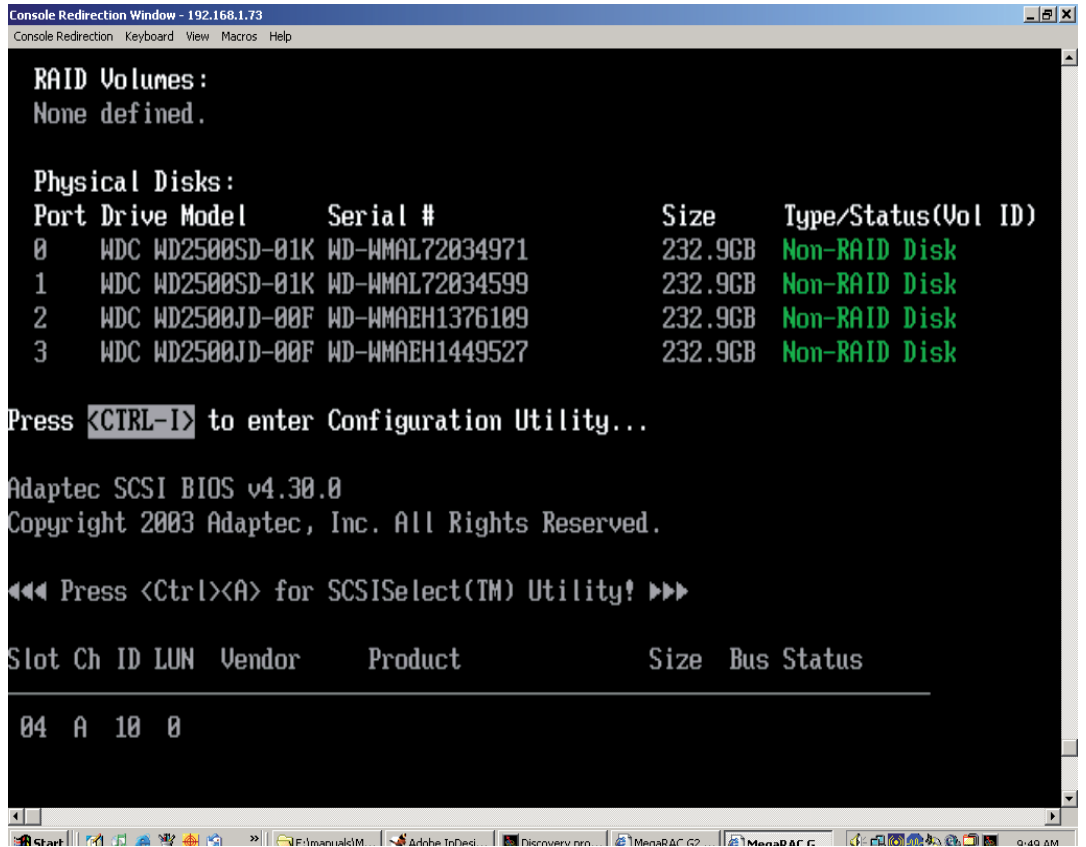
 **NOTE:** The Intel RAID Configuration Utility is only available for systems with two or more drives installed. The Intel RAID Utility screen will not display in systems with one drive installed.
Due to each serverboard controlling two of the four SATA drives in the system, the NovaScale R422/R422-INF only supports RAID levels 0 and 1

Using the Intel ESB2 SATA RAID Utility Program

Creating, Deleting and Resetting RAID Volumes

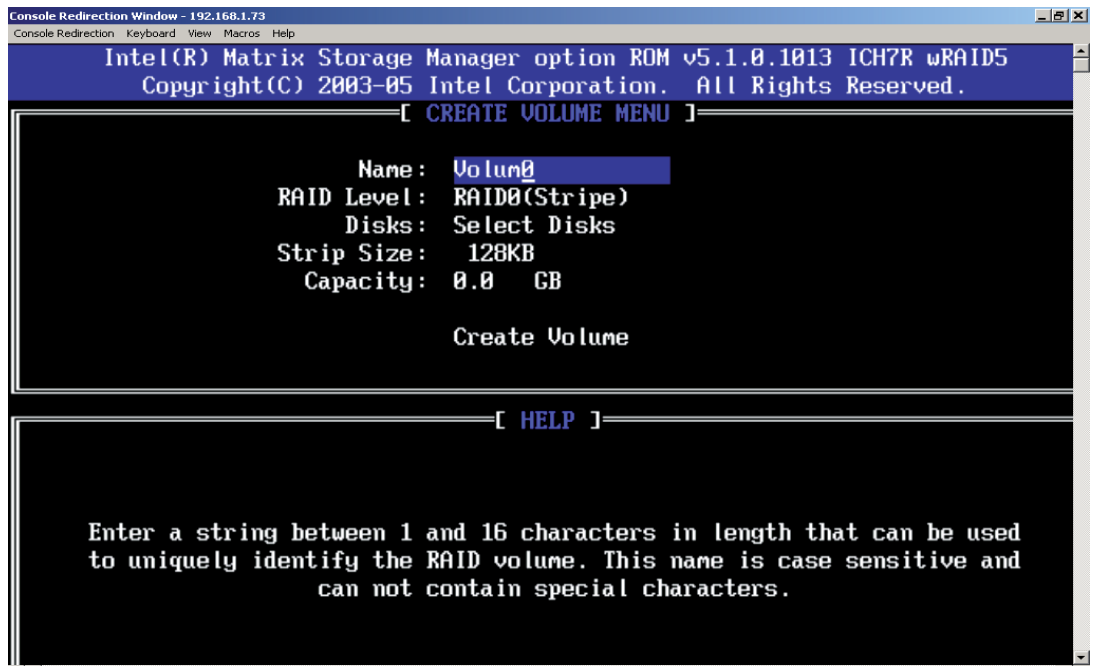
1. After the system exits from the BIOS Setup Utility, the system will automatically reboot. The following screen appears after Power-On Self Test.
2. When you see the above screen, press the <Ctrl> and the <I> keys simultaneously to have the main menu of the SATA RAID Utility appear:

 **NOTE:** All graphics and screen shots shown in the manual are for reference only. The screen shots shown in the manual do not imply Bull'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.

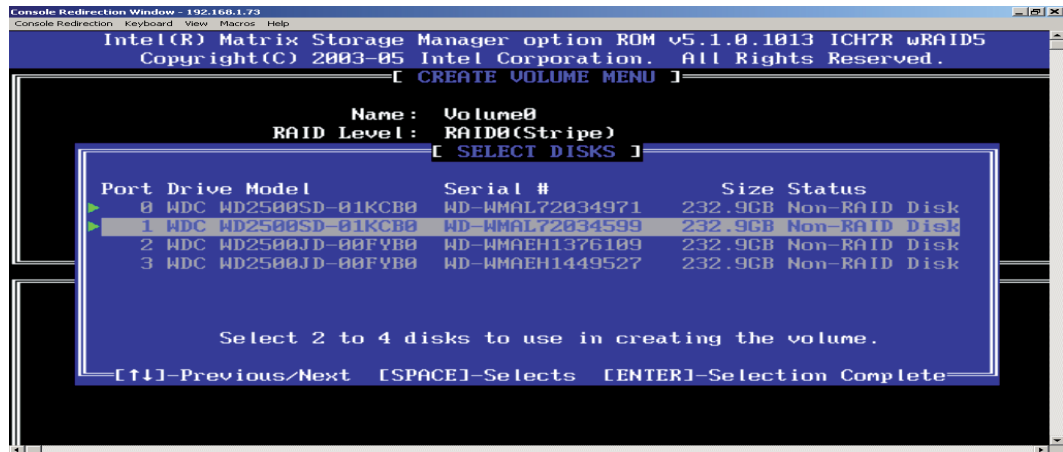


Creating a RAID 0 Volume

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



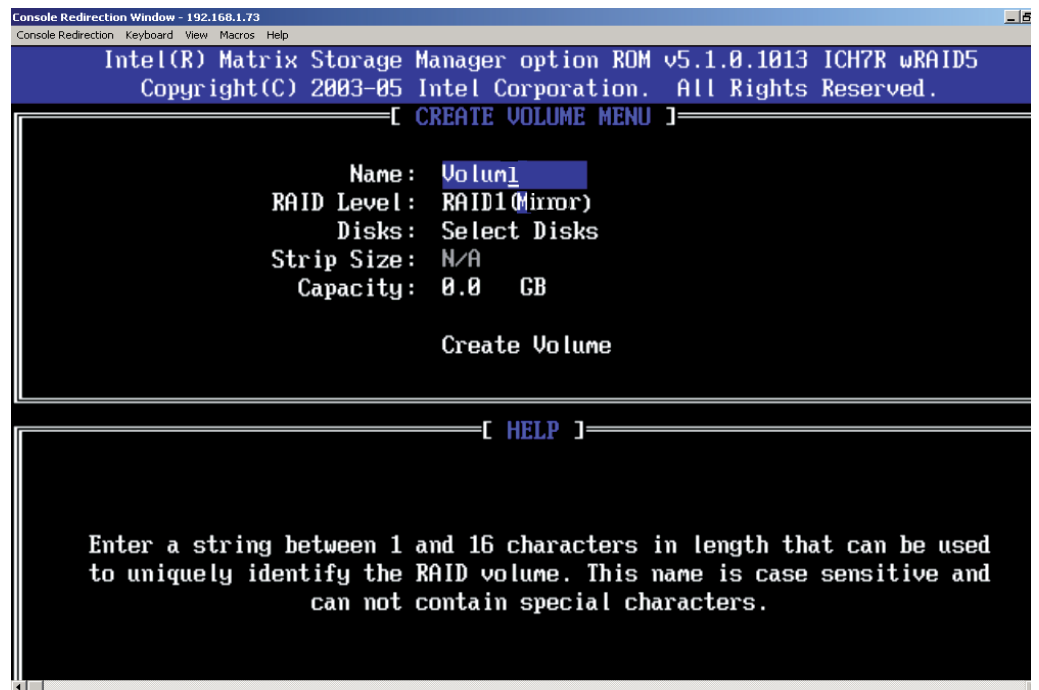
2. Specify a name for the RAID 0 set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)
3. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select RAID 0 (Stripe) and hit <Enter>.
4. When the Disks item is highlighted, press <Enter> to select the HDD to configure as RAID. The following pop-up screen displays:



5. 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.
6. 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.)
7. Press <Enter> when the Create Volume item is highlighted. A warning message displays.
8. 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

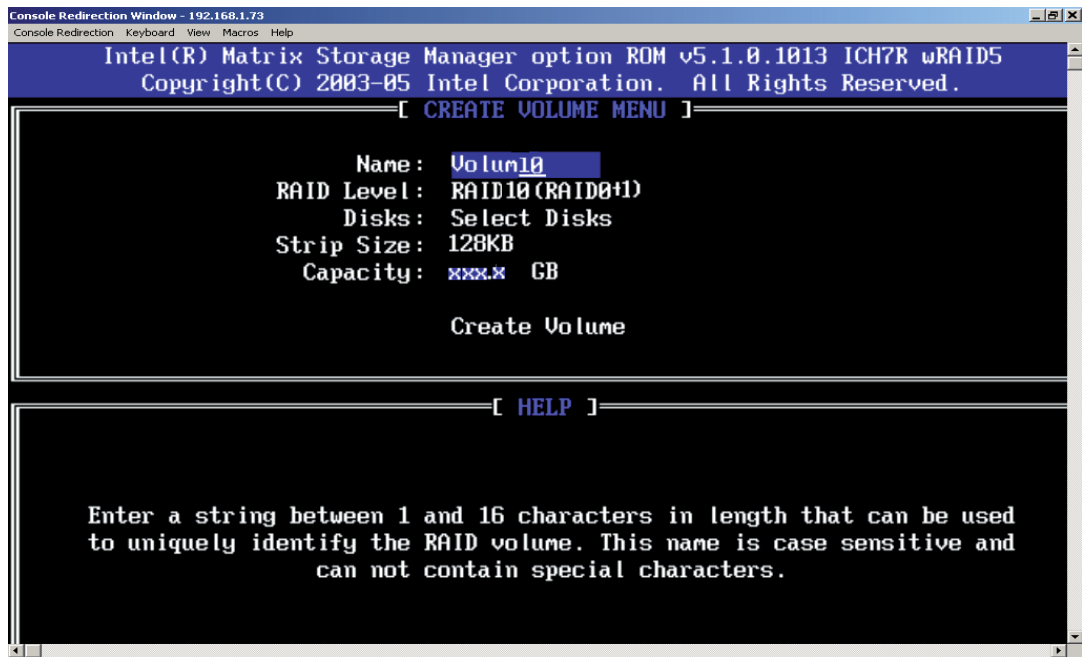
1. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:




2. 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.)
3. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select RAID 1 (Mirror) and hit <Enter>.
4. When the Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.
5. Press <Enter> when the Create Volume item is highlighted. A warning message displays.
6. 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)

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



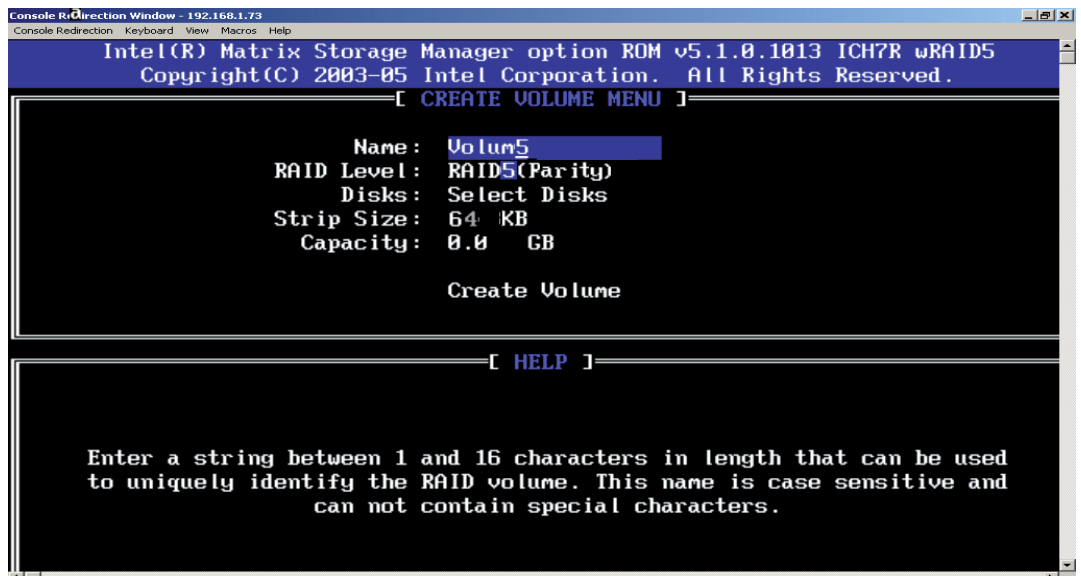
2. Specify a name for the **RAID 10** set and press <Enter>.
3. When RAID Level item is highlighted, use the <Up Arrow>, <Down Arrow> keys to select **RAID 10 (RAID1 + RAID0)** and hit <Enter>.
4. When the Stripe Size is highlighted, use the <Up Arrow>, <Down Arrow> keys to select the stripe size from 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.

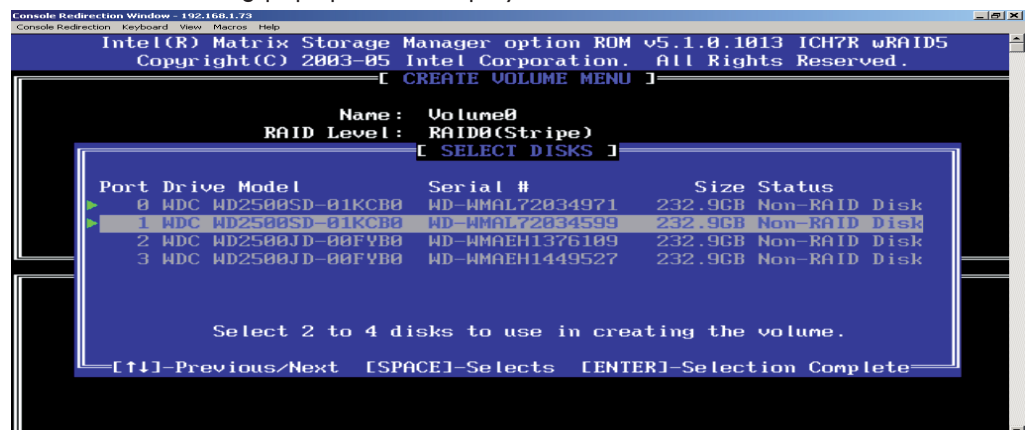
5. When the RAID Volume Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.
6. Press <Enter> when the Create Volume item is highlighted. A warning message displays.
7. When asked "Are you sure you want to create this volume (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)


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



2. Specify a name for the RAID 5 set and press <Enter>.
3. When the Raid Level is highlighted, use the <Up Arrow>, <Down Arrow> keys to select RAID 5 (Parity) and hit <Enter>.
4. When the Disk item is highlighted, press <Enter> to select the HDD to configure as RAID. The following pop-up screen displays:



5. 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.
6. 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.

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

8. Press Enter when the Create Volume item is highlighted. A warning message displays.
9. 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.

1. From the main menu, select item 2-Delete RAID Volume, and press <Enter>.
2. Use the <Up Arrow>, <Down Arrow> keys to select the RAID set you want to delete and press . A warning message displays.
3. 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.

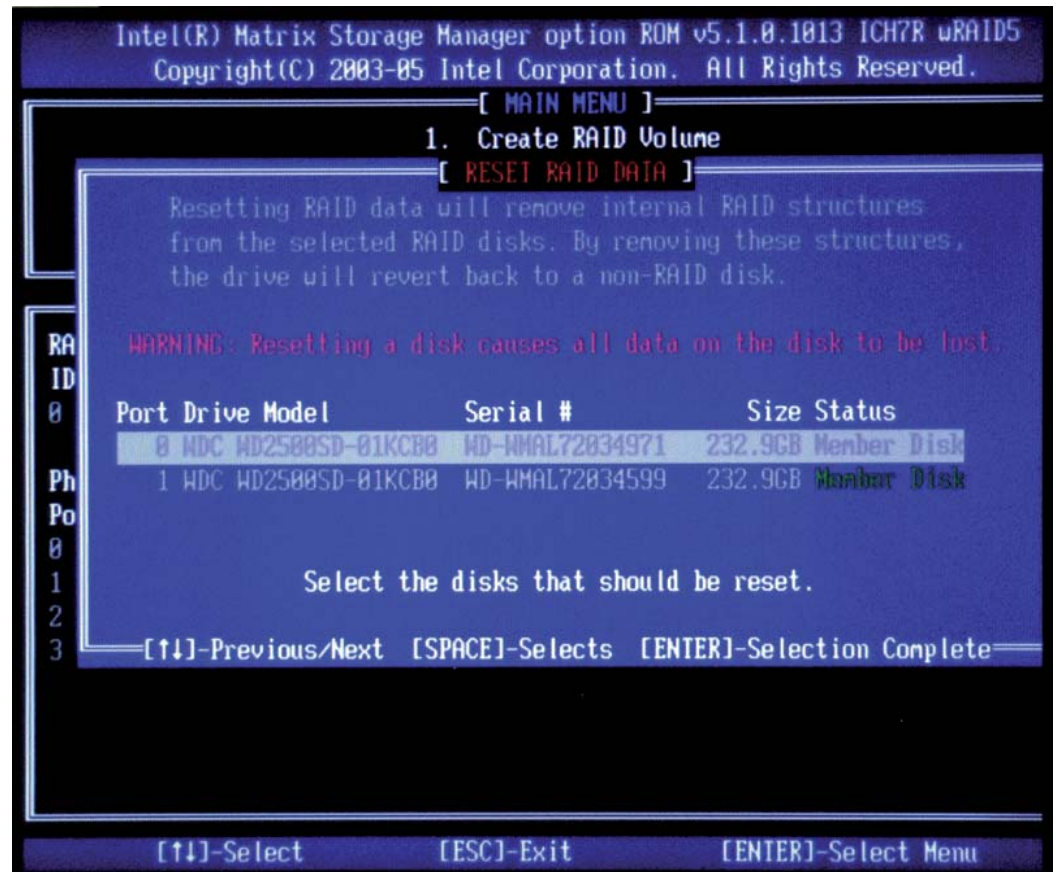
Resetting to Non-RAID and Resetting a RAID HDD



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.

1. From the main menu, select item3-Reset Disks to Non- RAID, and press <Enter>. The



following screen will appear:

2. Use the <Up Arrow>, <Down Arrow> keys to highlight the RAID set drive to reset and press <Space> to select.
3. Press <Enter> to reset the RAID set drive. A Warning message displays.
4. Press "Y" to reset the drive, or type "N" to go back to the main menu.

Exiting the Intel Matrix Storage Manager Utility

1. From the main menu, select item4-Exit, and press <Enter>. A warning message will appear.
2. Press "Y" to reset the drive, or type "N" to go back to the main menu.

C-2 Windows driver for "Intel ESB2 Serial RAID controller"

This driver is the "Intel AA RAID XP/2000/2003 Driver for ESB2"

Installing the OS

See Novascale R42x CD resources available from <http://support.bull.com>

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.



NOTE: The following section provides information on the Adaptec SATA RAID Driver based on the Intel Enterprise South Bridge 2 (ESB2) Controller.

D-1 Introduction to the Adaptec Embedded Serial ATA RAID Controller Driver

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 Parallel ATA. In addition, the cables used in PATA can only extend to 40cm long, while Serial ATA cables can extend up to one meter. Overall, Serial ATA provides better functionality than Parallel ATA.

Introduction to the Intel ESB2 I/O Controller Hub

Located in the South Bridge of the Intel 5000P 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's Serial ATA (SATA) Host Controller, which support up to six Serial ATA drives, up to two RAID volumes and up to four drives in RAID Configurations. (See 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 list is applicable to Adaptec's HostRAID Controller Firmware only.

Configuring Adaptec SATA RAID for Operating Systems that support RAID functions (--Windows, Red Hat & SuSe, Linux)

1. Press the key during system bootup to enter the BIOS Setup Utility.
2. 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.
3. 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.
4. Use the arrow keys to select the "Main" section in BIOS.
5. Scroll down to "SATA Control Mode" and press the <Enter> key to select "Enhanced"
6. Scroll down to "SATA RAID Enabled" and press <Enter>. Then, select "Enabled."
7. Scroll down to "ICH RAID Codebase" and select "Adaptec". Then press <Enter>. (*For ICH RAID Codebase: Change the setting from Intel to Adaptec.)
8. Scroll down to "Exit". Select "Exit Saving Changes" from the "Exit" menu. Press the <Enter> key to save the changes and exit the BIOS.
9. Once you've exited the BIOS Utility, the system will re-boot.
10. 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.

The Adaptec Embedded Serial ATA with HostRAID Controller Driver

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, Bull's X7DBT/X7DBT-INF 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:

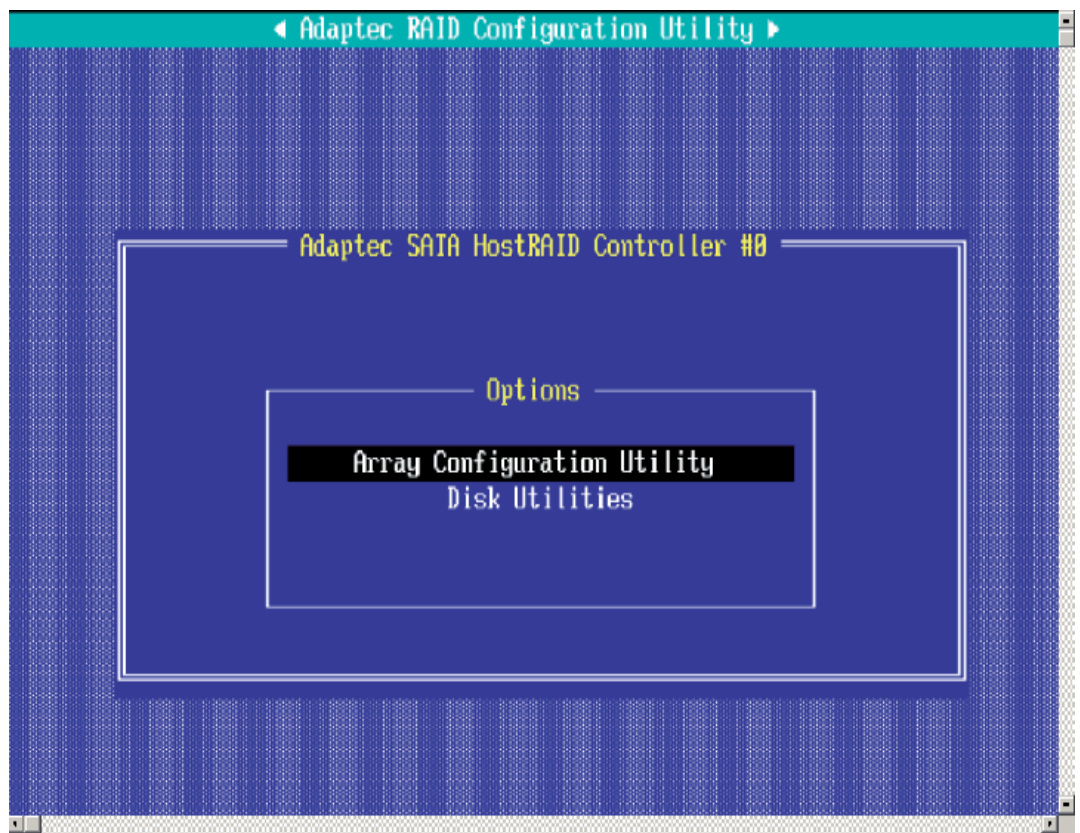
1. Enable RAID functions in the system BIOS (refer to Chapter 4 for System BIOS Configurations).

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.

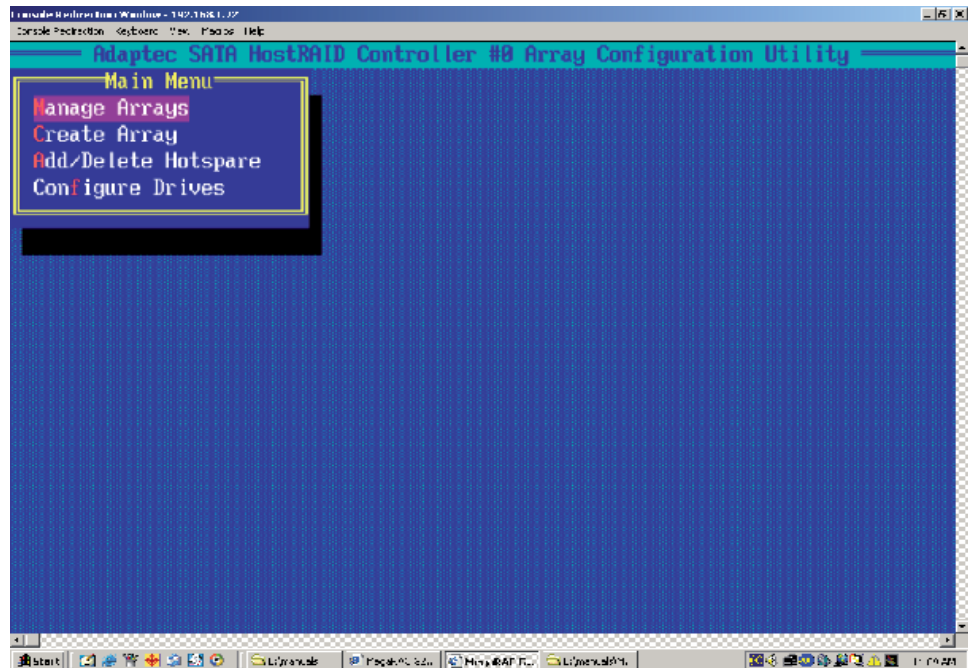
 **NOTE:** To select an option, use the arrow keys to highlight the item and then press the <Enter> key to select it. To return to the previous menu, press the <ESC> key. Press the <Insert> key to select a drive. When a drive is highlighted (selected), press the <Delete> key to de-select it.



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 below.



Configuring Disk Drives

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



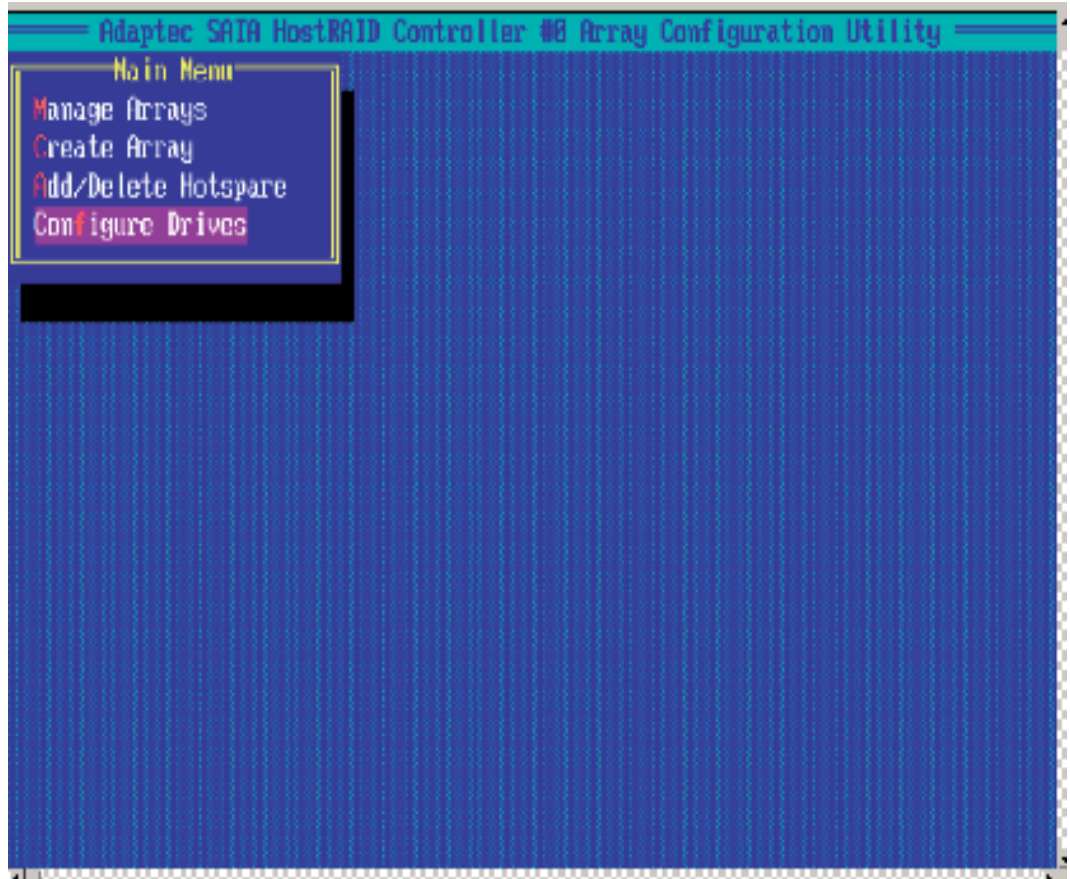
CAUTION:

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.

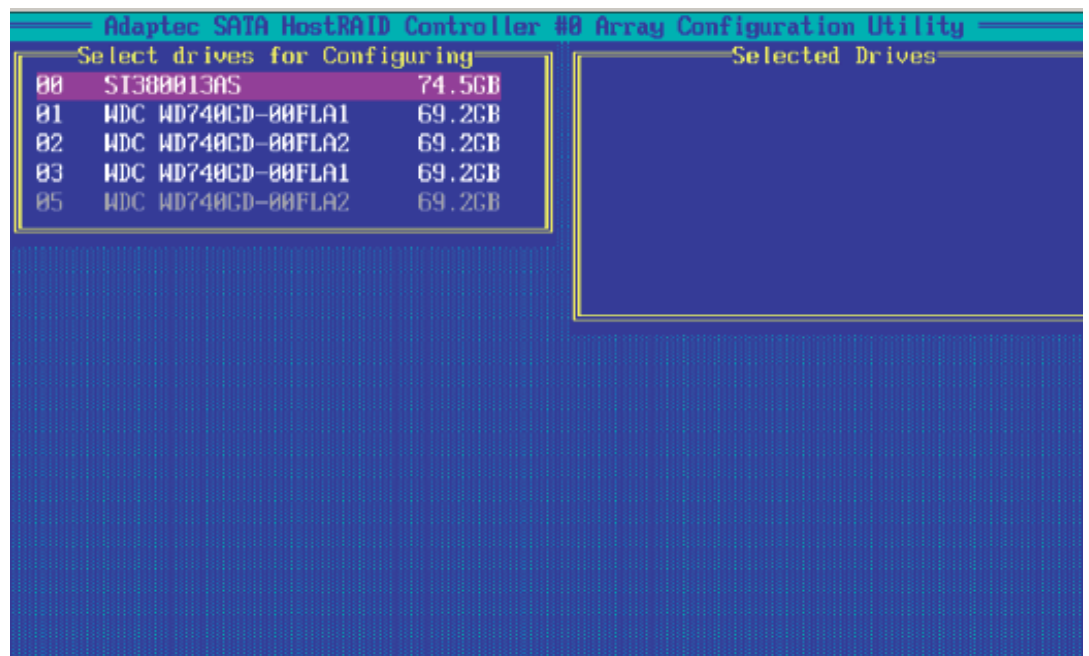
Do not configure a disk that is part of a boot array. To determine which disks are associated with a particular array, please refer to Viewing Array Properties.

To configure a disk drive:

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



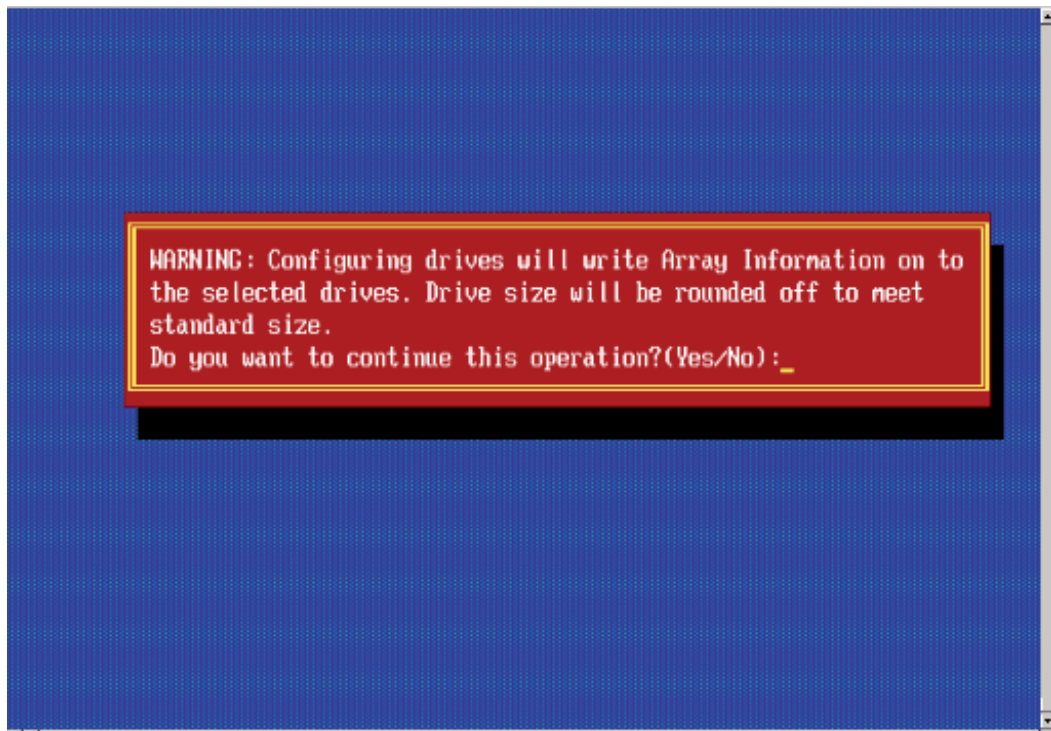
- From the "Select Drives for Configuring" List (shown below,) select the drives you want to configure and press <Insert>.



- 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.




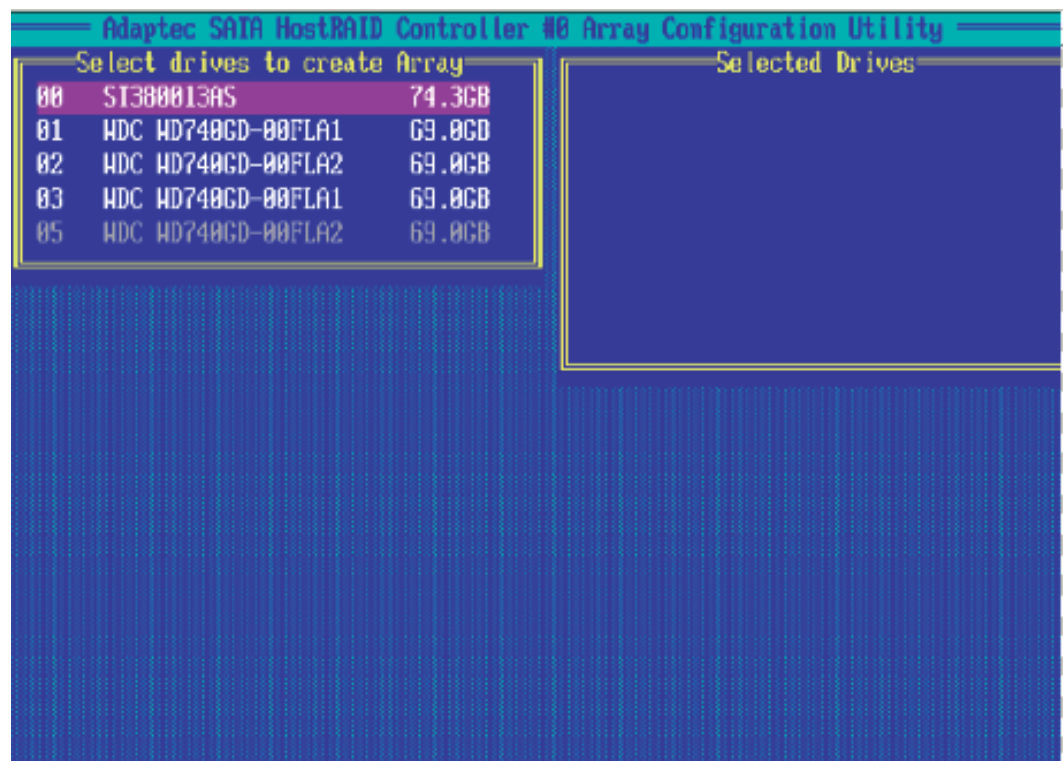
6. Make sure that you have selected the correct disk drives to configure. If correct, type Y to continue.

Creating Arrays

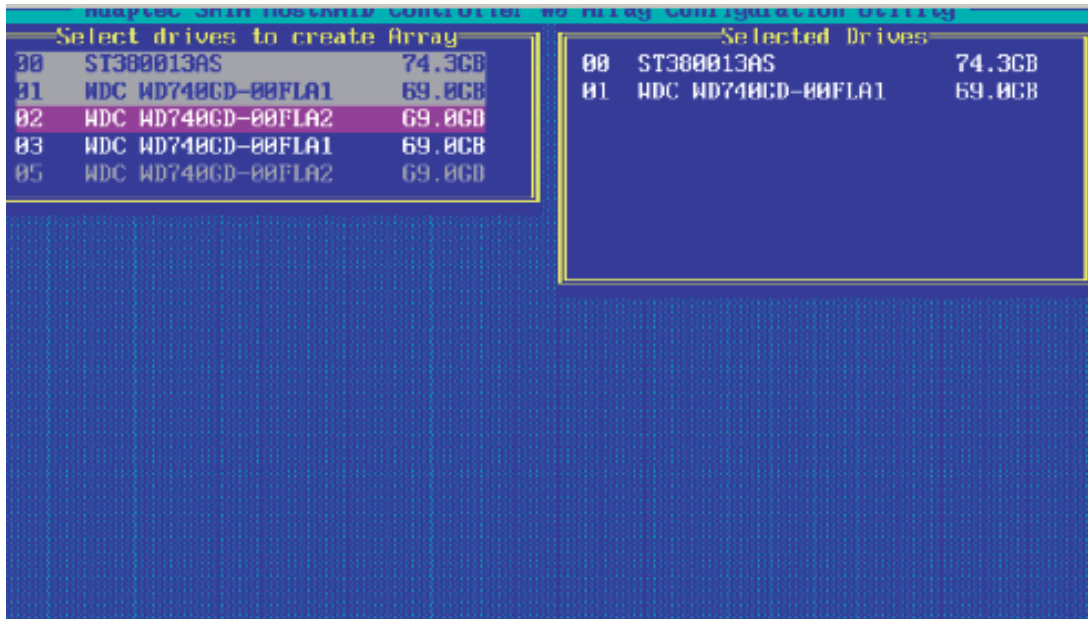
Before you create arrays, make sure that the disks for the array are connected and installed in your system. Note that disks with no usable space, or disks that are un-initialized or not formatted are shown in gray and cannot be used. **(Note:** It is recommended that you configure devices before you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

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

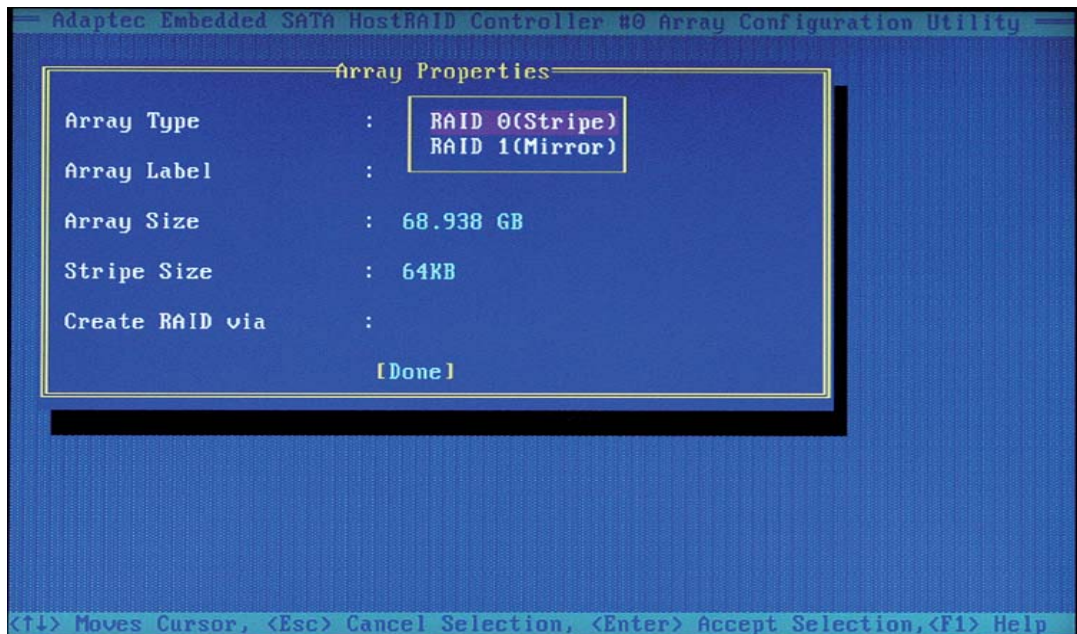
Once a new array is completed, you can assign properties to the array.



CAUTION:

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

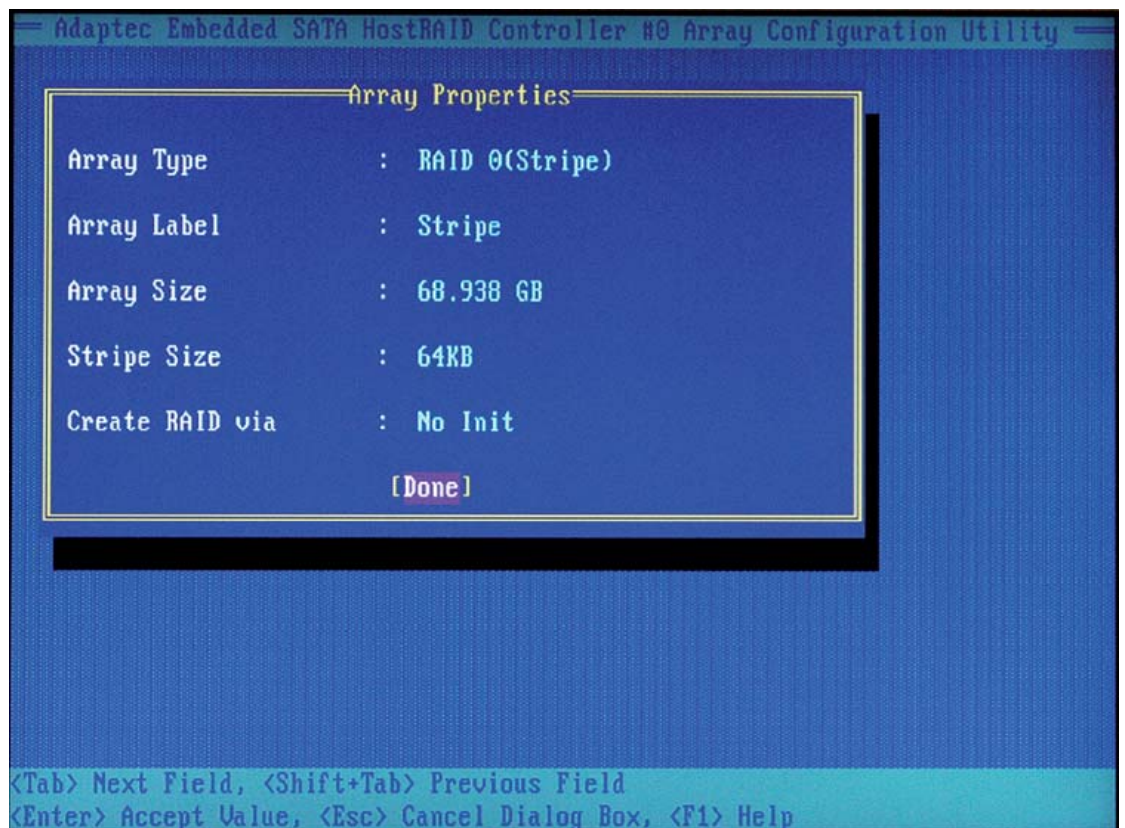
1. In the Array Properties menu (as shown in the screen below), select an array type and press **Enter**. Only the array types which are available will be displayed on the screen. (*RAID 0 or RAID 1 requires two drives.)




2. Under the item "**Arrays Label**", type in a label and press **<Enter>**. The label should contain more than 15 characters.
3. For RAID 0, select the desired stripe size. The available stripe sizes are 16, 32, and 64 KB. 64K is default size, please **do not change** the default setting.
4. The item: "**Create RAID via**" allows you to select the creation method for RAID 0 and RAID 1 from the different possibilities that are listed.

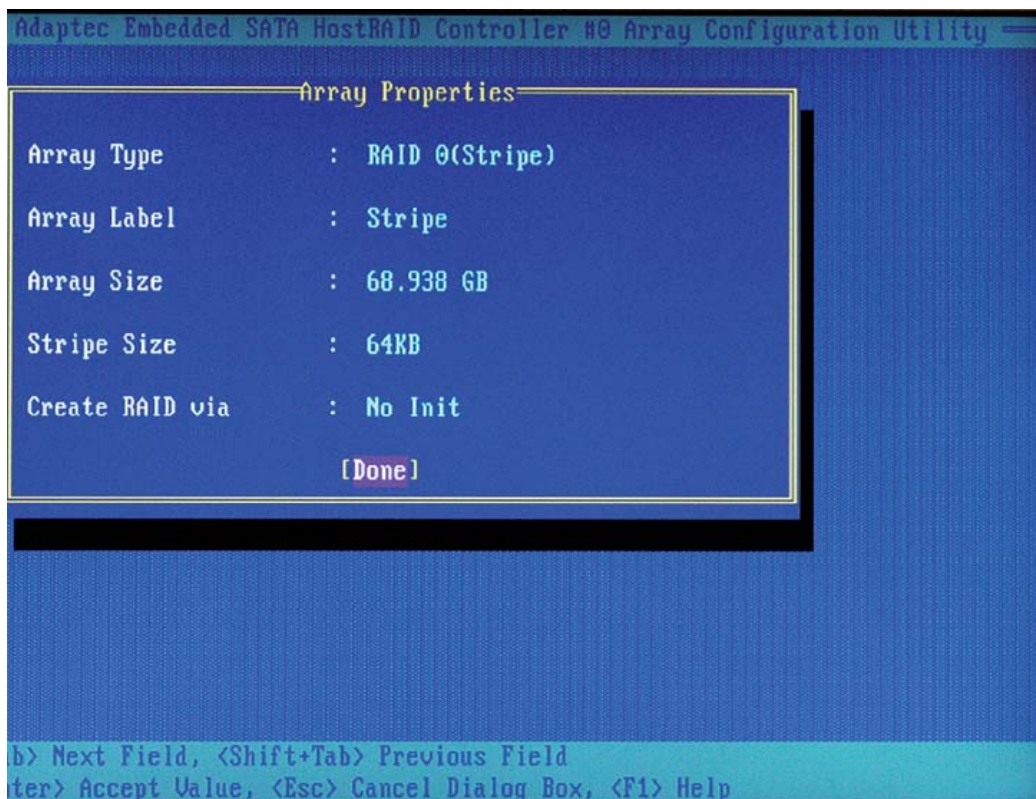
The following table provides examples, showing when each method is appropriate.

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).



Precautions when Creating Arrays

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.

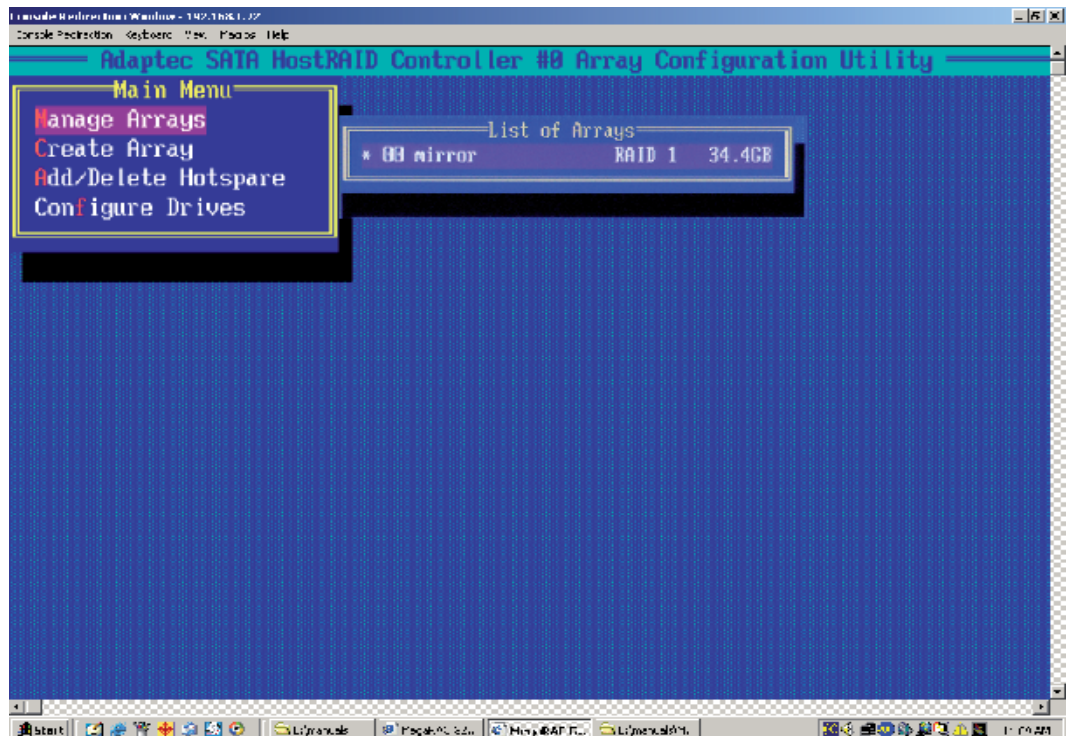


WARNING:

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

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 .
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

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 . 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



NOTE: In order to rebuild a RAID (RAID 0 or RAID 1), a new HDD will need to be added as a hotspare.

To add a Hotspare

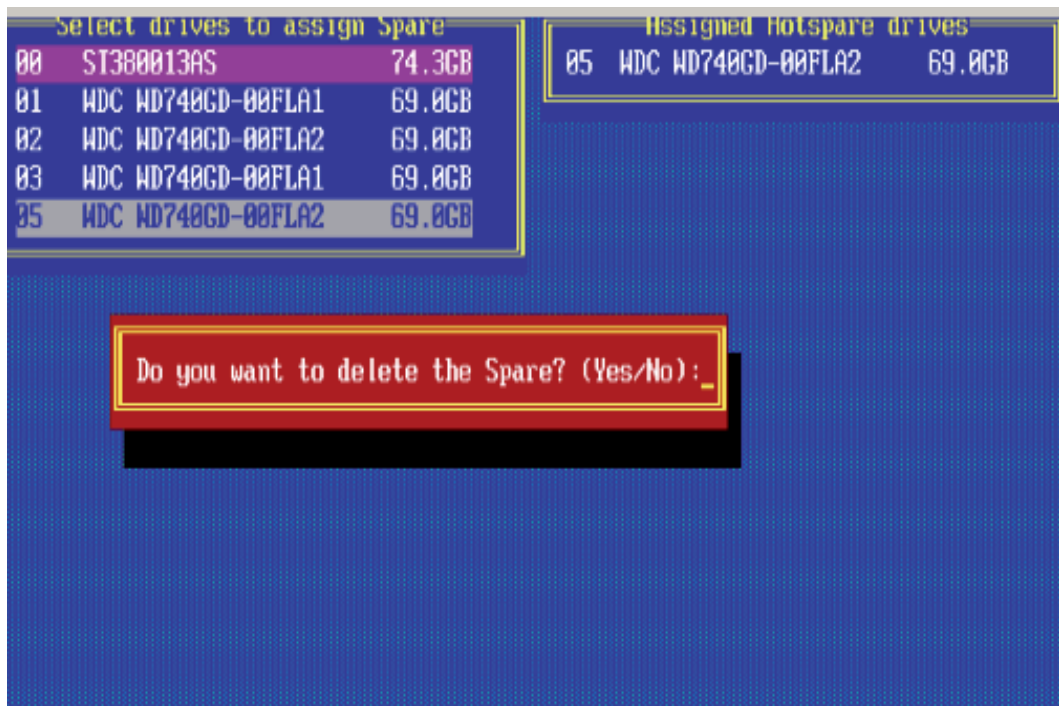
1. From the main menu (shown on Page D-4), select Add/Delete Hotspares.
2. Use the up and down arrow keys to highlight and select the disk you want to designate as a hotspare, and press **<Insert>**, and then, press **<Enter>**.
3. Press **Yes** when the following prompt is displayed:

"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.



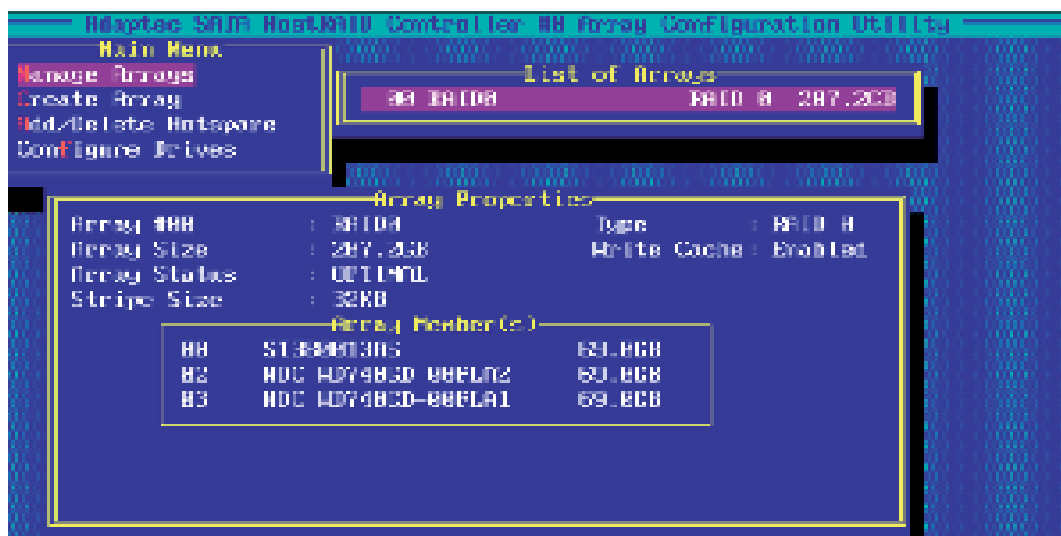
Viewing Array Properties

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.



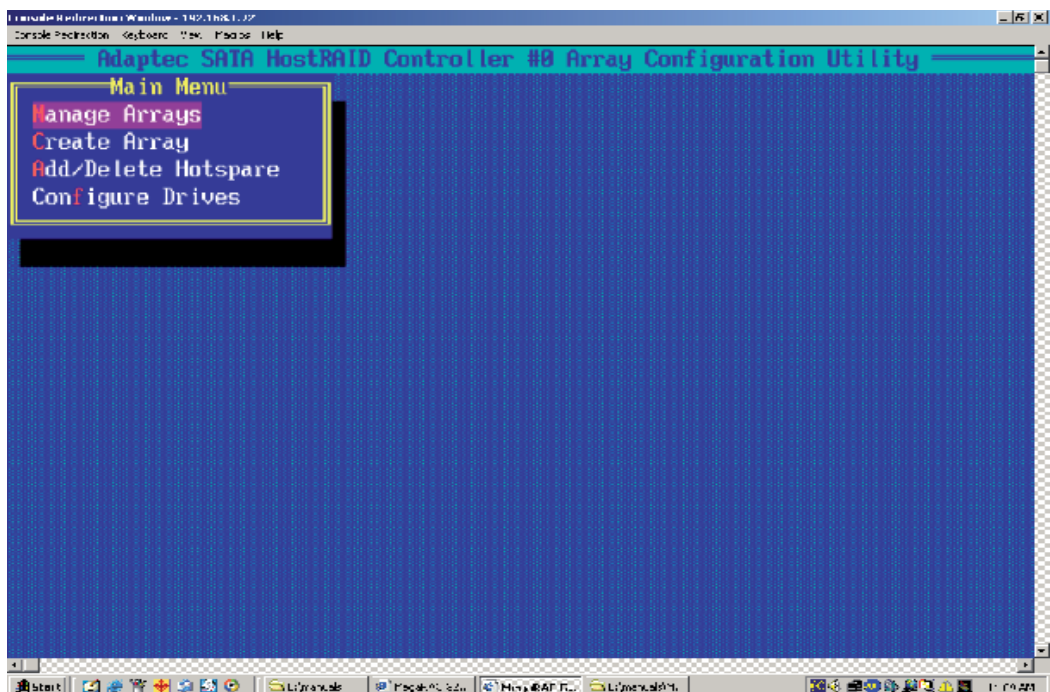
Rebuilding Arrays

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

If an array Build process is interrupted or if a critical member is missing, a Rebuild must be performed to restore its functionality. For a critical array rebuild operation, the optimal drive is the source drive.

 **NOTE:** If no spare array exists and a hard disk drive fails, you need to create a spare before you can 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.

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):*

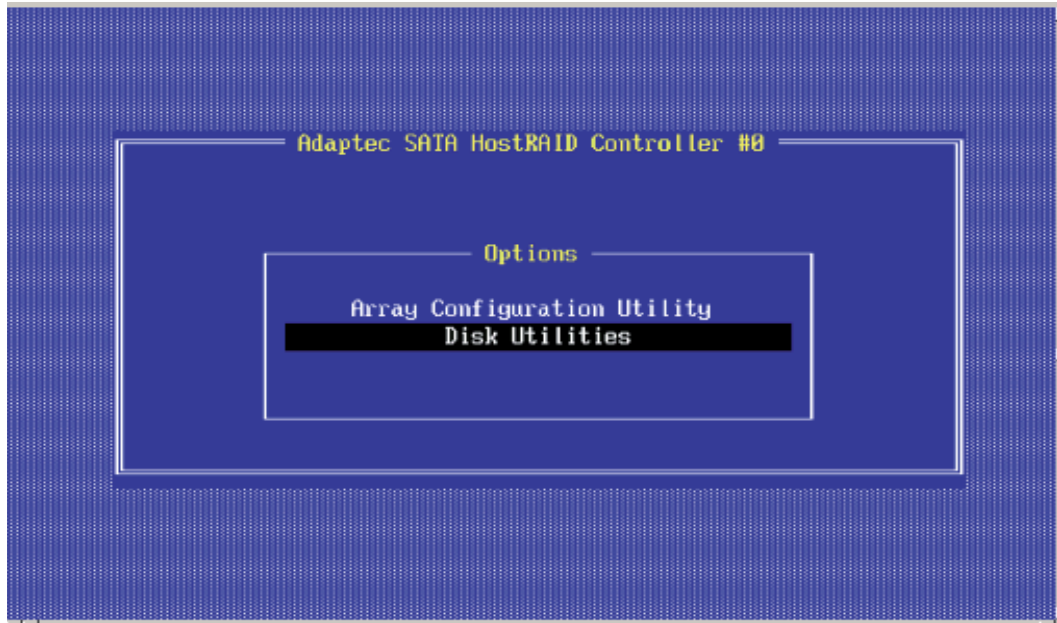
RAID 1 only—the following prompt is also displayed:

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.

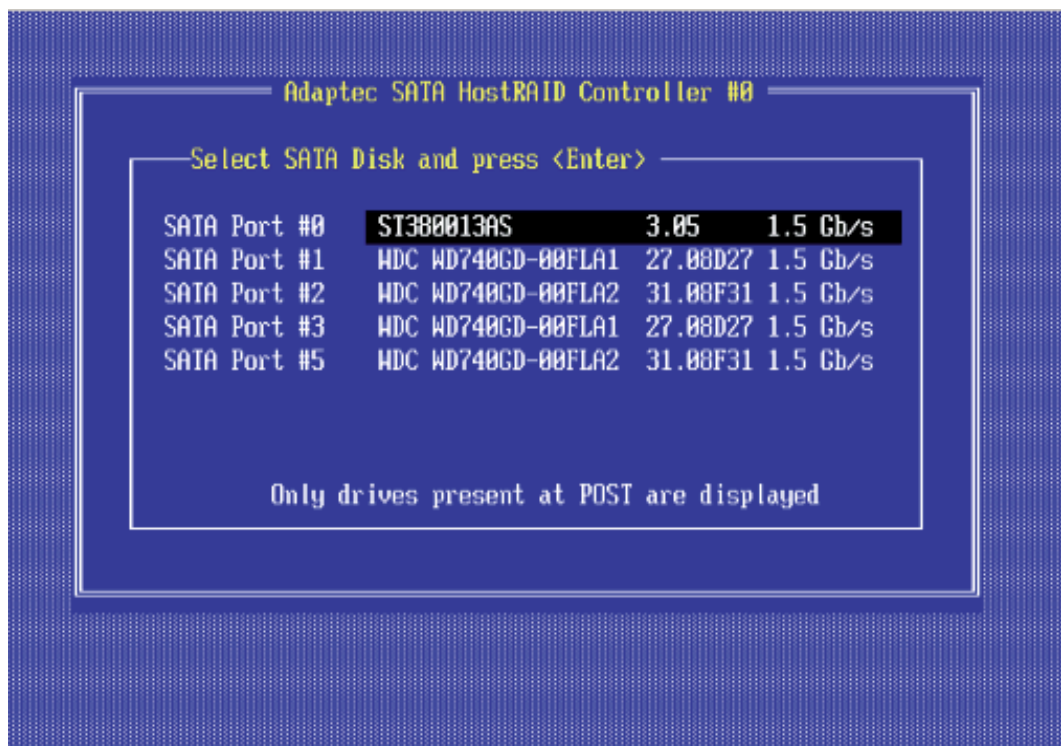
D-2 Using the Disk Utilities

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




To access the disk utilities

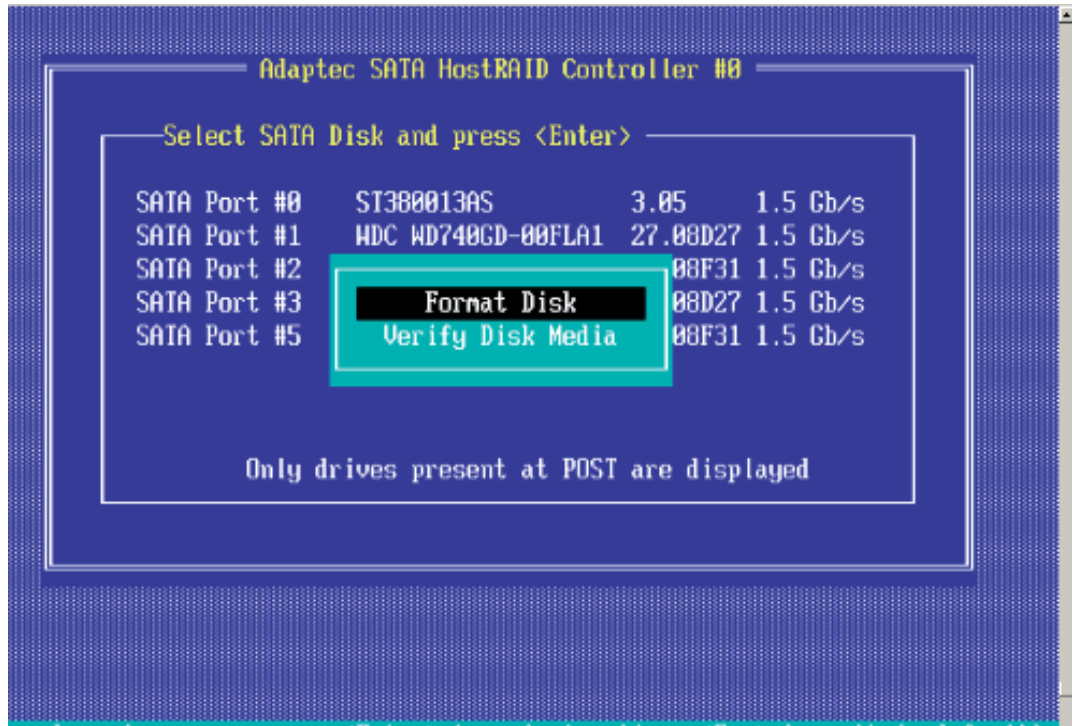
1. From the Adaptec RAID Configuration Utility Menu, select Disk **Utilities** (as shown above) and press **<Enter>**. The following screen appears.



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.

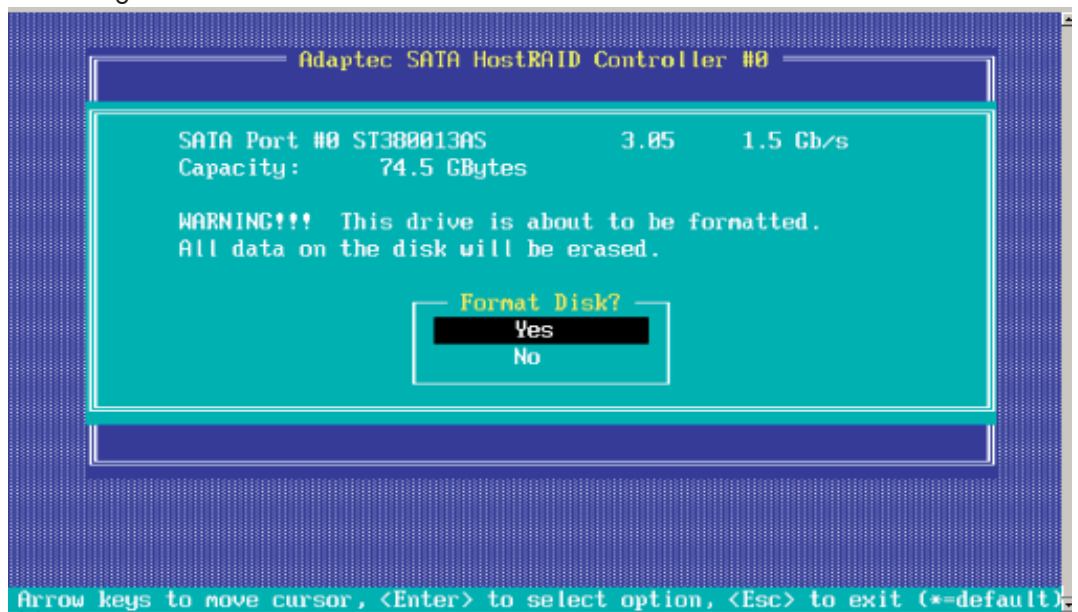


3. When the screen shown below displays, select **Format Disk** and press **<Enter>**. The following screen appears:
4. Read the warning message when it appears in the screen as shown below. To continue with disk formatting, select **Yes** and hit **<Enter>**. Otherwise, select **No** and press **<Enter>**.

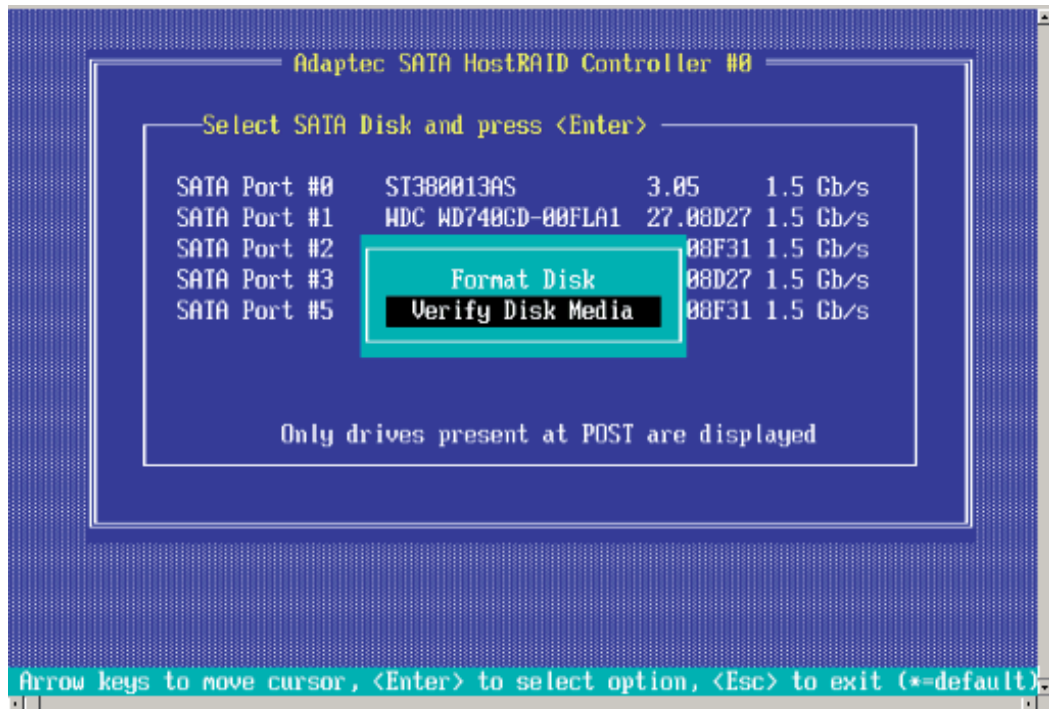


CAUTION:

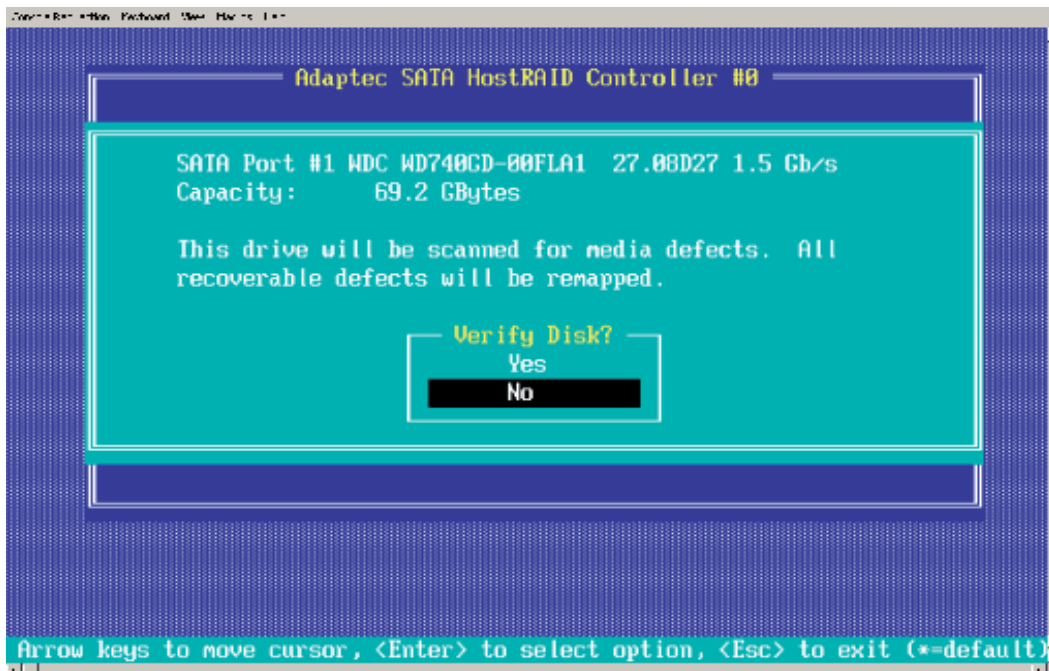
Formatting a disk destroys all data on the drive. Be sure to back up your data before formatting a disk.



To verify disk media

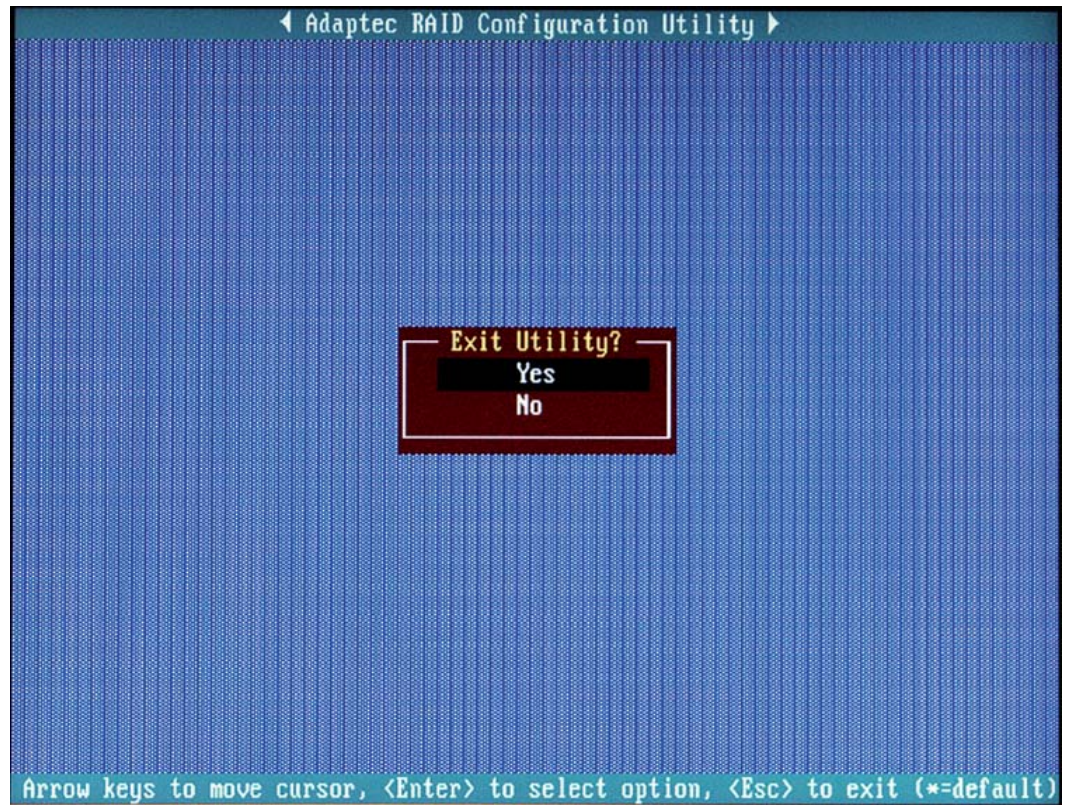


1. When the screen shown above displays, select **Verify Disk Media** and press **<Enter>**.
2. A message will display, indicating that the selected drive will be scanned for media defects. Select **Yes** and hit **<Enter>** to proceed with disk verifying; otherwise, select **No** and hit **<Enter>**.



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-2 Windows driver for the "Adaptec Embedded Serial ATA RAID Controller"

This driver is "Adaptec Embedded Serial ATA Raid Controller Driver"

Installing the OS

See Novascale R42x CD resources available from <http://support.bull.com>

Appendix E System Specifications and Regulatory Information

E-1 System Specifications

DESIGN

- Form factor Rack mount 1U drawer accommodating 2 servers

PROCESSORS

- Type 2X 2x dual core Intel® Xeon® (5100) at up to 3.0GHz OR 2X 2x quad core Intel® Xeon® (5300) at up to 2.66GHz

ARCHITECTURE

- Chipset 2X Intel 5000P Chipset (Blackford) – MCH + ESB2
- Processor Front Side Bus speed 2X 667/1066/1333 FSB depending on processor type

BIOS

- Phoenix® 8Mb Flash EEPROM

Motherboards

- Novascale Universal R422 : X7DBT
- Novascale Universal R422-INF : X7DBT-INF

MEMORY

- Memory Min/Max Up to 2X 32GB Fully Buffered Dimm DDR2 667MHz
- Memory slots (number, type) 2X 8x 240-pin DIMM sockets

I/O SLOTS

- Bus slots 2X 1x PCI-Express x8 (low profile)

SERIAL ATA CONTROLLER (one on each server)

- Intel® ESB2 on-chip controller to support two 3Gb/s Serial ATA (RAID 0 or 1)

MEDIA AND STORAGE DEVICES

- Hard Disk Drives SATA2 7200 rpm 2X 2x front-access hot-swap HDD SATA2 7200 rpm (160/250/500GB)
- Maximum Internal Storage capacity 2X 1000GB SATA2

VIDEO

- Video controller 2X ATI ES1000 PCI video controller (16MB video memory)

NETWORK

- Network interface controller 2X Intel® (ESB2/Gilgal) 82563EB Dual-port Gigabit Ethernet Controller
- Infiniband Mellanox MT25204AD-FCC-D Single-Port (Only on the Novascale Universal R422-INF)

SECURITY

- Front door / Intrusion protection Chassis intrusion detection

I/O PORTS

- USB ports 2X 2x USB 2.0
- Serial port 2X 1x COM
- SVGA video port 2X 1x
- System Management 2X SIMSO socket (IPMI 2.0 with virtual media-over-LAN & optional KVM-over LAN)
- Ethernet port 2X 2x RJ45
- 2X 1x external InfiniBand SDR/DDR connector (optional)

POWER SUPPLY

- Fixed PSU 1x shared fixed PSU (with independent power control for each server)
- Power consumption 980 Watts w/PFC (92% efficiency)
- Auto-sensing 110/220V – 60/50Hz

VENTILATION

- Fan specifications 2X 3x heavy-duty counter-rotating fans

PHYSICAL SPECIFICATIONS

- Size (HxWxD) 43 x 432 x 704 mm
- Weight 18.1kg (for chassis including 2 servers)

OS AND SOFTWARE

- Windows Server 2003 Certification Microsoft Windows Compute Cluster Server 2003
- Linux Support Red Hat Enterprise Linux 4 or 5 + Bull Advanced Server HPC software suite

OPERATING ENVIRONNEMENT

Operating Temperature:	10° to 35°C (50° to 95° F)
Non-operating Temperature:	-40° to 70° C (-40° to 158° F)
Operating Relative Humidity:	8% to 90% (non-condensing)
Non-operating Relative Humidity:	5 to 95% (non-condensing)

WARRANTY & SERVICES

- Standard warranty 3-year on site
- Warranty extension optional

REGULATORY & SAFETY

- Regulatory compliance CE (UL, FCC)

E-2 Regulatory Specifications and Disclaimer

Declaration of the Manufacturer or Importer

We hereby certify that this product is in compliance with European Union EMC Directive 89/336/EEC, using standards EN55022 (Class A) and EN55024 and Low Voltage Directive 73/23/EEC, using standard EN60950. The product has been marked with the CE Mark to illustrate its compliance.

Safety Compliance Statement

- UL 60950 (USA)
- IEC 60950 (International)
- CSA 60950 (Canada)

European Community (EC) Council Directives

This product is in conformity with the protection requirements of the following EC Council Directives:

Electromagnetic Compatibility

- 89/336/EEC (EN 55022 (1998))
- EN55024 (1998)
- EN61000-3-2 (1995)
- EN61000-3-3 (1995)

Europe EMC Directive, 89/336/EEC

- . EN55022, Class A Limit, Radiated & Conducted Emissions
- . EN55024, ITE Specific Immunity Standard
- . EN61000-4-2, ESD Immunity (Level 2 Contact Discharge, Level 3 Air Discharge)
- . EN61000-4-3, Radiated Immunity (Level 2)
- . EN61000-4-4, Electrical Fast Transient (Level 2)
- . EN61000-4-5, AC Surge
- . EN61000-4-6, Conducted RF
- . EN61000-4-8, Power Frequency Magnetic Fields
- . EN61000-4-11, Voltage Dips and Interrupts
- . EN61000-3-2, Limit for Harmonic Current Emissions
- . EN61000-3-3, Voltage Flicker

Low Voltage

- 73/23/EEC (EN 60950)

EC Conformity

- 93/68/EEC

Telecommunications Terminal Equipment

- 199/5/EC

Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product.

Compliance with these directives requires:

- An EC declaration of conformity from the manufacturer
- An EC label on the product
- Technical documentation

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with standard IEC 60950.

Federal Communications Commission (FCC) Statement

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

FCC Declaration of Conformity

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This product is in conformity with the protection requirements of the following standards:

Electrical Compatibility:

- UL 60950
- CSA 60950

Canadian Compliance Statement (Industry Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This product is in conformity with the protection requirements of the following standards:

Laser Compliance Notice

This product that uses laser technology complies with Class 1 laser requirements.

A CLASS 1 LASER PRODUCT label is located on the laser device.

- Class 1 Laser Product
- Luokan 1 Laserlaite
- Klasse 1 Laser Apparat
- Laser Klasse 1

Definition of Safety Notices

DANGER:

A Danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury.

CAUTION:

A Caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury.

WARNING:

A Warning notice indicates an action that could cause damage to a program, device, system, or data.

Electrical Safety

The following safety instructions shall be observed when connecting or disconnecting devices to the system.

DANGER:

The Customer is responsible for ensuring that the AC electricity supply is compliant with national and local recommendations, regulations, standards and codes of practice.

An incorrectly wired and grounded electrical outlet may place hazardous voltage on metal parts of the system or the devices that attach to the system and result in an electrical shock.

It is mandatory to remove power cables from electrical outlets before relocating the system

CAUTION:

This unit has more than one power supply cable. Follow procedures for removal of power from the system when directed.

Laser Safety Information

The optical drive in this system unit is classified as a Class 1 level Laser product. The optical drive has a label that identifies its classification.

The optical drive in this system unit is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electro technical Commission (IEC) 60825-1: 2001 and CENELEC EN 60825-1: 1994 for Class 1 laser products.

CAUTION:

Invisible laser radiation when open. Do not stare into beam or view directly with optical instruments.

Class 1 Laser products are not considered to be hazardous. The optical drive contains internally a Class 3B gallium-arsenide laser that is nominally 30 mill watts at 830 nanometers. The design incorporates a combination of enclosures, electronics, and redundant interlocks such that there is no exposure to laser radiation above a Class 1 level during normal operation, user maintenance, or servicing conditions.

Data Integrity and Verification

WARNING:

Bull NovaScale Servers are designed to reduce the risk of undetected data corruption or loss. However, if unplanned outages or system failures occur, users are strongly advised to check the accuracy of the operations performed and the data saved or transmitted by the system at the time of outage or failure.

Environmental Regulation

This product has been built to comply with the Restriction of Certain Hazardous Substances (RoHS) Directive 2002/95/EC.

Technical publication remarks form

Title:	NovaScale R422 Installation and User's Guide
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Reference:	86 A1 95ET 00
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Date:	July 2007
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ERRORS IN PUBLICATION

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