R421

Installation and User's Guide

NOVASCALE

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R421

Installation and User's Guide

Hardware

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Preface

About This Manual

This manual is written for system integrators, PC technicians and knowledgeable PC users. It provides information for the installation and use of the Bull NovaScale R421 X7DBR-i motherboard. The NovaScale R421 X7DBR-i supports dual Intel Xeon 64-bit dual core processors with a front side bus speed of 1.333 GHz/1.066 GHz/667 MHz. With dual 64-bit Xeon dual core processors, the 5000P chipset, and 8 DDR2 FBD 667/533 memory modules built-in, the NovaScale R421 X7DBR-i offers substantial functionality and performance enhancements to the motherboards based on the NetBurst microarchitecture while remaining compatible with 32-bit based software.

The features include Intel Hyper-Threading Technology, Virtualization Technology, Hyper Pipelined Technology, Execution Trace Cache, Thermal Monitor 2 (TM2), Enhanced Intel SpeedStep technology, Advanced Dynamic Execution, Advanced Transfer Cache, Streaming SIMD Extensions 3 (SSE3) and Extended Memory 64 Technology (EM64T). These features allow the motherboard to operate at much higher speeds with better power management in much safer environments than the traditional motherboards. The NovaScale R421 X7DBR-i is ideal for high performance dual processor (DP) enterprise server environments. This product is intended to be professionally installed.

Manual Organization

Chapter 1 describes the features, specifications and performance of the mainboard and provides detailed information about the chipset.

Chapter 2 provides hardware installation instructions. Read this chapter when installing the processor, memory modules and other hardware components into the system.

Chapter 3 describes the installation of the NovaScale R421 server chassis.

If you encounter any problems, see **Chapter 4**, which describes troubleshooting procedures for the video, the memory and the system setup stored in CMOS.

Chapter 5 includes an introduction to BIOS and provides detailed information on running the CMOS Setup utility.

Appendix A and **Appendix B** provide BIOS POST Messages and POST Codes.

Appendix C and **Appendix D** list *Intel HostRAID Setup Guidelines* and *Adaptec HostRAID Setup Guidelines*.

Appendix E includes *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)

Table of Contents

Chapter 1   Introduction

1-1   Overview

Checklist

The Novascale R421 is a 1U server which consists of the CSE-812L-520B 1U chassis and one MBD-X7DBR-i-B serverboard.

In addition to the serverboard and chassis, the following hardware components, as listed below, are included with the Novascale R421 server:

- 520W Power Supply (PWS-521-1H20)

- Two (2) CPU heatsinks (SNK-P0017)

- One (1), air shroud (MCP-310-00008-01)

- Three (3) SATA hard drive carrier

- SATA cables (three (3) CBL-0061L, two (2) CBL-0082L))

- Two (2) 10cm 5K RPM Blower Fan (FAN-0059L)

- Rack mount hardware with screws (CSE-PT34)

1-2   Contacting Bull S.A.S. Technical Support

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

Figure 1-1. Bull NovaScale R421 MotherBoard

☞ **NOTE:** The drawings and pictures shown in this manual were based on the latest PCB Revision available at the time of publishing of the manual. The motherboard you've received may or may not look exactly the same as the graphics shown in the manual.)
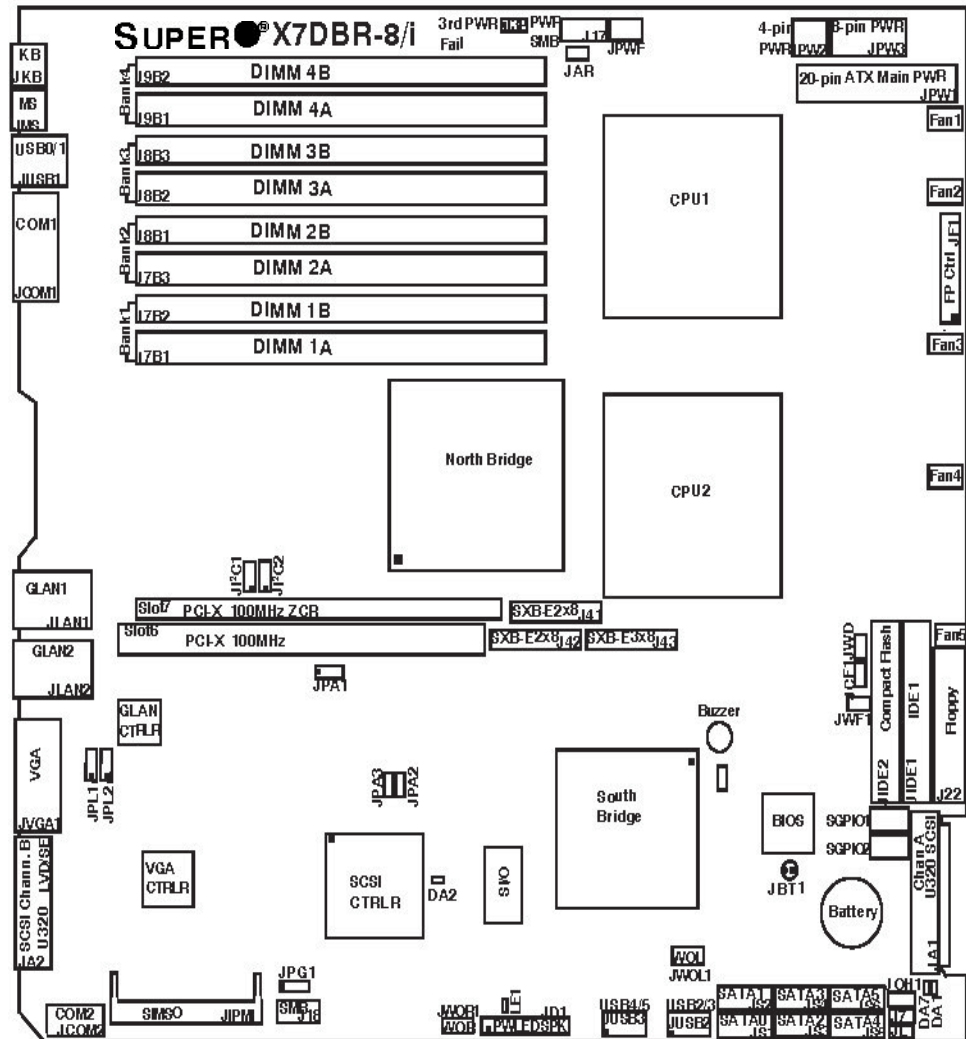
(not drawn to scale)

Figure 1-2. NovaScale R421 Motherboard Layout

Notes:

1. Jumpers not indicated are for test purposes only.

2. See *Chapter 2* for detailed information on jumpers, I/O ports and JF1 front panel connections.

3. "■" indicates the location of Pin 1.

4. For Compact Card to work properly, please enable JCF1 by putting cap on it and connect JWF1 to a power supply.

5. **When LE1 is on, remove the power cable before removing or installing components.**

1-3 Quick Reference (X7DBR-8/X7DBR-i)

Jumper	Description	Default Setting
J3P	3rd PWR Failure Detect	Off (Disabled)
JBT1	CMOS Clear	See Chapter 2
JCF1	Compact Card Master/Slave Select	On (Master)
JI2C1/JI2C2	SMBBus to PCI-E Slots	Off (Disabled)
JPG1	VGA Enable	Pins 1-2 (Enabled)
JPL1/JPL2	GLAN1/GLAN2 Enable	Pins 1-2 (Enabled)
JWD	Watch Dog	Pins 1-2 (Reset)

Connector	Description
ATX PWR (JPW1)	Primary 20-Pin ATX PWR Connector
Aux. PWR/CPU PWR	+12V 4-pin PWR (JWP2)/+12V 8-pin PWR(JPW3)
Buzzer	Internal Speaker
Chassis Intrusion (JL1)	Chassis Intrusion Header
COM1/COM2	COM1(JCOM1)/COM2(JCOM2) Serial Port Connectors
Compact PWR (JWF1)	Compact Card PWR Connector (*Used if JCF1 is on.)
DA1/DA2	SCSI Channel A/B Activity LED Indicators(See Chapt.2)
DIMM#1A-DIMM#4B	Memory DDR2 Fully Buffered (FBD) Slots
FAN 1-5	Fans 1-5 (CPU Fans/Chassis Fans)
Floppy (J22)	Floppy Disk Drive Connector
FP CTRL (JF1)	Front Control Panel Connector
GLAN 1/2 (JLAN1/2)	G-bit Ethernet Ports
IDE1/IDE2*	IDE1 Hard Drive (JIDE1)/Compact Flash Card (JIDE2)

(*See note 4 on previous page)

Connector	Description
OH LED (JOH1)	Overheat LED
JAR	Alarm Reset Enable
JPWF	Power Supply Failure Connector (See Chapter 2)
PCI-X (Slot 6)	PCI-X 100 MHz
PCI-X (Slot 7)	PCI-X 100 MHz Zero Channel RAID (ZCR) Slot

PWR LED/SPKR (JD1)   PWR LED(pins1-3)/SpeakerHeader (pins 4-7)

PWR SMB (J17)   Power System Management (I2C) Header

SATA0-SATA5 (JS1-6)   Intel SATA 0-5 Connectors

SCSI Chan. A/B (JA1/JA2) SCSI Channel A/Channel B Connectors (*X7DBR-8)

SGPIO1/2 (J29, J30)   Serial General Purpose Input/Output Headers

SIMSO (JIPMI)   SIM SO-DIMM IPMI Slot

SMB (J18)   System Management Bus Header

SXB-E1/SXB-E2/SXB-E3   PCI-Exp x8 slots (J41/J42/J43)

USB 0/1,USB 2/3,USB4/5   Back Panel USB 0/1, Front Panel USB 2/3, FP USB4/5

VGA (JVGA1)   VGA Connector

WOL (JWOL1)   Wake-on-LAN Header

WOR (JWOR)   Wake-on-Ring Header
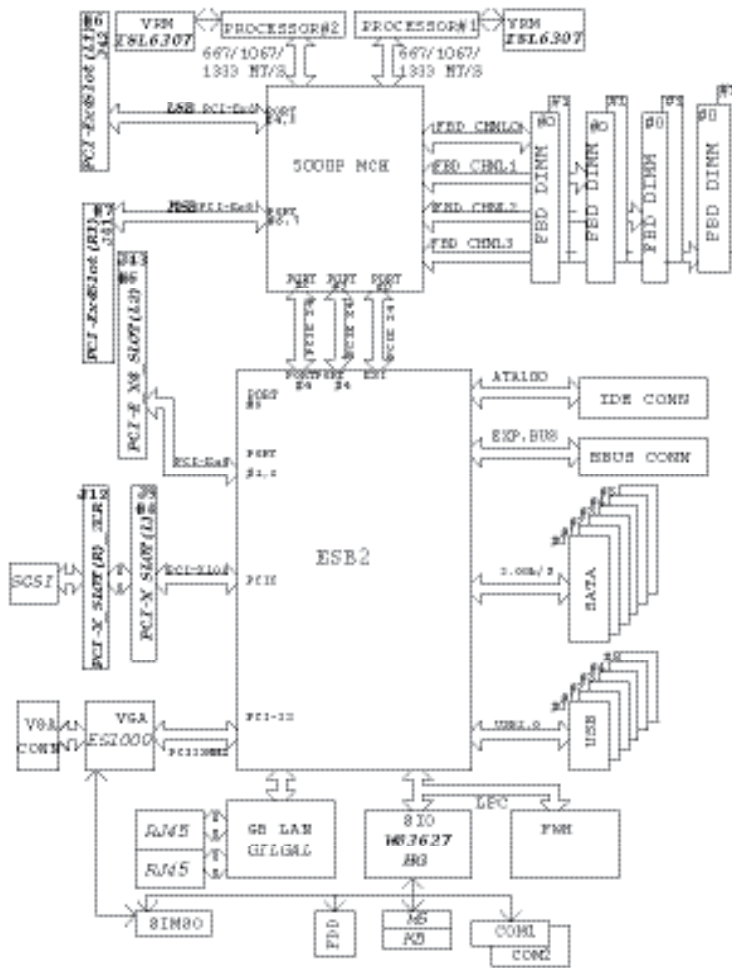
Figure 1-3. General Block Diagram of the 5000P Chipset

1-4   Chipset Overview

Built upon the functionality and the capability of the 5000P chipset, the NovaScale R421 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 a single, dual or quad Intel 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 8 Fully Buffered DIMM modules, providing up to 32 GB of DDR2 FBD ECC memory. The MCH chipset also provides three x8 PCI-Express interface 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.

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:

The Xeon Dual Core Processor

- 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

1-5   Special Features

Recovery from AC Power Loss

BIOS provides a setting for you to determine how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must hit the power switch to turn it back on) or for it to automatically return to a power- on state. See the Power Lost Control setting in the Advanced section (Boot Features) to change this setting. (*Note: Default: Last State).

1-6   PC Health Monitoring

This section describes the PC health monitoring features of the NovaScale R421 motherboard (X7DBR-i). All have an onboard System Hardware Monitor chip that supports PC health monitoring.

Onboard Voltage Monitors for CPU Cores, Memory, Chipset, +1.8V, +3.3V, +5V, +12V, –12V, +3.3V Standby, +5V standby and VBAT

An onboard voltage monitor will scan these voltages 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.

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 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 overheat 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 Overheat LED and Control

This feature is available when the user enables the CPU overheat warning function in the BIOS. This allows the user to define an overheat temperature. When this temperature is exceeded, both the overheat fan and the warning LED are triggered.

☞ **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*

1-7 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 Windows 2000, Windows XP and Windows 2003 Server Operating Systems.

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 an ATX 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 to "wake-up" the whole system. During the SoftOff state, the ATX 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 Power section of the BIOS Setup routine.

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, up-dates 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.

NOTE: Wake-On-LAN requires an ATX 2.01 (or above) compliant power supply.

1-8   Power Supply

As with all computer products, a stable power source is necessary for proper and reliable operation. It is even more important for processors that have high CPU clock rates.

The NovaScale R421 Motherboard (X7DBR-i) can only accommodates 24-pin ATX power supplies. Although most power supplies generally meet the specifications required by the CPU, some are inadequate. In addition, the 12V 4-pin power supply (JPW2) - is also required to ensure adequate power supply to the system. Also your power supply must supply 1.5A for the Ethernet ports.

It is strongly recommended that you use a high quality power supply that meets ATX power supply Specification 2.02 or above. It must also be SSI compliant (info at http://www.ssiforum.org/). Additionally, in areas where noisy power transmission is present, you may choose to install a line filter to shield the computer from noise. It is recommended that you also install a power surge protector to help avoid problems caused by power surges.

1-9   Super I/O

The disk drive adapter functions of the Super I/O chip include a floppy disk drive controller that is compatible with industry standard 82077/765, a data separator, write pre-compensation circuitry, decode logic, data rate selection, a clock generator, drive interface control logic and interrupt and DMA logic. The wide range of functions integrated onto the Super I/O greatly reduces the number of components required for interfacing with floppy disk drives. The Super I/O supports 360 K, 720 K, 1.2 M, 1.44 M or 2.88 M disk drives and data transfer rates of 250 Kb/s, 500 Kb/s or 1 Mb/s. It also provides two high-speed, 16550 compatible serial communication ports (UARTs), one of which supports serial infrared communication. Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability and a processor interrupt system. Both UARTs provide legacy speed with baud rate of up to 115.2 Kbps as

well as an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s, which support higher speed modems.

The Super I/O supports one PC-compatible printer port (SPP), Bi-directional Printer Port (BPP) , Enhanced Parallel Port (EPP) or Extended Capabilities Port (ECP).

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through an SMI or SCI function pin. It also features auto power management to reduce power consumption.

The IRQs, DMAs and I/O space resources of the Super I/O can flexibly adjust to meet ISA PnP requirements, which support ACPI and APM (Advanced Power Management).

Chapter 2 Installation

2-1   Static-Sensitive Devices

Electric-Static-Discharge (ESD) can damage electronic components. To prevent damage to your system board, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

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

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

- Handle the 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 motherboard 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 motherboard.

- Use only the correct type of onboard CMOS battery as specified by the manufacturer. Do not install the onboard battery upside down to avoid possible explosion.

Unpacking

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

2-2   Processor and Heatsink Fan Installation

> ⚠ **When handling the processor package, avoid placing direct pressure on the label area of the fan.**

> ☞ **NOTE:** Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.

When purchasing an Intel Xeon Dualcore 51xx or Quadcore 53xx processor or when receiving a motherboard with an Intel Xeon Dualcore 51xx or Quadcore 53xx processor 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.

Refer to the **MB Features Section** for more details on CPU support.

Installation of the Intel Xeon Dualcore 51xx or Quadcore 53xx Processor

Socket Clip
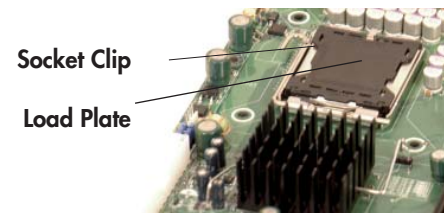
Load Plate

1. Press the socket clip to release the load plate, which covers the CPU socket, from its locking position.

2. Gently lift the socket clip to open the load plate.
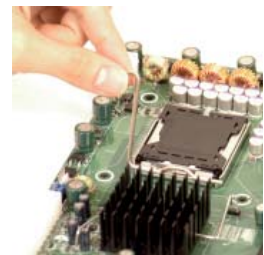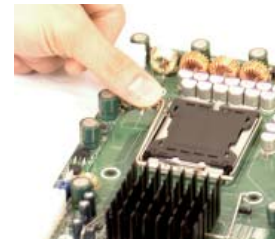
Load Plate
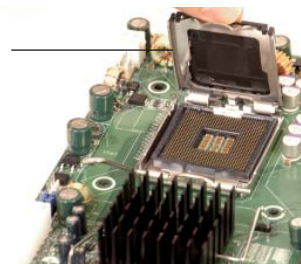
3. Use your thumb and your index finger to hold the CPU at the North Center Edge and the South Center Edge of the CPU.

4. Align CPU Pin1 (the CPU corner marked with a triangle) against the socket corner that is marked with a triangle cutout.

5. Align the CPU key that is the semi-circle cutout below a gold dot against the socket key, the notch on the same side of the triangle cutout on the socket.

6. Once aligned, carefully lower the CPU straight down to the socket. (**Do not drop the CPU on the socket. Do not move the CPU horizontally or vertically. Do not rub the CPU against the surface or against any pins of the socket to avoid damage to the CPU or the socket.)

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

8. Use your thumb to gently push the socket clip down to the clip lock.

9. If the CPU is properly installed into the socket, the plastic cap will be automatically released from the load plate when the clip is pushed in the clip lock.
Remove the plastic cap from the motherboard.
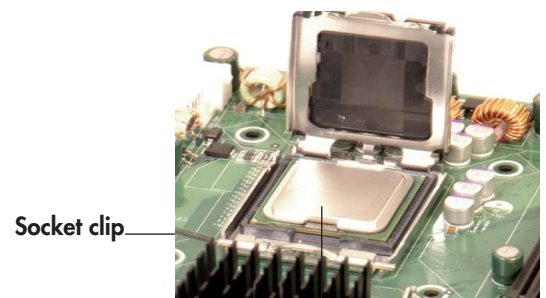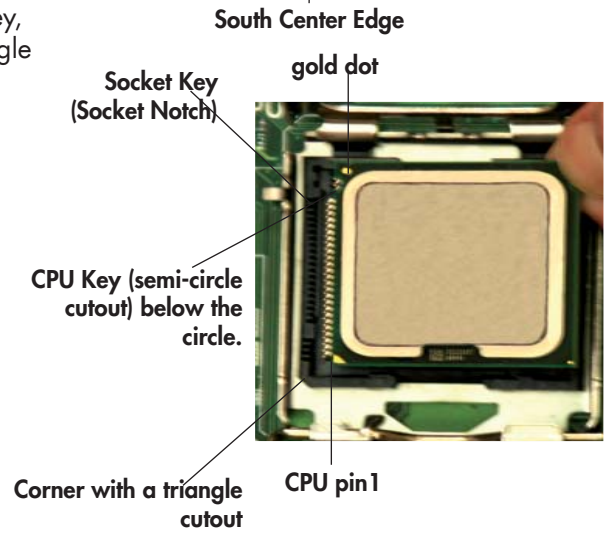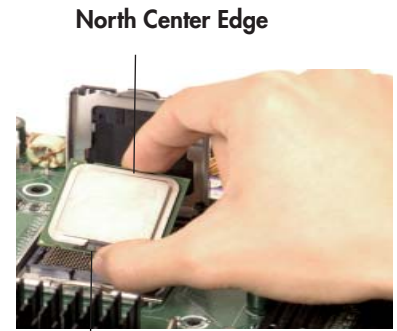
WARNING:
Please keep the plastic cap. The motherboard and the CPU must be shipped with the plastic cap properly installed to protect the CPU pins. Shipment without the CPU plastic cap properly installed will void the warranty.

North Center Edge

South Center Edge

Socket Key (Socket Notch)

gold dot

CPU Key (semi-circle cutout) below the circle.

Corner with a triangle cutout

CPU pin1

Socket clip

CPU in the CPU socket
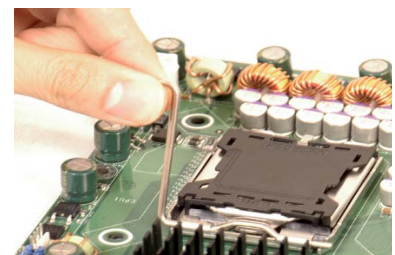
Plastic cap is released from the load plate if the CPU is properly installed.
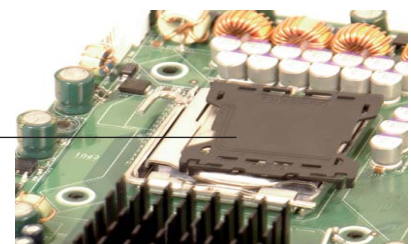
2-3   Installation of the Heatsink

CEK Heatsink Installation

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 retention mechanism.

3. Screw in two diagonal screws (i.e. the #1 and the #2 screws) until they arejust snug (do not tighten the screws fully to avoid possible damage to the CPU.)

CEK Passive Heatsink

Screw #1   **Screw #2**

Screw #1

Screw #2
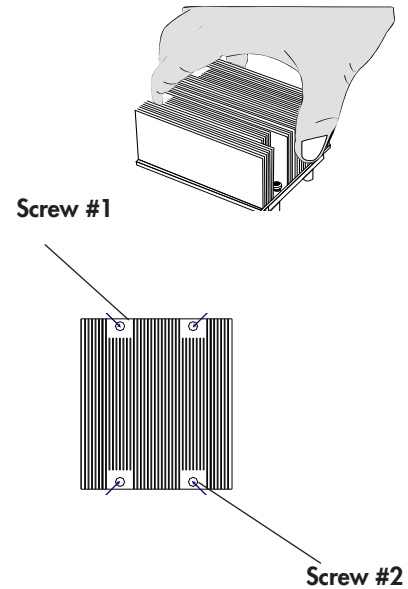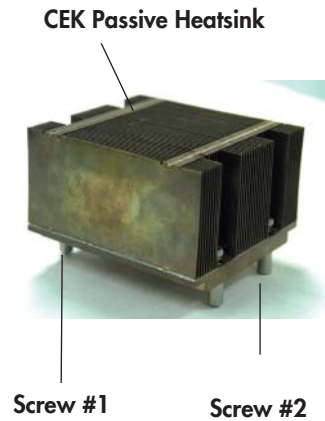
2-4   To Un-install the Heatsink

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 in order to prevent damage done to the CPU or the CPU socket.

1. Unscrew and remove the heatsink screws from the motherboard in the sequence as show in the picture on the right.

NO.1 SCREW   NO.4 SCREW

NO.3 SCREW   NO.2 SCREW
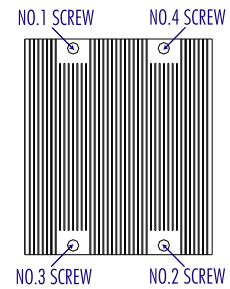
2. Hold the heatsink as shown in the picture on the right and **gently** wiggle the heatsink to loosen it from the CPU. (Do not use excessive force when wiggling the heatsink!!)

3. Once the heatsink is loosened, remove the heatsink from the CPU socket.

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 CPU and the heatsink.
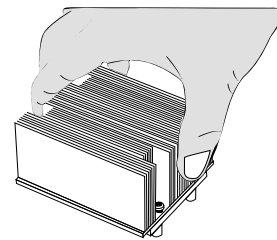
Mounting the Motherboard in the Chassis

All motherboards have standard mounting holes to fit different types of chassis. Make sure that the locations of all the mounting holes for both motherboard and chassis match. Make sure that the metal standoffs click in or are screwed in tightly. Then, use a screwdriver to secure the motherboard onto the motherboard tray.

☞ **NOTE:** Some components are very close to the mounting holes. Please take precautionary measures to prevent damage done to these components when you install the motherboard to the chassis.

2-5   Installing DIMMs

⚠ **WARNING:**
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 2-1)

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. (*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 R421** Motherboard supports up to 32 GB fully buffered (FBD) ECC DDR2 667/533 in 8 DIMMs. Populating DIMM modules with pairs of memory modules of the same size and same type will r**esult in Interleaved Memory which will increase memory performance.**

Optimized DIMM Population Configurations																
	Branch 0								**Branch 1**							
Number of DIMMs	**Bank 1 (Channel 0)**				**Bank 2 (Channel 1)**				**Bank 3 (Channel 2)**				**Bank 4 (Channel 3)**			
2 DIMMs	1A	---	---	---	2A	---	---	---	---	---	---	---	---	---	---	---
4 DIMMs	1A	---	---	---	2A	---	---	---	3A	---	---	---	4A	---	---	---
6 DIMMs	1A	1B	---	---	2A	2B	---	---	3A	---	---	---	4A	---	---	---
8 DIMMs	1A	1B	---	---	2A	2B	---	---	3A	3B	---	---	4A	4B	---	---

(*__Notes:__ **i.** DIMM slot# specified: DIMM slot to be populated; "---": DIMM slot not to be populated. **ii.** Both FBD 533 MHz and 667MHz 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 in **both Branch 0 and Branch 1**. **iv.** For memory to work properly, you need to follow the restrictions listed above.)

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

Due to the allocation of memory to system devices, the memory remaining available for operational use will be reduced when 4 GBs of RAM is used. The reduction in memory availability is disproportional. (*Refer to the Memory Availability Table on the next page for more details.*)

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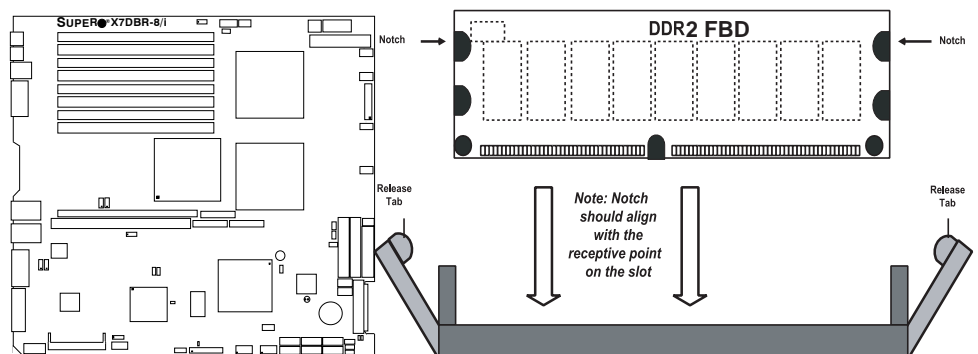
Figure 2-1. Installing and Removing DIMMs

Top View of DDR2 FBD Slot
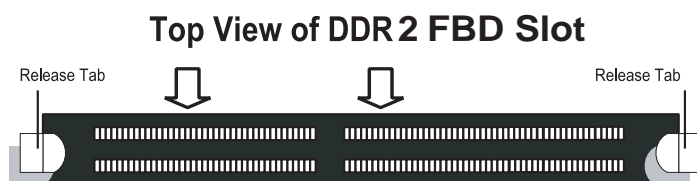
To Install:

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.

2-6   Control Panel Connectors/IO Ports

The I/O ports are color coded in conformance with the PC 99 specification. See Figure 2-3 below for the colors and locations of the various I/O ports.

Back Panel Connectors/IO Ports
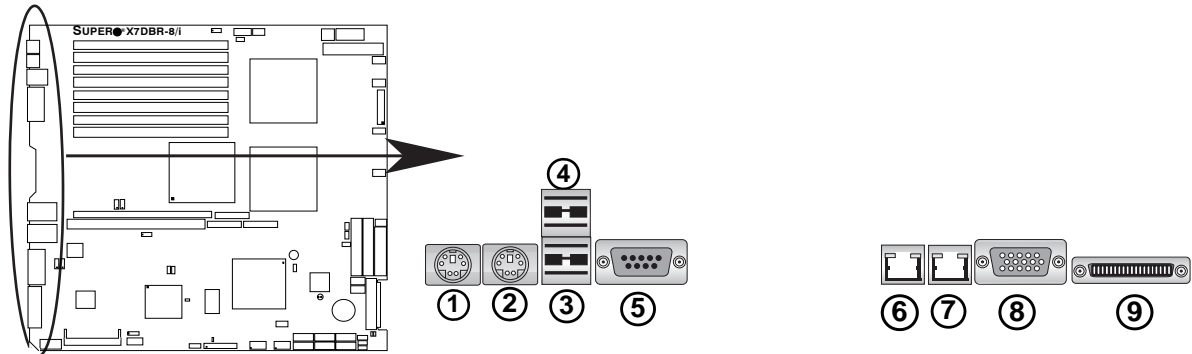
Figure 2-2. Back Panel I/O Port Locations and Definitions

Back Panel Connectors

1.   Keyboard (Purple)

2.   PS/2 Mouse (Green)

3.   Back Panel USB Port 0

4.   Back Panel USB Port 1

5.   COM Port 1 (Turquoise)

6.   Gigabit LAN 1

7.   Gigabit LAN 2

8.   VGA Port (Blue)

9.   SCSI (Channel B)

(*See Section 2-5 for details.*)

Front Control Panel

JF1 contains header pins for various buttons and indicators that are normally located on a control panel at the front of the chassis. These connectors are designed specifically for use with NovaScale R421 server chassis. See Figure 2-4 for the descriptions of the various control panel buttons and LED indicators. Refer to the following section for descriptions and pin definitions.

Figure 2-4. JF1 Header Pins
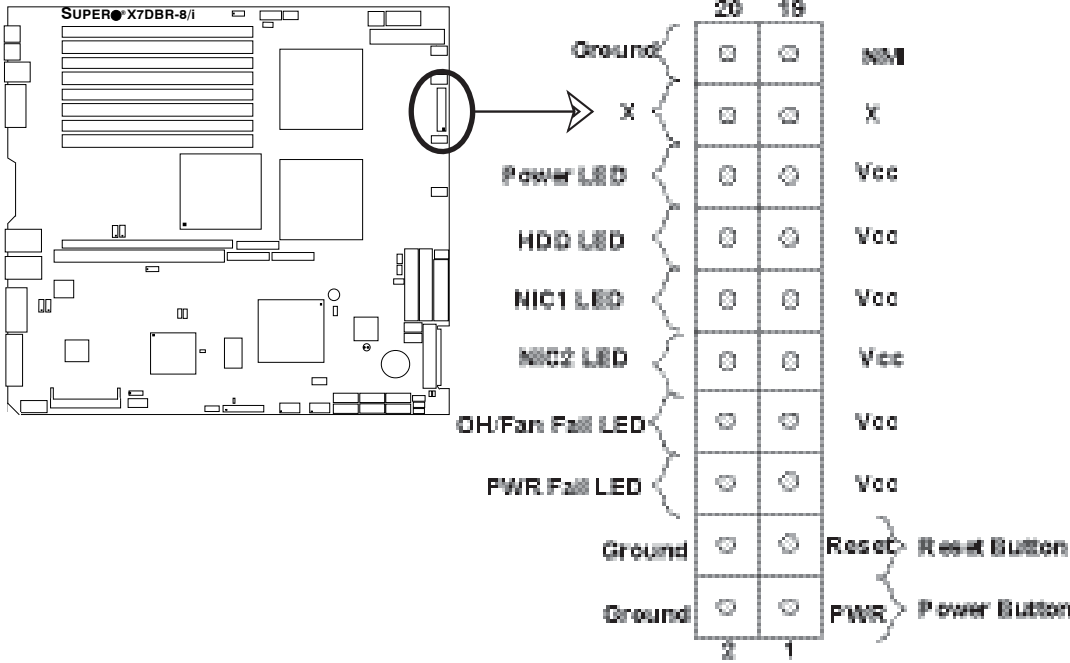
Front Control Panel Pin Definitions
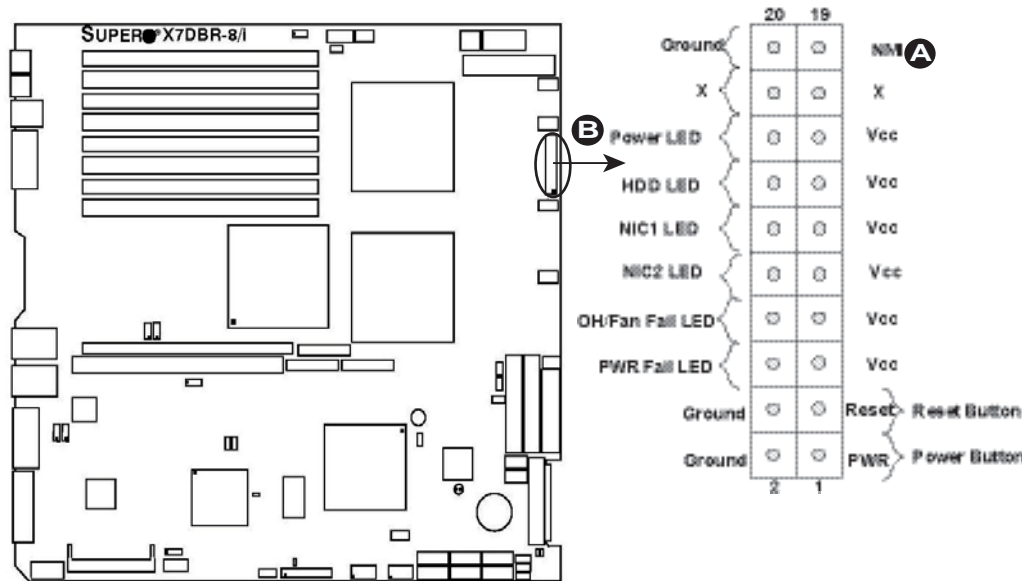
A. NMI

B. PWR LED

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

Power LED

The Power LED connection is located on pins 15 and 16 of JF1. Refer to the table on the right for pin definitions.

Power LED Pin Definitions (JF1)	
Pin#	Definition
15	+5V
16	Ground
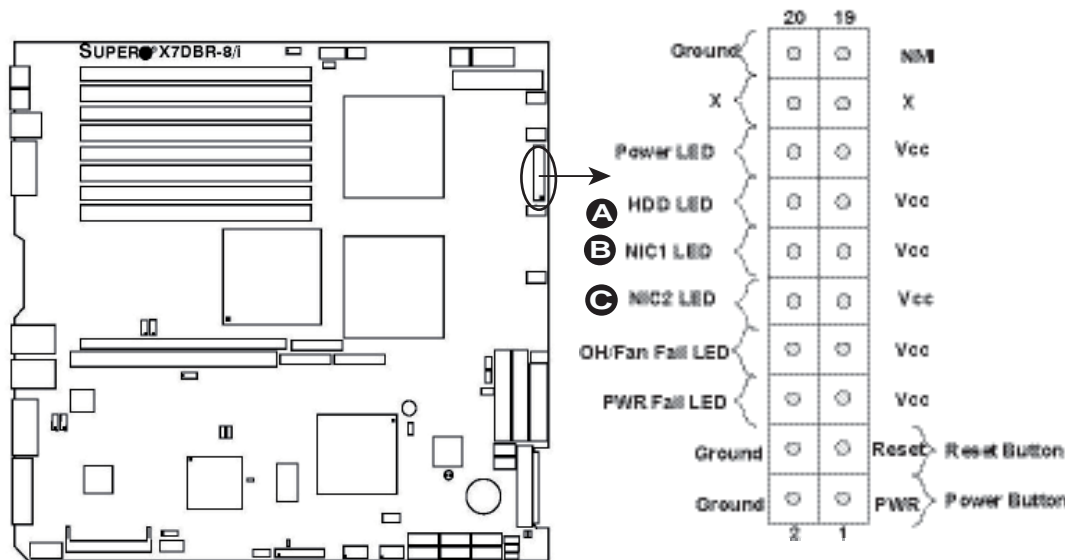
A. HDD LED

B. NIC1 LED

C. NIC2 LED

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	+5V
14	HD Active

NIC1/NIC2 LED Indicators

The NIC (Network Interface Controller) LED connection for GLAN port1 is located on pins 11 and 12 of JF1 and the LED connection for GLAN Port2 is on Pins 9 and 10. Attach the NIC LED cables to display network activity. Refer to the table on the right for pin definitions.

GLAN1/2 LED Pin Definitions (JF1)	
Pin#	Definition
9/11	Vcc
10/12	PWR Fail
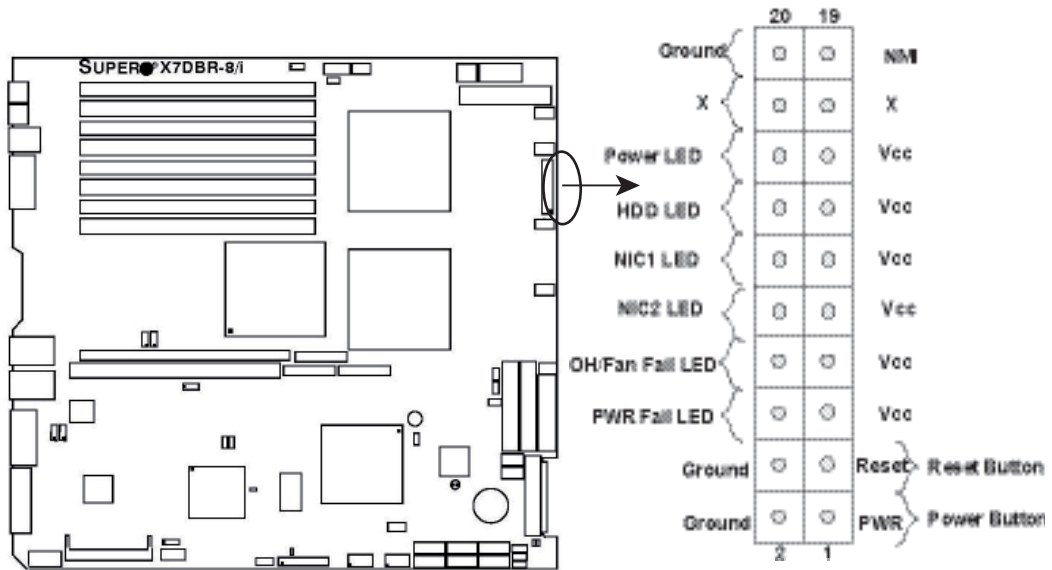
A. OH/Fan Fail LED

B. PWR Supply Fail

Overheat/Fan Fail LED (OH)

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

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

OH/Fan Fail Indicator Status	
State	Definition
Off	Normal
On	Overheat
Flashing	Fan Fail

Power Fail LED

The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table on the right for pin definitions.

PWR Fail LED Pin Definitions (JF1)	
Pin#	Definition
5	Vcc
6	Ground
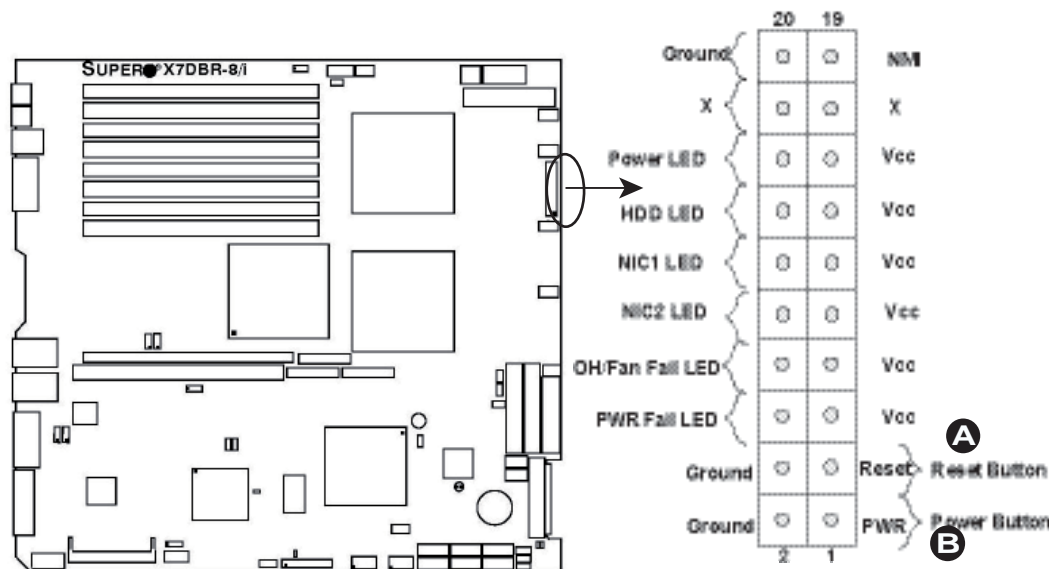
A. Reset Button

B. PWR Button

Reset Button

The Reset Button connection is located on pins 3 and 4 of JF1. Attach it to the hardware reset switch on the computer case. Refer to the table on the right for pin definitions.

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

Power Button

The Power Button connection is located on pins 1 and 2 of JF1. Momentarily contacting both pins will power on/off the system. This button can also be configured to function as a suspend button (with a setting in BIOS - *see Chapter 4*). To turn off the power when set to suspend mode, press the button for at least 4 seconds. Refer to the table on the right for pin definitions.

Power Button Pin Definitions (JF1)	
Pin#	Definition
1	Signal
2	+3V Standby

2-7   Connecting Cables
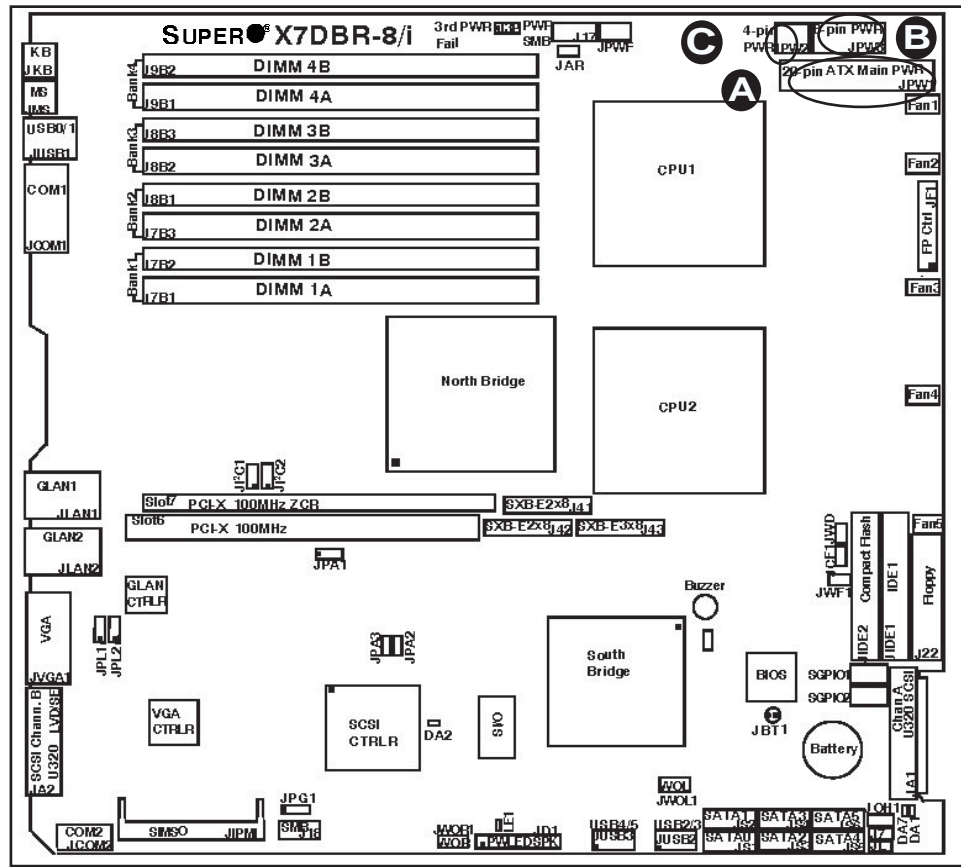
ATX Power Connector

There are a 20-pin main power supply
connector(JPW1) and an 8-pin CPU PWR connector
(JPW3) on the motherboard. These power
connectors meet the SSI EPS 12V specification.
The 4-pin 12V PWR supply is required to provide
adequate power to the system. See the table on the
right for pin definitions for a connector (JPW1). For
information on the 8-pin PWR (JPW3), please refer
below.

Processor Power Connector

In addition to the Primary ATX power connector
(above), **the 12V 8-pin CPU PWR connector at JPW3
must also be connected to your power supply**. See
the table on the right for pin definitions.

A. ATX Main PWR

B. 8-pin Processor PWR

C. 4-pin PWR

ATX Power 20-pin Connector Pin Definitions			
Pin#	Definition	Pin #	Definition
11	+3.3V	1	+3.3V
12	-12V	2	+3.3V
13	COM	3	COM
14	PS_ON	4	+5V
15	COM	5	COM
16	COM	6	+5V
17	COM	7	COM
18	Res (NC)	8	PWR_OK
19	+5V	9	5VSB
20	+5V	10	+12V

Required Connection

12V 8-pin Power CPU Connector Pin Definitions		12V 4-pin Power Connector Pin Definitions	
Pins	Definition	Pins	Definition
1 through 4	Ground	1 and 2	Ground
5 through 8	+12V	3 and 4	+12V

SUPER●X7DBR-8/i
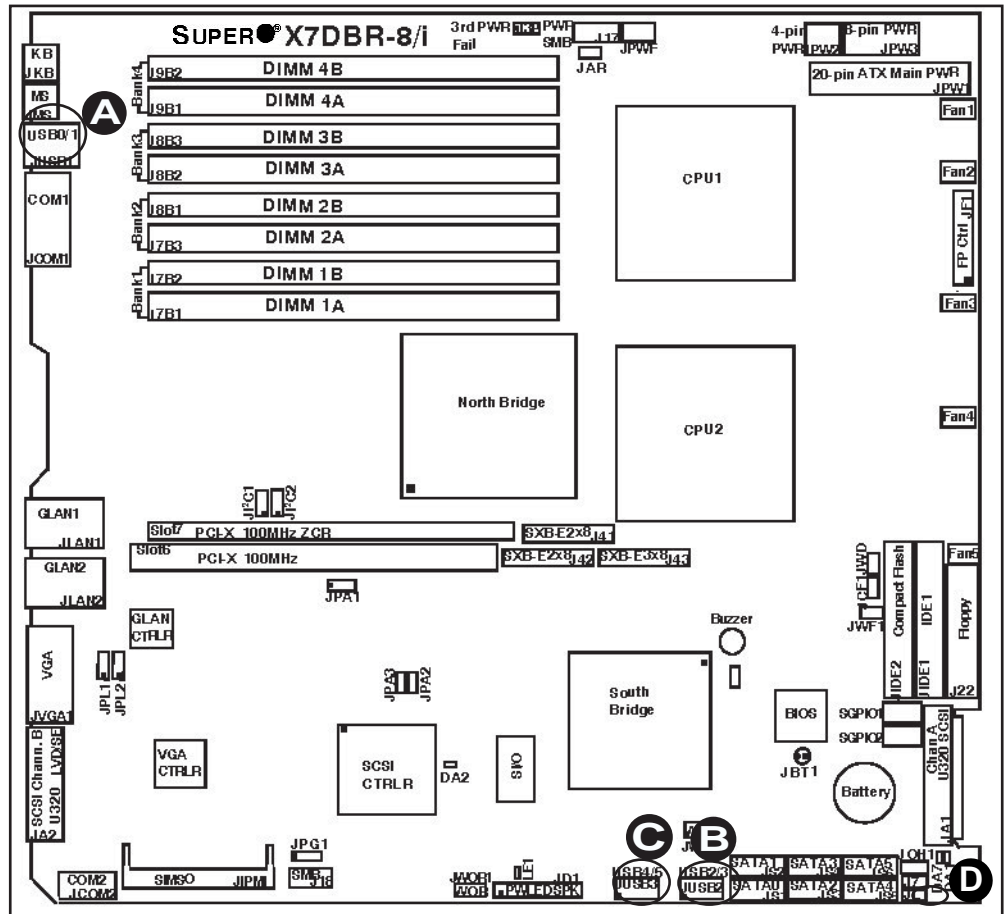
A. Back Panel USB 0/1

B. Front Panel USB 2/3

C. Front Panel USB 4/5

D. Chassis Intrusion

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

Universal Serial Bus (USB)

There are six USB 2.0 (Universal Serial Bus) ports/headers on the motherboard. Two of them are Back Panel USB ports (USB#0/1:JUSB1), and the other are Front Panel USB headers (USB#2/3:JUSB2, USB#4/5: JUSB3). See the tables on the right for pin definitions.

Front Panel USB Pin Definitions (USB 2/3/4/5)			
USB4		**USB5**	
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

Chassis Intrusion

A Chassis Intrusion header is located at JL1. Attach the appropriate cable from the chassis to inform you of a chassis intrusion when the chassis is opened.

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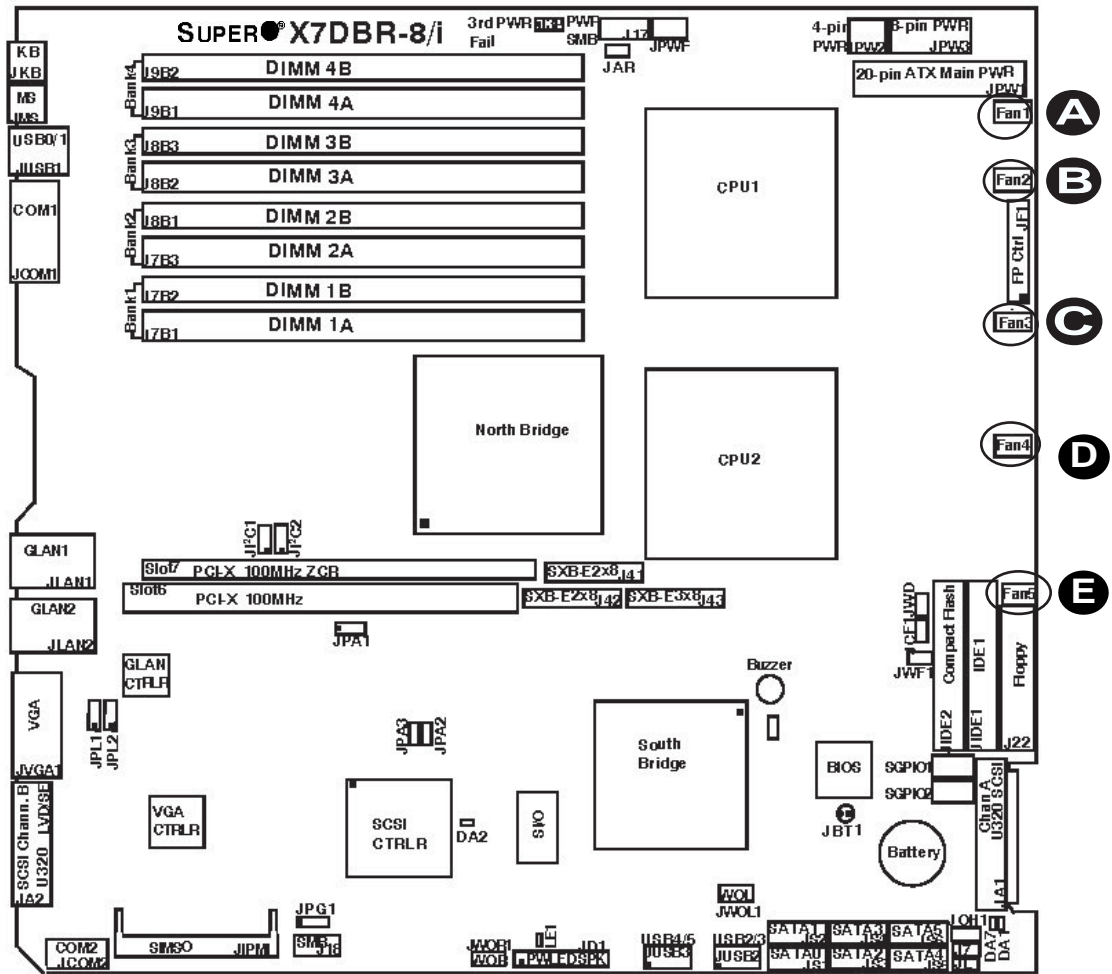
Fan Headers

The NovaScale R421 motherboard (X7DBR-I) has five chassis/system fan headers (Fan1 to Fan5.) See the tables below for the right for pin definitions. (The onboard fan speeds are controlled by Thermal Management via BIOS Hardware Monitor in the Advanced Setting. Note: Default: Disabled.)

A. Fan 1

B. Fan 2

C. Fan 3

D. Fan 4

E. Fan 5

NOTE: All these fans are 4-pin fan connectors. However, Pins 1-3 of the fan headers are backward compatible with the traditional 3-pin fans

3-Pin Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer

4-Pin Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer
4	PWM Signals
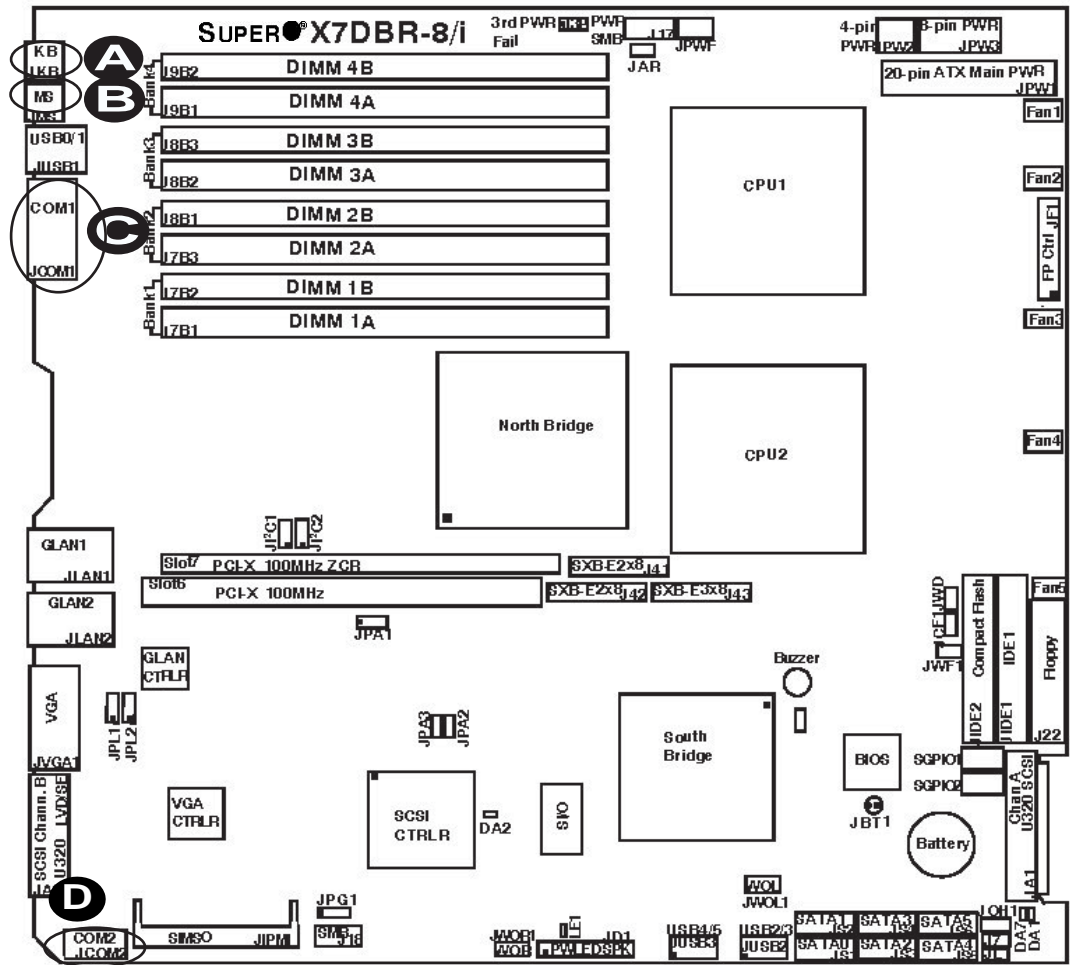
A. Keyboard

B. Mouse

C. COM1

D. COM2

ATX PS/2 Keyboard and PS/2 Mouse Ports

The ATX PS/2 keyboard and the PS/2 mouse ports are located at JKM and JMS. See the table on the right for pin definitions. (The mouse port is above the keyboard port. See the table on the right for pin definitions.)

PS/2 Keyboard and Mouse Port Pin Definitions	
Pin#	Definition
1	Data
2	NC
3	Ground
4	VCC
5	Clock
6	NC

Serial Ports

COM1 is a connector located on the IO Backpanel and COM2 is a header located at JCOM2. See the table on the right for pin definitions.

Serial Port Pin Definitions (COM1/COM2)			
Pin #	Definition	Pin #	Definition
1	CD	6	DSR
2	RD	7	RTS
3	TD	8	CTS
4	DTR	9	RI
5	Ground	10	NC

(Pin 10 is available on COM2 only. NC: No Connection.)
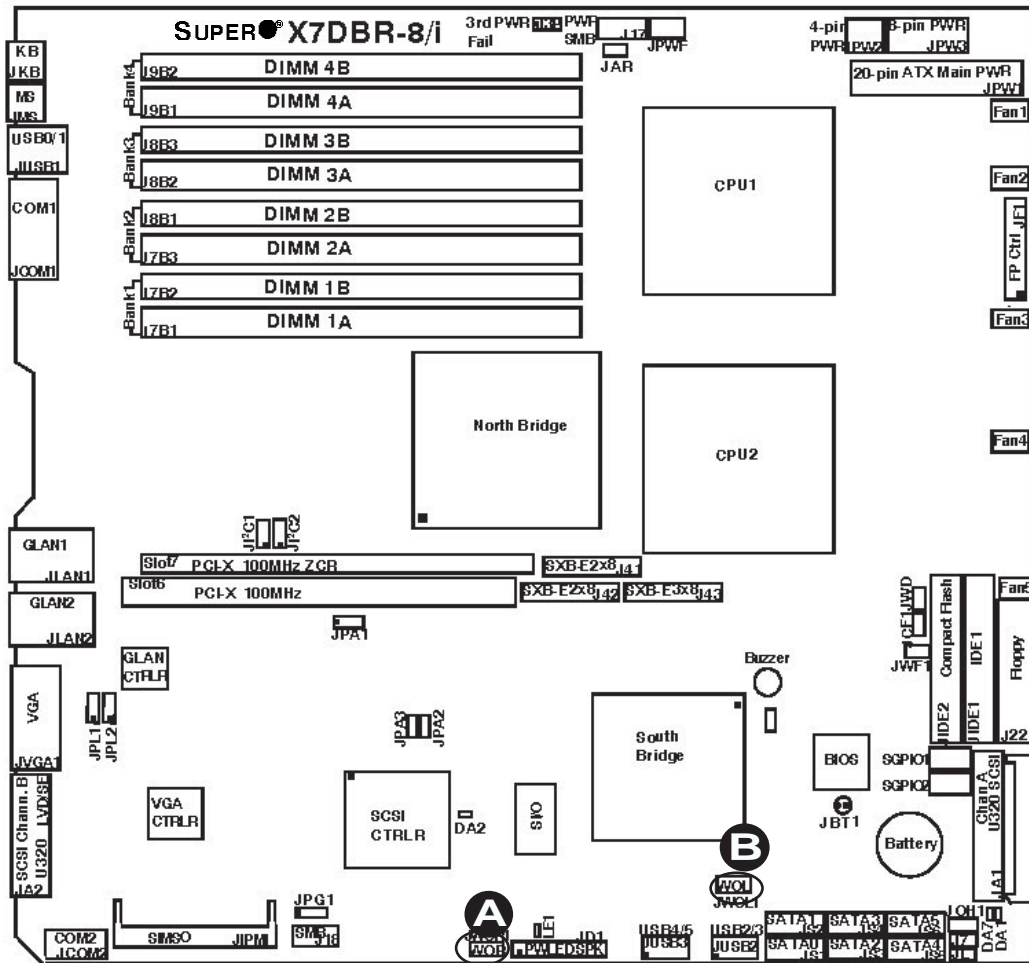
A. WOR

B. WOL

Wake-On-Ring

The Wake-On-Ring header is designated JWOR. This function allows your computer to receive and be "woken up" by an incoming call to the modem when the system is in the suspend state. See the table on the right for pin definitions. You must have a Wake-On-Ring card and cable to use this feature. Please make sure to enable this function in the BIOS.

Wake-On-Ring Pin Definitions	
Pin#	Definition
1	Ground
2	Wake-up

Wake-On-LAN

The Wake-On-LAN header is located at JWOL1 on the motherboard. See the table on the right for pin definitions. (You must also have a LAN card with a Wake-On-LAN connector and cable to use this feature.)

Wake-On-LAN Pin Definitions	
Pin#	Definition
1	+5V Standby
2	Ground
3	Wake-up
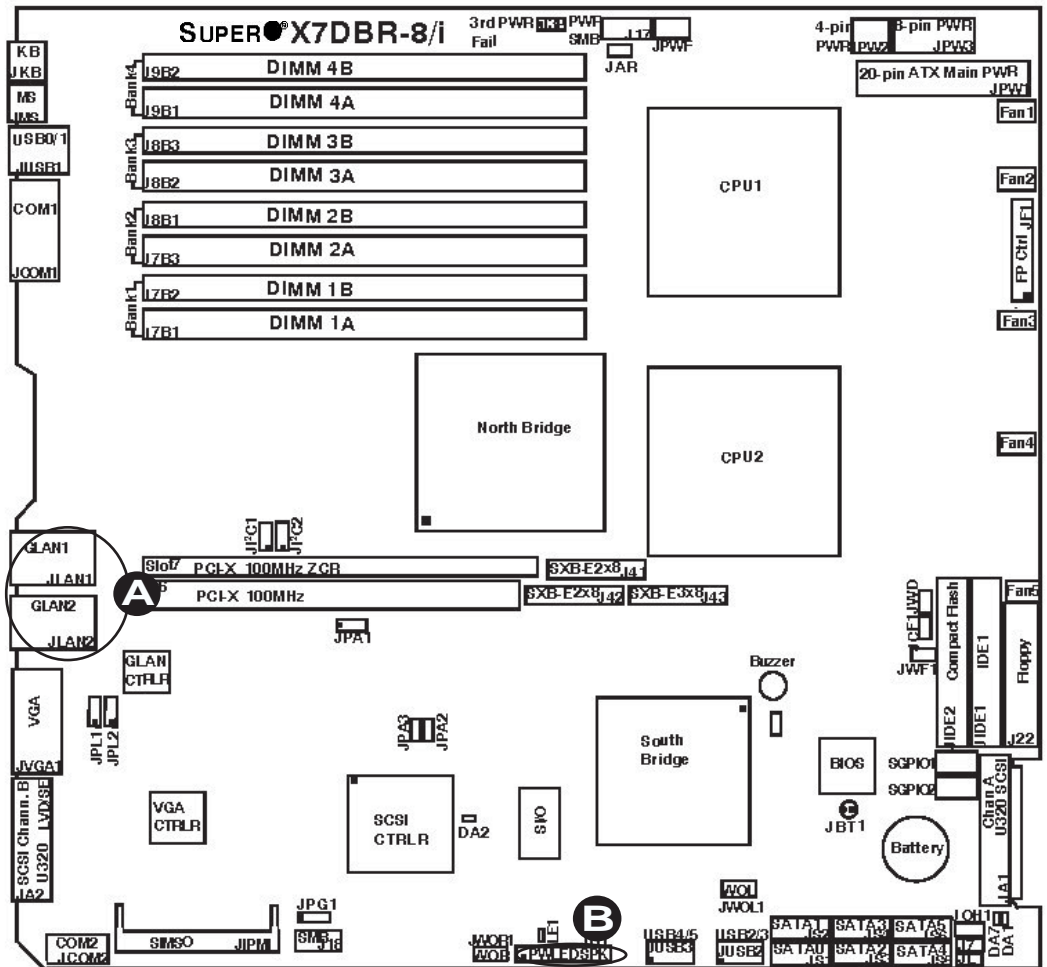
A. GLAN1/2

B. PWR LED/Speaker

GLAN 1/2 (Giga-bit Ethernet Ports)

Two G-bit Ethernet ports are designated JLAN1 and JLAN2 on the IO backplane. This port accepts RJ45 type cables.

GLAN1   GLAN2

Power LED/Speaker

On the JD1 header, pins 1-3 are for a power LED and pins 4-7 are for the speaker. See the table on the right for speaker pin definitions. Note: The speaker connector pins are for use with an external speaker. If you wish to use the onboard speaker, you should close pins 6-7 with a jumper.

Speaker Connector	
Pin Setting	**Definition**
Pins 6-7	Internal Speaker
Pins 4-7	External Speaker
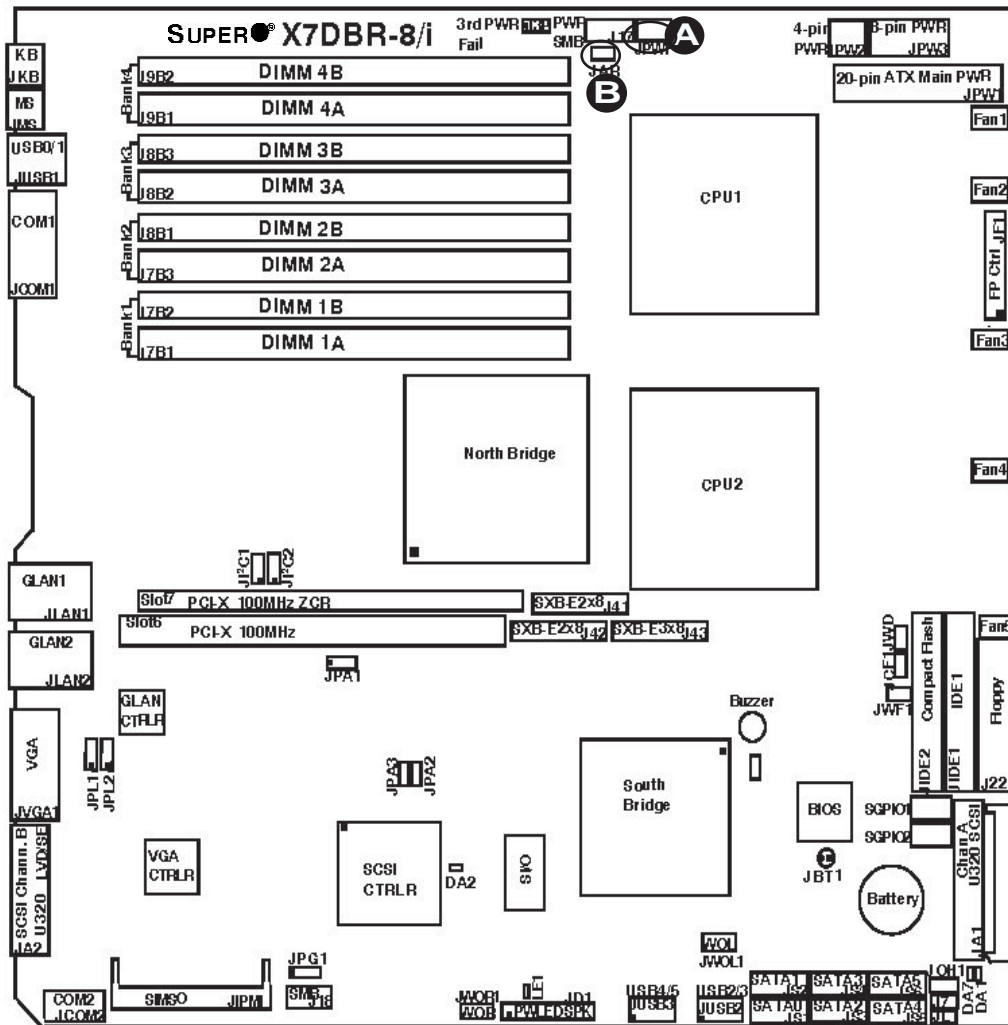
A. Power Fault

B. Alarm Reset

Power Fault (PWR Supply Failure)

Connect a cable from your power supply to the Power Failure header (JPWF) to provide warning of power supply failure. This warning signal is passed through the PWR_LED pin to indicate of a power failure on the chassis. See the table on the right for pin definitions.

PWR Supply Fail LED Pin Definitions	
Pin#	Definition
1	PWR 1: Fail
2	PWR 2: Fail
3	PWR 3: Fail
4	Signal: Alarm Reset

Note: This feature is only available when using NovaScale 421 redundant power supplies.

Alarm Reset

If three power supplies are installed and Alarm Reset (JAR1) is enabled, the system will notify you when any of the three power modules fails. Connect JAR1 to a micro-switch to enable you to turn off the alarm that is activated when a power module fails. See the table on the right for pin definitions.

Alarm Reset	
Pin Setting	Definition
Pin 1	Ground
Pin 2	+5V

SUPER● X7DBR-8/i
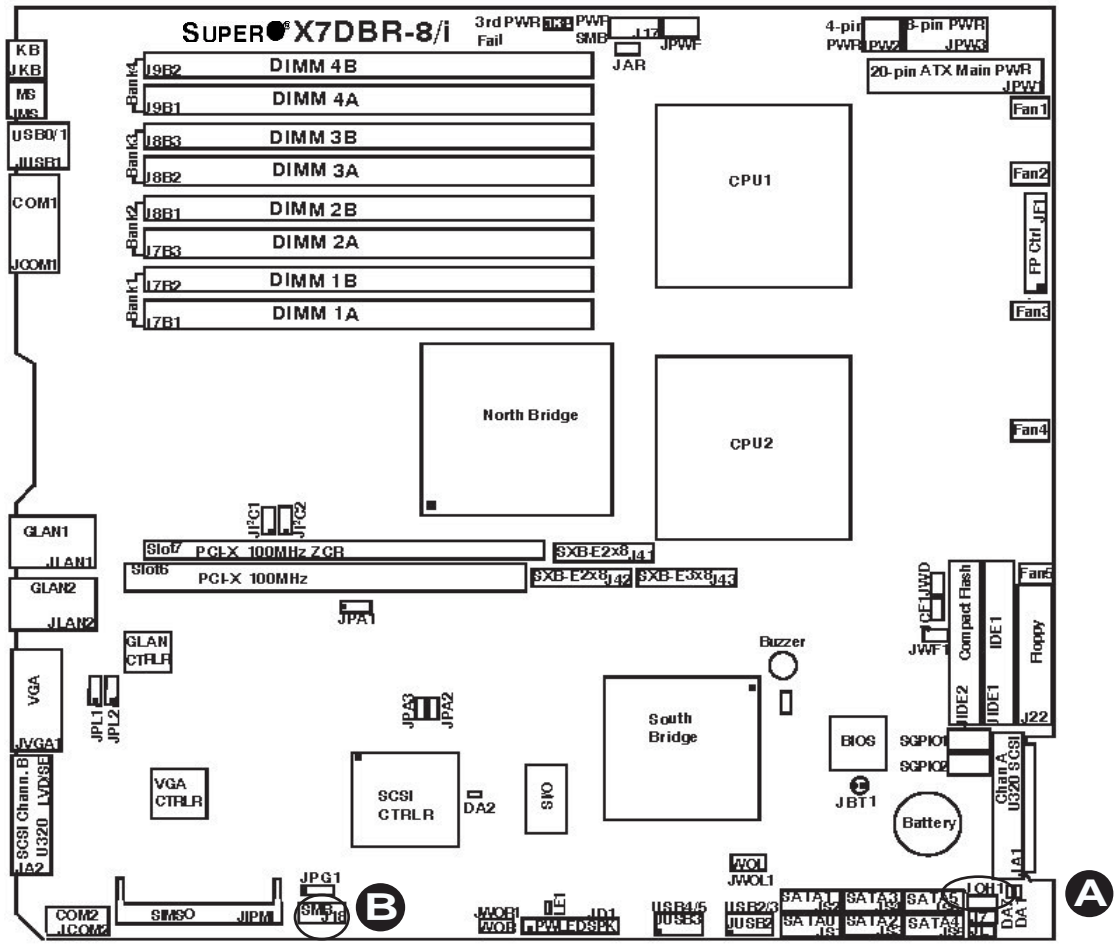
A. OH/Fan Fail LED

B. SMB Header

Overheat LED/Fan Fail (JOH1)

The JOH1 header is used to connect an LED to provide warnings of chassis overheating. This LED will blink to indicate a fan failure. Refer to the table on right for pin definitions.

SMB

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

Overheat LED Pin Definitions	
Pin#	Definition
1	5vDC
2	OH Active

OH/Fan Fail LED	
State	Message
Solid	Overheat
Blinking	Fan Fail

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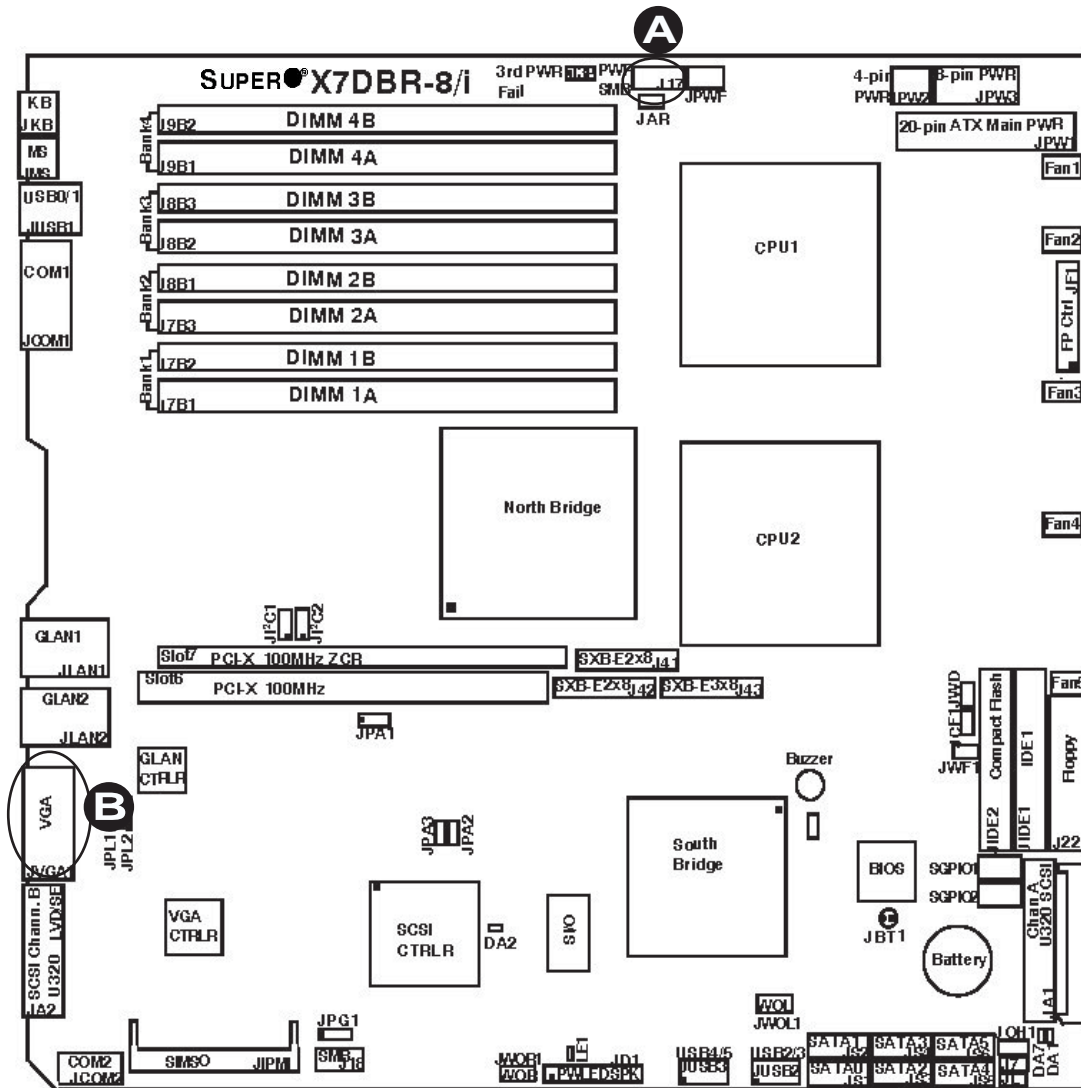
A. PWR SMB

B. VGA

Power SMB (I^2 C) Connector

Power SMB (I2 C) Connector (J17) monitors the status of PWR Supply, Fan and system temperature. See the table on the right for pin definitions.

PWR SMB Pin Definitions	
Pin#	Definition
1	Clock
2	Data
3	PWR Fail
4	Ground
5	+3.3V

VGA Connector

A VGA connector (JVGA1) is located next to the GLAN2 port on the IO backplane. Refer to the board layout above for the location.
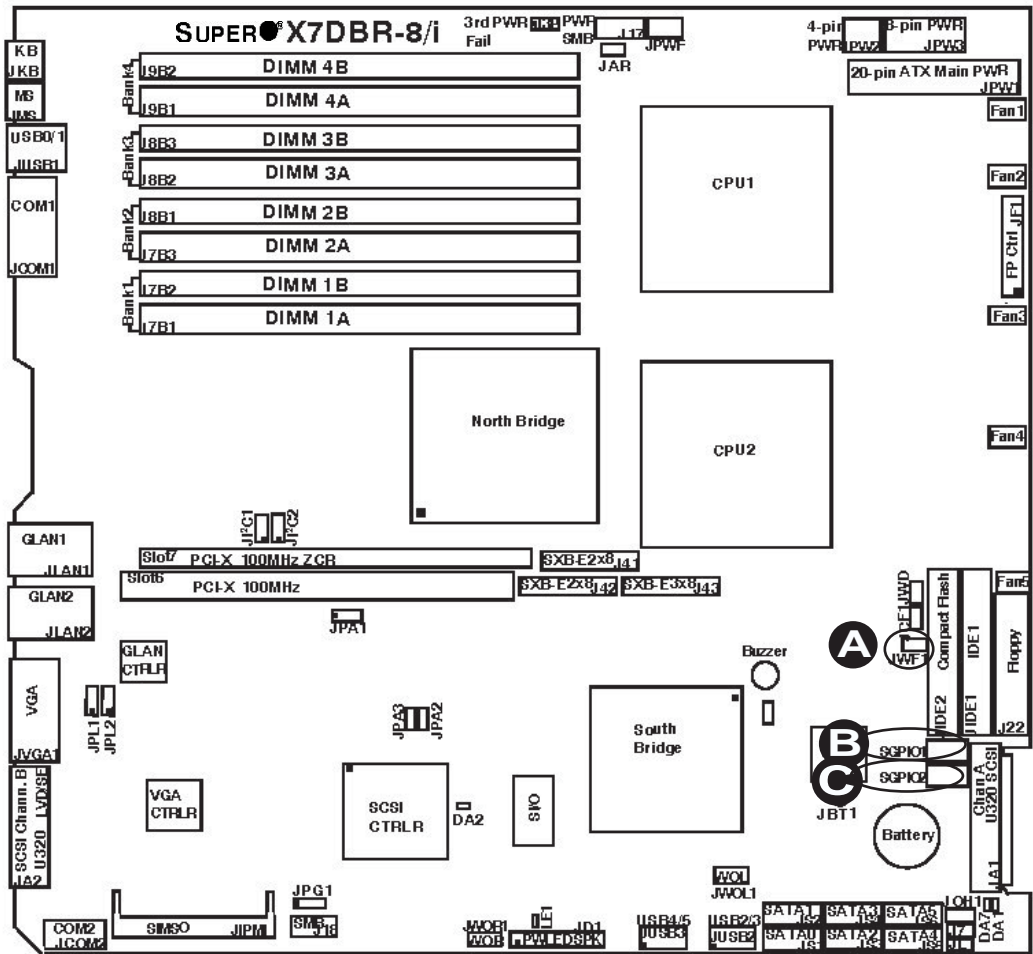
A. Compact Flash PWR Connector

B. SGPIO1

C. SGPIO2

Compact Flash Card PWR Connector

A Compact Flash Card Power Connector is located at JWF1. For the Compact Flash Card or the Compact Flash Jumper (JCF1) to work properly, you will need to connect a power cable to JWF1 first. Refer to the board layout below for the location.

Compact Flash Card PWR Connector	
Jumper	Definition
On	Power On
Off	Power Off

SGPIO Headers

There are two SGPIO (Serial General Purpose Input/Output) headers (J29, J30) located on the motherboard. These headers are used to "talk to" the AMI Chip on the backplane. See the table on the right for pin definitions. Refer to the board layout below for the locations of the headers.

SGPIO SMB Pin Definitions			
Pin#	Definition	Pin	Definition
1	*NC	2	*NC
3	Ground	4	Data
5	Load	6	Ground
7	*NC	8	*NC

NOTE: NC = No Connections

2-8   Jumper Settings

Explanation of Jumpers

To modify the operation of the motherboard, 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 motherboard layout pages for jumper locations.

3 2 1

Connector Pins

Jumper Cap

3 2 1

Setting

Pin 1-2 short
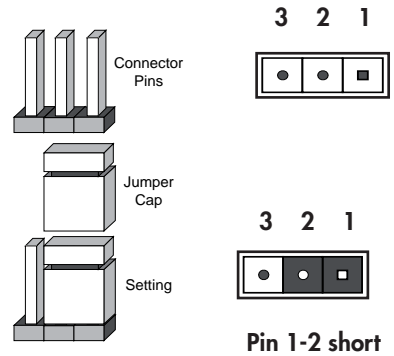
☞ **NOTE:** On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.

GLAN Enable/Disable

JPL1/JPL2 enable or disable the GLAN Port1/GLAN Port2 on the motherboard. See the table on the right for jumper settings. The default setting is enabled.

GLAN Enable	
Pin#	Definition
1-2	Enabled (*default)
2-3	Disabled

A. GLAN Port1 Enable
B. GLAN Port2 Enable
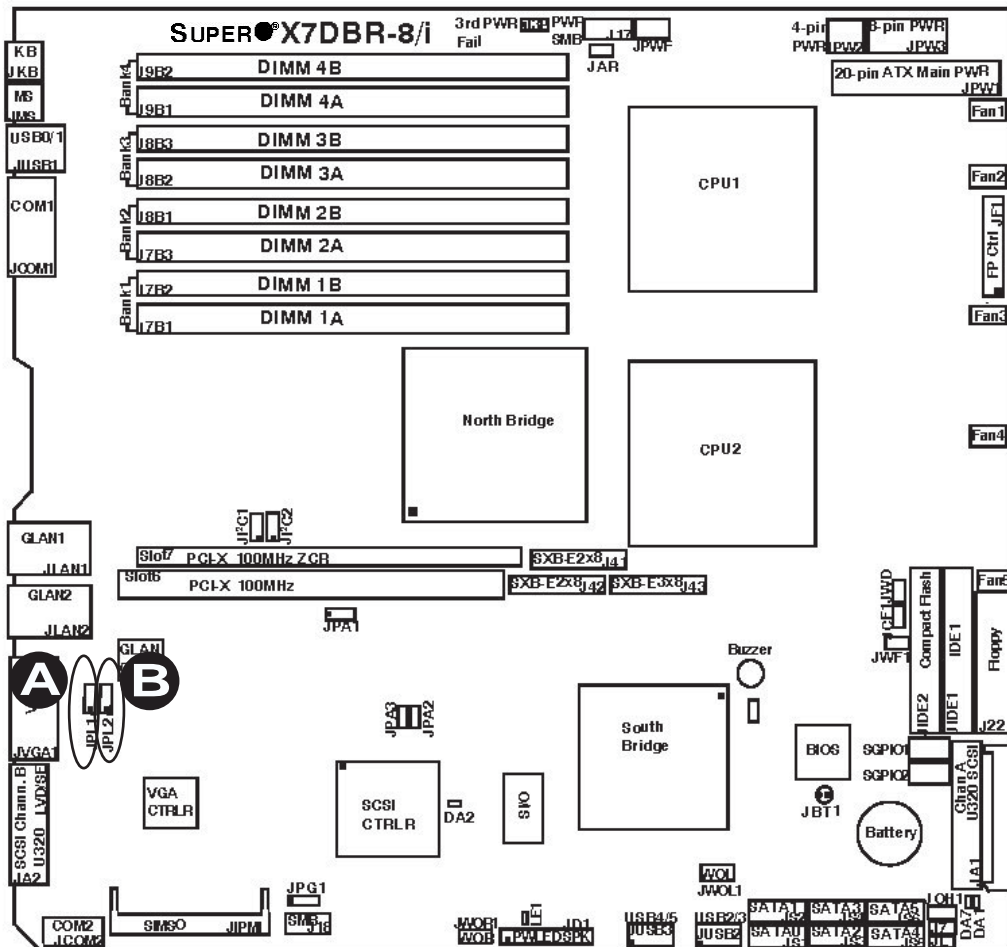
CMOS Clear

JBT1 is used to clear CMOS. Instead of pins, this "jumper" consists of contact pads to prevent the accidental clearing of CMOS. To clear CMOS, use a metal object such as a small screwdriver to touch both pads at the same time to short the connection. Always remove the AC power cord from the system before clearing CMOS.

NOTE: For an ATX power supply, you must completely shut down the system, remove the AC power cord and then short JBT1 to clear CMOS.

Watch Dog Enable/Disable

JWD controls the Watch Dog function. Watch Dog is a system monitor that can reboot the system when a software application is "hung up". Pins 1-2 will cause WD to reset the system if an application is hung up. Pins 2-3 will generate a non-maskable interrupt signal for the application that is hung up. 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 (*default)
Pins 2-3	NMI
Open	Disabled

NOTE: When enabled, the user needs to write their own application software in order to disable the Watch Dog Timer.

A. Clear CMOS
B. Watch Dog Enable
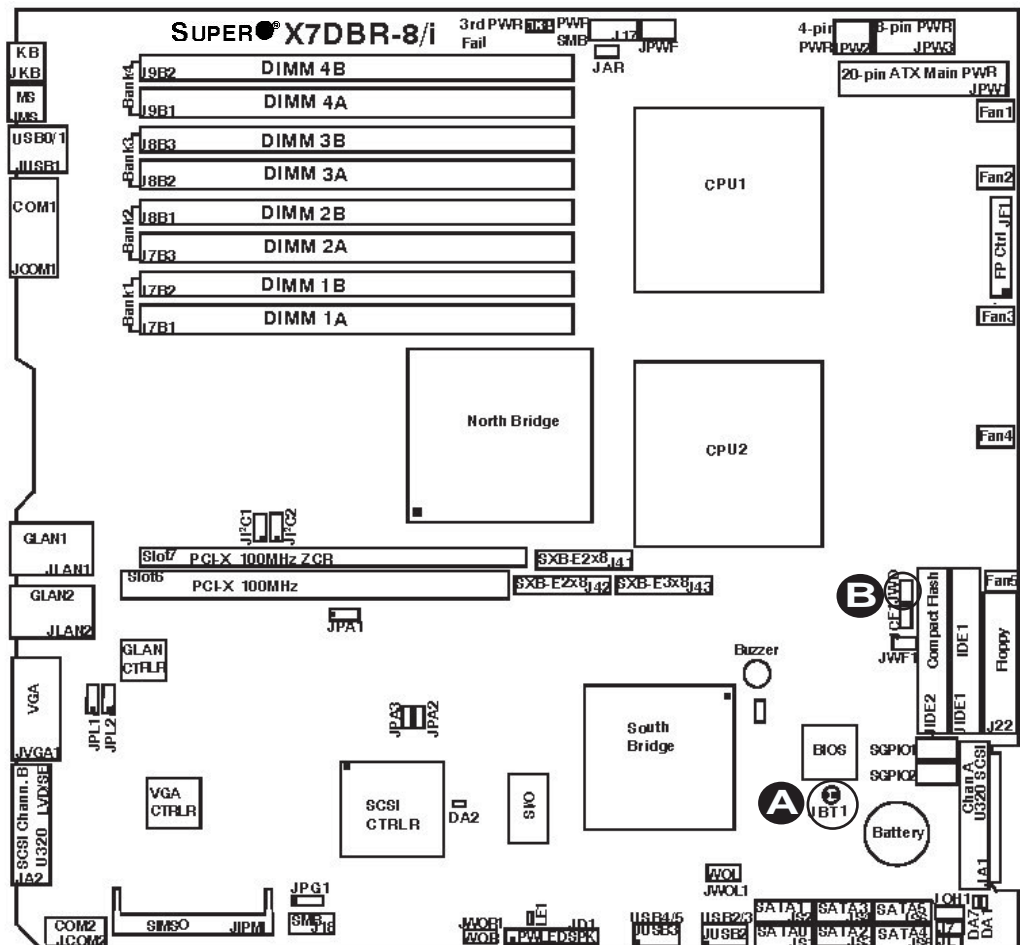
SCSI Controller Enable/Disable

Jumper JPA1 is used to enable or disable the Adaptec SCSI controller. The default setting is on pins 1-2 to enable SCSI. See the table on the right for jumper settings.

SCSI Enable/Disable Jumper Settings	
Jumper Setting	Definition
*Pins 1-2 (Default)	Enabled
Pins 2-3	Disabled

SCSI Termination Enable/Disable

Jumpers JPA2/JPA3 are used to enable or disable termination for SCSI Channel A (JPA2) and Channel B (JPA3) connectors. The default setting is open to enable termination. See the table on the right for jumper settings.

SCSI Term. Enable/Disable Jumper Settings	
Jumper Setting	Definition
*Open (default)	Enabled
Closed	Disabled

NOTE: In order for the SCSI drives to function properly, please do not change the default setting (enabled) set by the manufacturer.

A. SCSI Enable
B. SCSI Channel A Termination Enable
C. SCSI Channel B Termination Enable
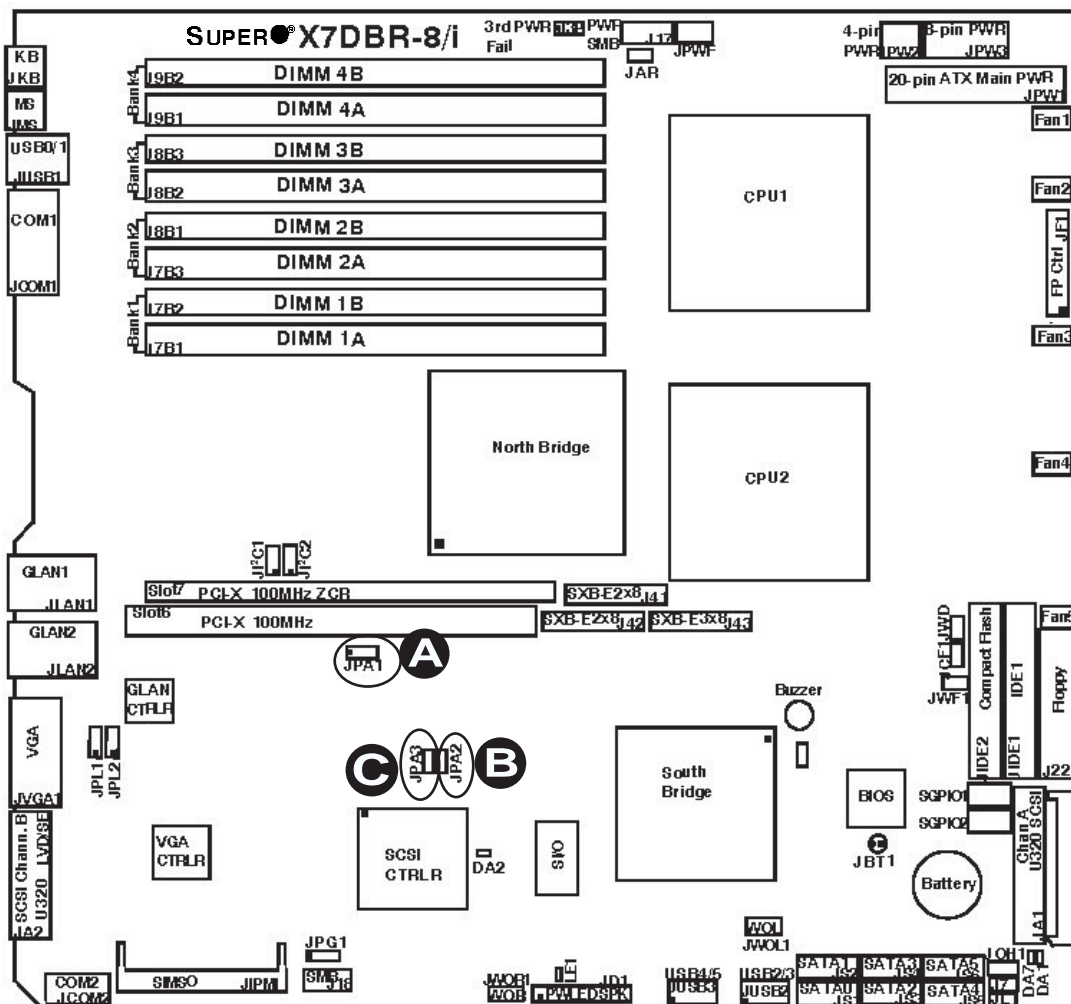
3rd PWR Supply PWR Fault Detect (J3P)

The system can notify you in the event of a power supply failure. This feature is available when three power supply units are installed in the chassis with one acting as a backup. If you only have one or two power supply units installed, you should disable this (the default setting) with J3P to prevent false alarms.

3rd PWR Supply PWR Fault Jumper Settings	
Jumper Setting	**Definition**
Closed	Enabled
Open	Disabled (*Default)

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.

SCSI Enable/Disable Jumper Settings (JPA1)	
Both Jumpers	**Definition**
*Pins 1-2	Enabled
Pins 2-3	Disabled

A. 3rd PWR Fail
B. VGA Enabled
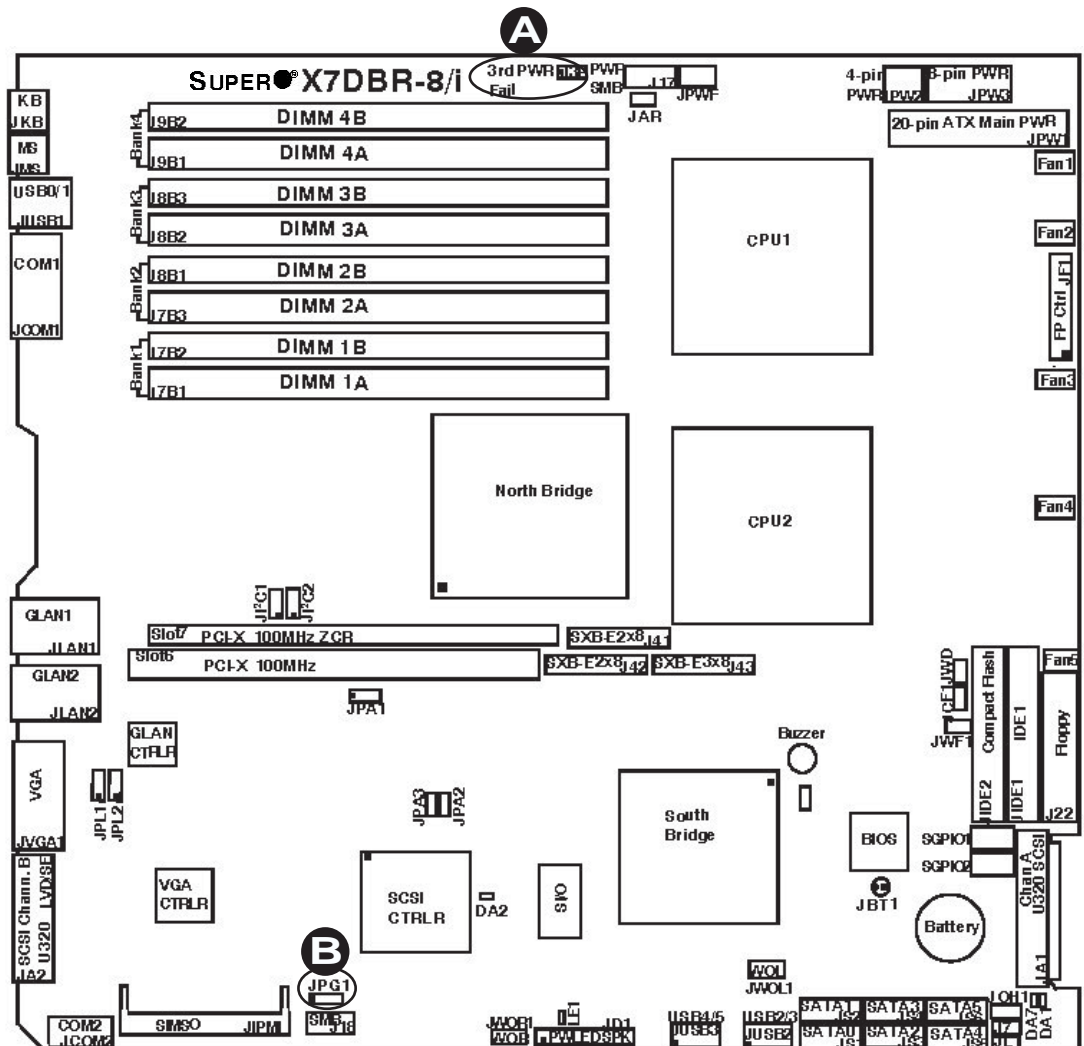
I²C Bus to PCI Slots 1/2

JI²C1/JI²C2 allow you to enable I²C Bus to PCI-X/PCI-E slots. See the table on the right for jumper settings. The default setting is Disabled.

I²C Bus to PCI Slots Jumper Settings	
Jumper	Definition
1-2	Enabled
Off	Disabled (Default)

Compact Flash Master/Slave Select

A Compact Flash Master (Primary)/Slave (Secondary) Select Jumper is located at JCF1. Close this jumper to enable Compact Flash Card. For the Compact Flash Card or the Compact Flash Jumper (JCF1) to work properly, you will need to connect the Compact Flash Card power cable to JWF1 first. Refer to the board layout below for the location.

Compact Flash Card Master/ Slave Select	
Jumper	Definition
Open	Slave (Secondary)
Closed	Master (Primary)

A. JI²C1
B. JI²C2
C. Compact Flash Master/Slave Select
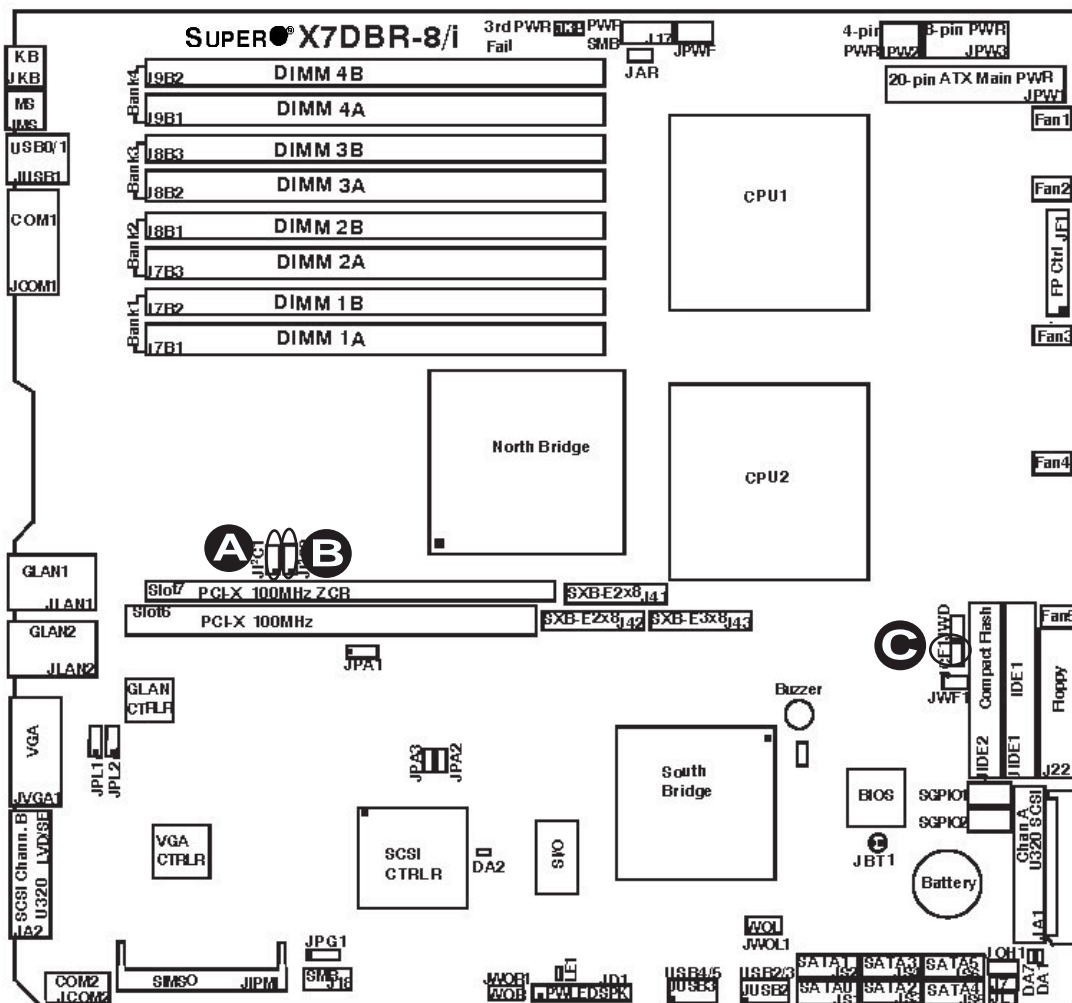
2-9   Onboard Indicators

GLAN LEDs

There are two GLAN ports on the motherboard. Each Gigabit Ethernet LAN port has two LEDs. The green LED indicates activity, while the power LED may be green, amber or off to indicate the speed of the connection. See the tables at right for more information.

Activity LED   Link LED

GLAN Activity Indicator	
LED Color	Definition
Off	No Activity or 10 Mbps
Blinking	Active

A. GLAN Port1 LEDs
B. GLAN Port2 LEDs

GLAN Link Indicator	
LED Color	Definition
Off	No Connection or 10 Mbps
Green	100 Mbps
Amber	1 Gbps
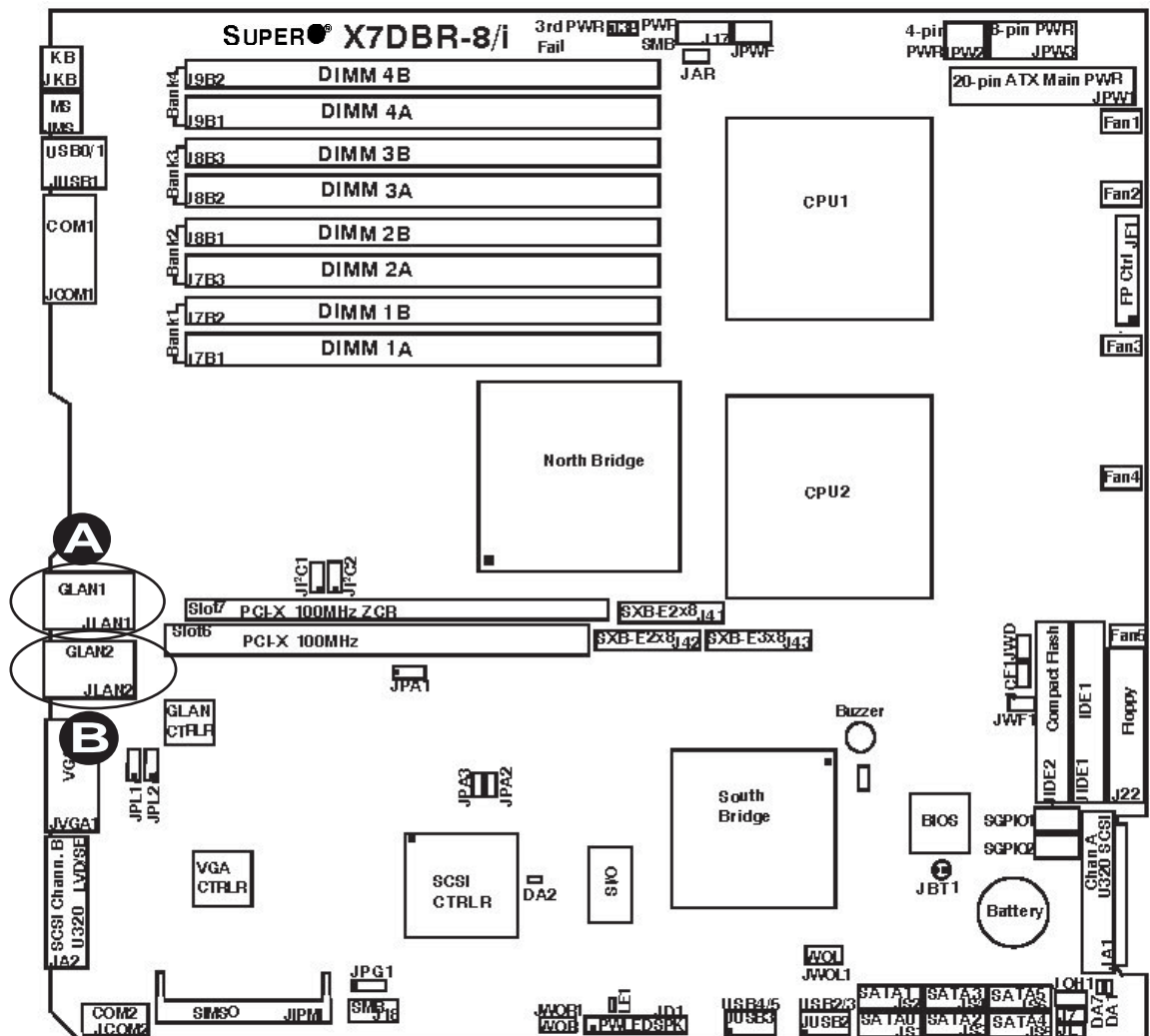
2-10 Floppy Drive, Hard Disk Drive, SIMSO-DIMM IPMI and SCSI Connections

Note the following when connecting the floppy and hard disk drive cables:

- The floppy disk drive cable has seven twisted wires.

- A red mark on a wire typically designates the location of pin 1.

- A single floppy disk drive ribbon cable has two connectors to provide for two   floppy disk drives. The connector with twisted wires always connects to drive A, and the connector that does not have twisted wires always connects to drive B.

Floppy Connector

The floppy connector is located at J22. See the table on the right for the pin definitions.

A. Floppy Port

Floppy Drive Connector Pin Definitions (Floppy)			
Pin#	Definition	Pin #	Definition
1	Ground	2	FDHDIN
3	Ground	4	Reserved
5	Key	6	FDEDIN
7	Ground	8	Index
9	Ground	10	Motor Enable
11	Ground	12	Drive Select B
13	Ground	14	Drive Select B
15	Ground	16	Motor Enable
17	Ground	18	DIR
19	Ground	20	STEP
21	Ground	22	Write Data
23	Ground	24	Write Gate
25	Ground	26	Track 00
27	Ground	28	Write Protect
29	Ground	30	Read Data
31	Ground	32	Side 1 Select
33	Ground	34	Diskette
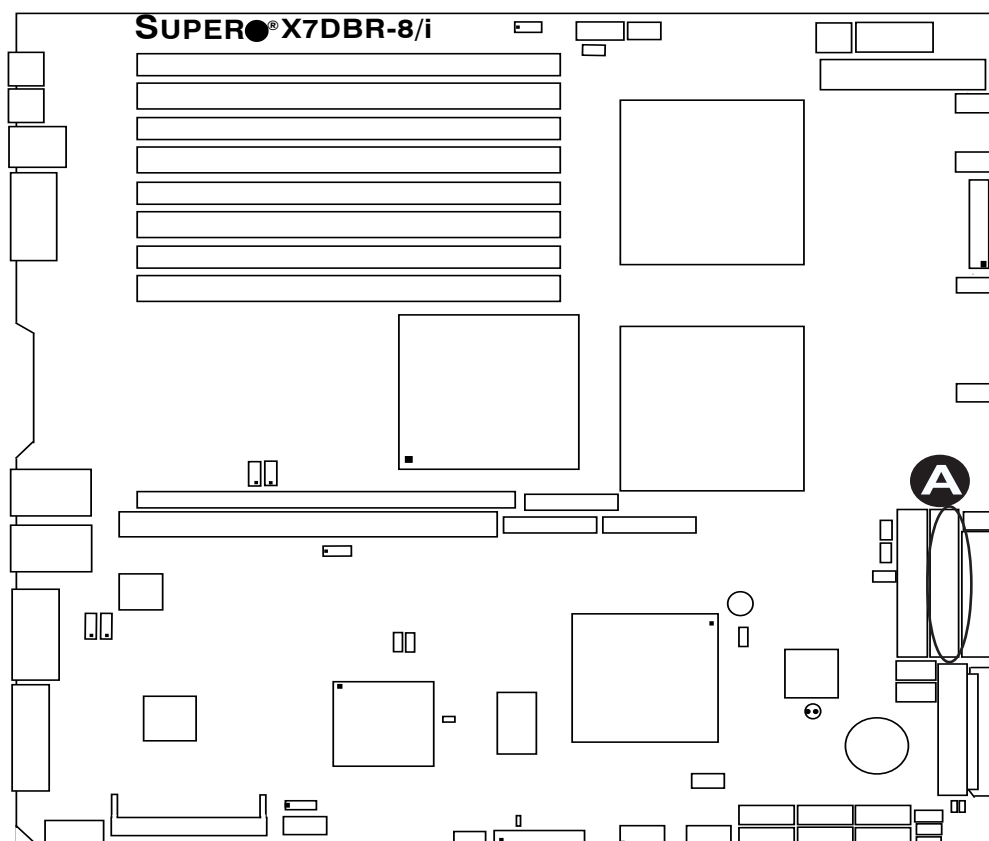
SIMSO Slot

There is a SIM SO-DIMM IPMI Slot on the motherboard. Refer to the layout below for the location of SIMSO slot.

A. SIMSO Slot
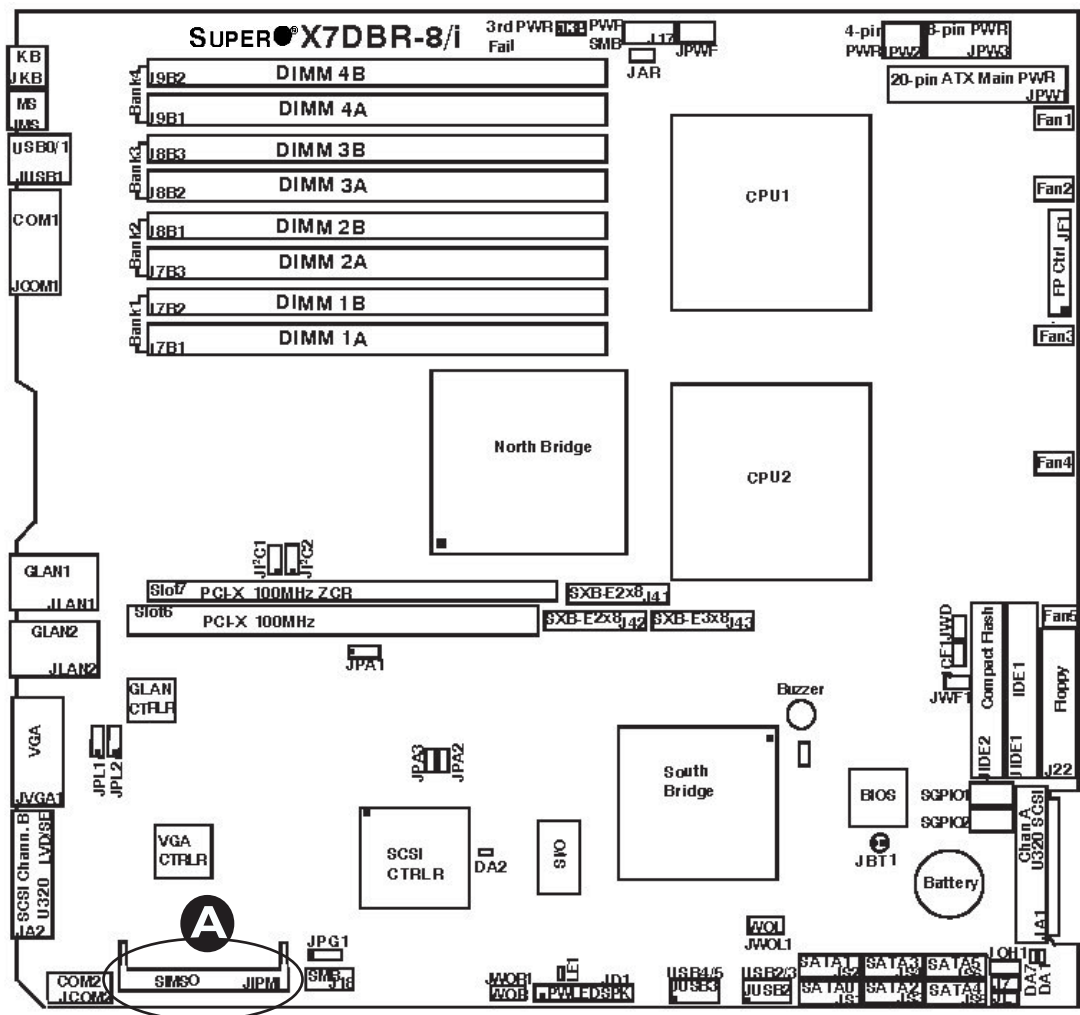
IDE Connectors

There are two IDE Connectors (JIDE1: Blue, JIDE2: White) on the motherboard. The blue IDE connector (JIDE1) is designated as the Primary IDE Drive. The white IDE connector (JIDE2) is designated as the Secondary IDE Drive, reserved for Compact Flash Card use only. (See the note below.) See the table on the right for pin definitions.

A. IDE#1
B. Compact Flash Card

IDE Drive Connectors Pin Definitions			
Pin#	Definition	Pin #	Definition
1	Reset IDE	2	Ground
3	Host Data 7	4	Host Data 8
5	Host Data 6	6	Host Data 9
7	Host Data 5	8	Host Data 10
9	Host Data 4	10	Host Data 11
11	Host Data 3	12	Host Data 12
13	Host Data 2	14	Host Data 13
15	Host Data 1	16	Host Data 14
17	Host Data 0	18	Host Data 15
19	Ground	20	Key
21	DRQ3	22	Ground
23	I/O Write	24	Ground
25	I/O Read	26	Ground
27	IOCHRDY	28	BALE
29	DACK3	30	Ground
31	IRQ14	32	IOCS16
33	Addr1	34	Ground
35	Addr0	36	Addr2
37	Chip Select 0	38	Chip Select 1
39	Activity	40	Ground

NOTE: JIDE2 (the white slot) is reserved for Compact Flash Card only. Do not use it for other devices. If JIDE2 is populated with a Compact Flash Card, JIDE1 (the blue slot) will be available for one device only. For the Compact Flash Card to work properly, you will need to connect a power cable to JWF1 first.
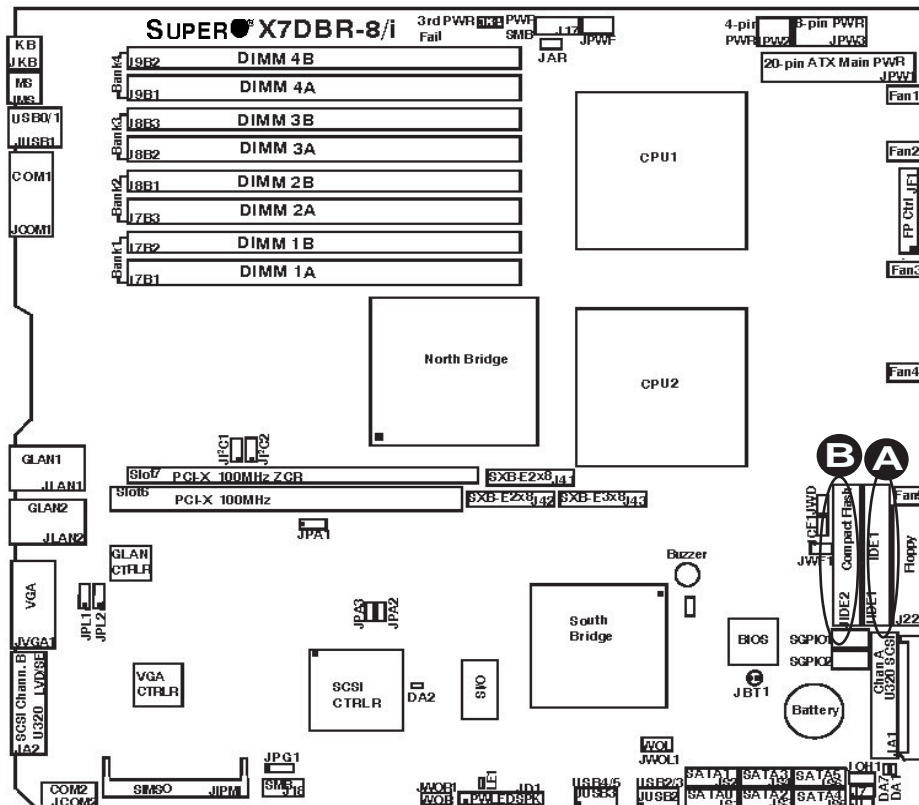
Chapter 3   NovaScale R421 Chassis Installation

3-1   Introduction

Overview

NovaScale R421 server chassis features a unique and highly-optimized design. The chassis is equipped with high efficiency power supply. High performance fans provide ample optimized cooling for FB-DIMM memory modules and three hot-swap drive bays offer maximum storage capacity.

Where to get Replacement Components

Though not frequently, you may need replacement parts for your system. To ensure the highest level of professional service and technical support, we strongly recommend purchasing exclusively from Bull SAS.

Contacting Bull

For details on contacting Bull go to http://support.bull.com

3-2   System Safety

Overview

This chapter provides a quick setup checklist to get your NovaScale R421 server up and running. Following the steps in order given should enable you to have your server setup and operational within a minimal amount of time. This quick set up assumes that you are an experienced technician, familiar with common concepts and terminology.

Warnings and Precautions

You should inspect the box the server was shipped in and note if it was damaged in any way. If the server itself shows damage, file a damage claim with carrier who delivered your system.

Decide on a suitable location for the rack unit that will hold that server. 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 at least one grounded power outlet.

Preparing for Setup

The NovaScale R421 server includes a set of rail assemblies, including mounting brackets and mounting screws you will need to install the systems into the rack. Please read this manual in its entirety before you begin the installation procedure.

Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the NovaScale R421 from damage:

- Be aware of the locations of the power on/off switch on the server 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 board and memory modules. When disconnecting power, you should first power down the system with the operating system and then unplug the power cords from all the power supply modules in the system.

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

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

- Do not use mats designed to decrease electrostatic 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 grounded electrical outlets.

- Server board Battery - **CAUTION**:
  There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarities 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.

General Safety Precautions

- Keep the area around the server clean and free of clutter.

- Place the server 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.

System Safety

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:

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

- 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 any board from its 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 server board and peripherals back into their antistatic bags when not in use.

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

3-3   System Interface

Overview

There are several LEDs on the control panel as well as others on the drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. The NovaScale R421 server has two buttons on the control panel: a reset button and an on/off switch. This chapter explains the meanings of all LED indicators and the appropriate response you may need to take.
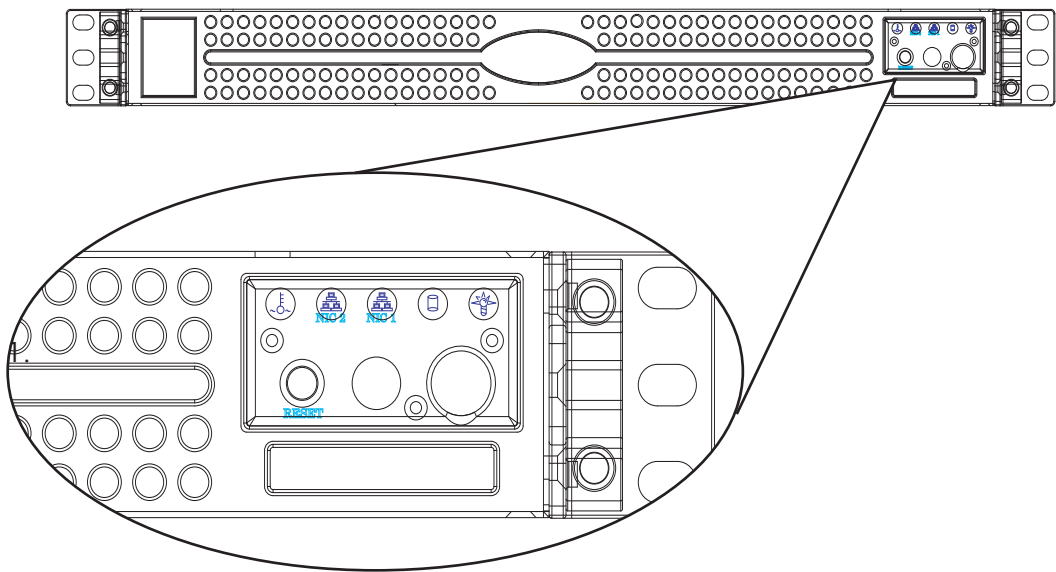
Figure 3-1 NovaScale R421 Front panel

Control Panel Buttons

There are two push-buttons located on the front of the chassis. These are (in order from left to right) a reset button and a power on/off button.

- **Reset:** The reset button is used to reboot the system.

- **Power:** The main power switch is used to apply or remove power from the power supply to the server system. Turning off system power with this button removes the main power but keeps standby power supplied to the system. Therefore, you must unplug system before servicing.

Control Panel LEDs

The control panel located on the front of the NovaScale R421 server chassis has five LEDs. These LEDs provide you with critical information related to different parts of the system. 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 continuously on (not flashing) 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. This LED will remain flashing or on as long as the overheat condition exists.

- **NIC2:** Indicates network activity on GLAN2 when flashing.

- **NIC1:** Indicates network activity on GLAN1 when flashing.

- **HDD:** Indicates IDE channel activity. SATA drive, SCSI drive activity when flashing.

- **Power:** Indicates power is being supplied to the system's power supply units. This LED should normally be illuminated when the system is operating

3-4   Server Setup and Maintenance

Overview

This chapter covers the steps required to install components and perform maintenance on the chassis. The only tool you will need to install components and perform maintenance is a Phillips screwdriver. Print this page to use as a reference while setting up your chassis.

Installation Steps

Installation Step 1: Remove the Chassis Cover

Installation Step 2: Install Hard Drives

Installation Step 3: Installing the Motherboard

Installation Step 4: System Blowers

Installation Step 5: Installing the Air Shroud

Installation Complete

⚠ Review the warnings and precautions listed in the manual before setting up or servicing this chassis. These include information in *Section 3-2: System Safety* and the warning/precautions listed in the setup instructions.

Figure 3-2: Removing the Chassis Cover

To remove the chassis cover

1. Press the release tabs to remove the cover from the locked position. Press both tabs at the same time.

2. Once the top cover is released from the locked position, slide the cover toward the rear of the chassis.

3. Lift the cover off the chassis.

WARNING:
Except for short periods of time, do **NOT** operate the server without the cover in place. The chassis cover must be in place to allow proper airflow and prevent overheating.

Hard Drive Bracket

Figure 3-3: Remove the Hard Drive

To install a hard drive to the chassis

1. Locate the hard drive bracket.

2. Remove the screw securing the bracket to the chassis and slide the bracket toward the rear of the chassis.

3. Connect a standard hard drive to the bracket and secure the connection with the six screws connected to the bracket.

☞ **NOTE:** The bracket includes six screw and six rubber feet to reduce vibration. Always use the rubber feet with installing the hard drive.

4. Carefully slide replace the bracket in the chassis and secure the hard drive with the screw that was previously removed.
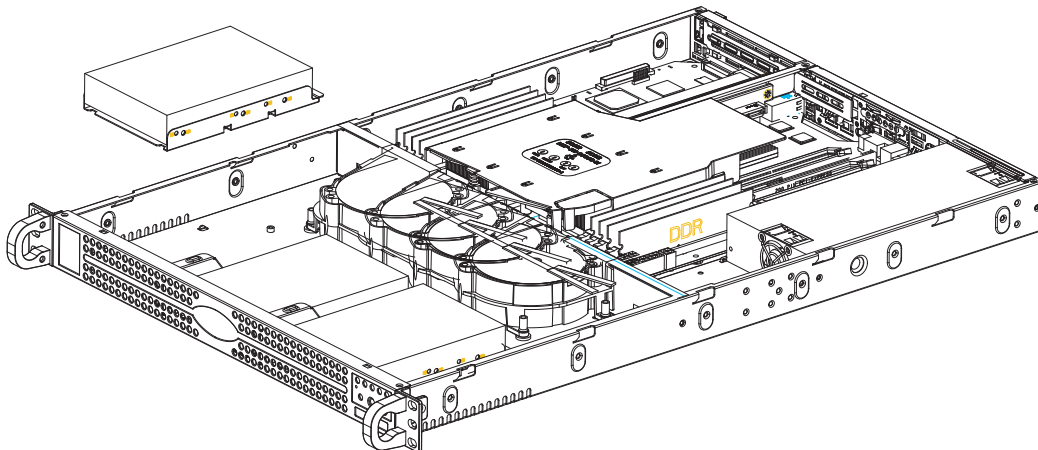
Figure 3-4: Install the Hard Drive and Bracket

Riser Bracket Card

Figure 3-5: Riser Card Bracket

Permanent and Optional Standoffs

Standoffs prevent short circuits by securing space between the motherboard and the chassis surface. The NovaScale R421 server includes permanent standoffs in locations used by its motherboard (X7DBR-i). These standoffs accept the rounded Phillips head screws included in the NovaScale R421 server accessories packaging.

Riser Card

The NovaScale R421 server include permanent riser cards that allow the chassis to utilize a variety of add-on cards. Before installing the motherboard you must remove the riser card. To do so, simply remove the two screws holding the riser card and lift the riser card from the chassis.

To install the motherboard

1. Review the documentation that came with your motherboard. Become familiar with component placement, requirements, precautions, and cable connections.

2. Open the chassis cover.

3. Remove the riser card bracket.

4. As required by your motherboard, install standoffs in any areas that do not have a permanent standoff. To do this:

    a. Place a hexagonal standoff screw through the bottom the chassis.

    b. Secure the screw with the hexagon nut (rounded side up).

5. Lay the motherboard on the chassis aligning the permanent and optional standoffs

6. Secure the motherboard to the chassis using the rounded, Phillips head screws.

7. Secure the CPU(s), heatsinks, and other components to the motherboard as described in the motherboard documentation.

8. Connect the cables between the motherboard, backplane, chassis, front panel, and power supply, as needed. Also, the blowers may be temporarily removed to allow access to the backplane ports.

9. Replace the riser card bracket. If you are installing an add-on card, skip forward in this manual for add-on card installation instructions.

Add-on Card/Expansion Slot Setup

NovaScale R421 server chassis includes one full length/full height and one low profile add-on card slot.
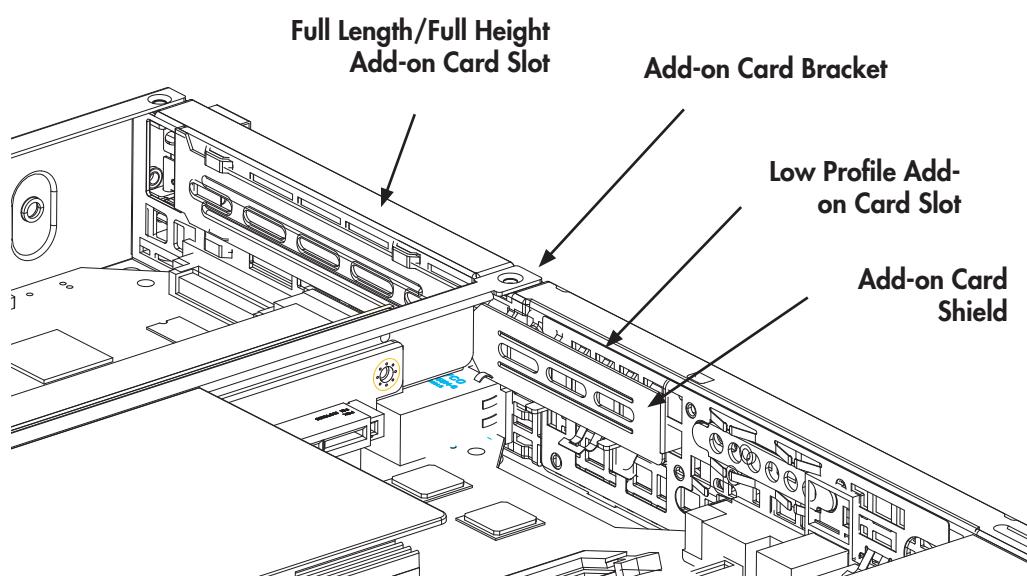
Figure 3-6: NovaScale R421 server Add-on Card

To install an add-on card

1. Disconnect the power supply, lay the server on a flat surface, and open the chassis cover.

2. In the rear of the chassis, pull open the add-on card clip and remove the add-on card shield.

3. If you have not already done so, remove the Add-on Card Bracket. To do so, simple remove the screws and life the Add-on Card Bracket straight up. Depending on your chassis model, you must remove two or three screws.

4. Confirm that each add-on card you want use has an "L" bracket and connect each add-on card to the riser card embedded in the riser card bracket.

5. Re-connect the riser card (with add-on cards) to the motherboard.

6. Secure each card to the chassis using the card's L bracket and close the add-on card shield clip.

Riser Card Bracket   **Riser Card**
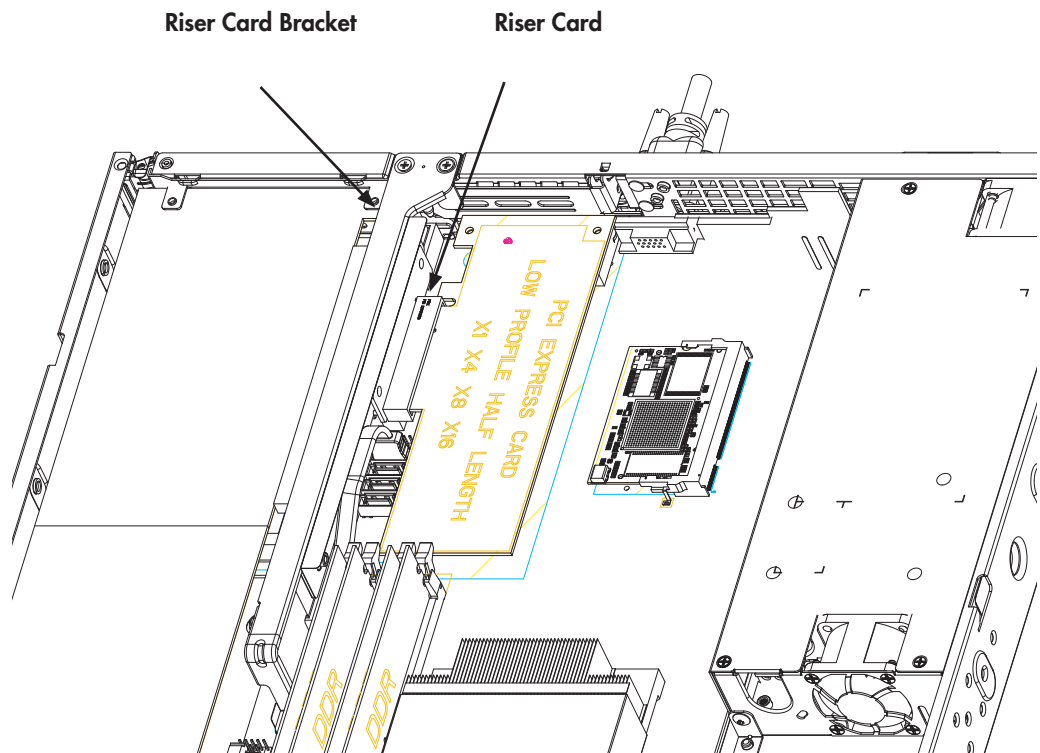
Figure 3-7: NovaScale R421 Riser Card and Bracket

7. Replace the chassis cover and continue setup according to the add-on card instructions.

Installation Step 4:   System Blowers

Two heavy duty blowers provide cooling for the chassis. These blowers circulate air through the chassis as a means of lowering the chassis internal temperature.
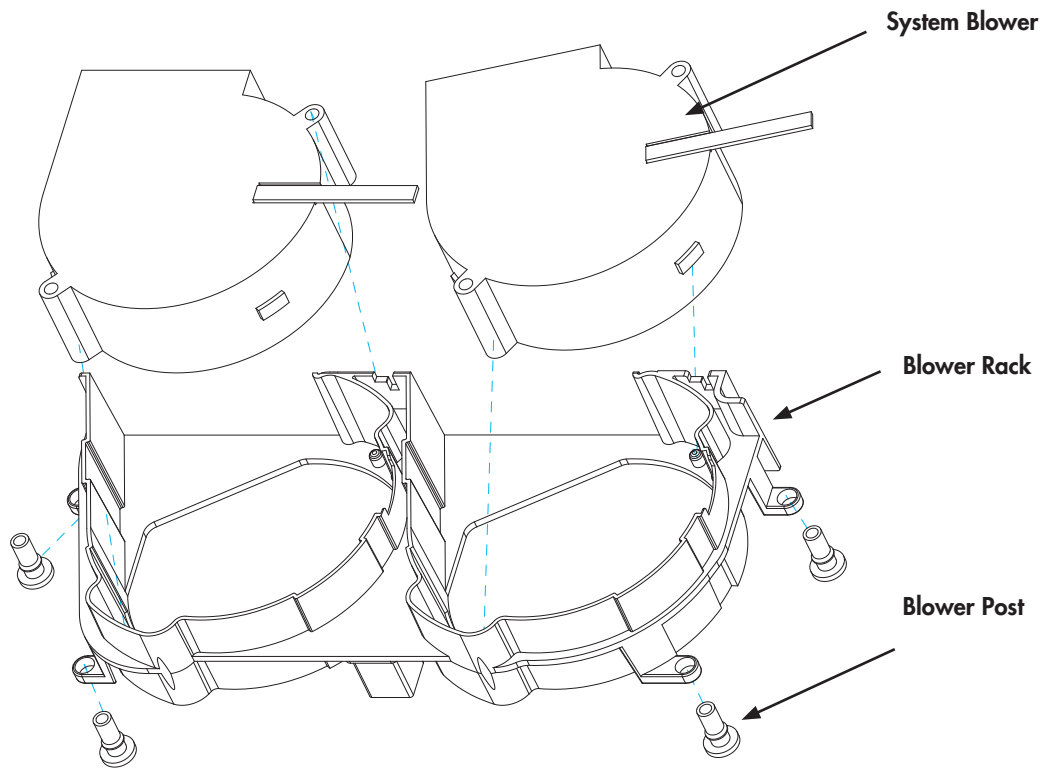
Figure 3-8: Unassembled System Blowers

System Blower General Information

When using the NovaScale R421 server be aware of the following:

- The blower rack can be adjusted into two different positions: Left and Right.

- Blowers can be removed from the blower rack and rotated by 15 degrees.

- The chassis includes foam barriers that regulate the air stream to the rear of the chassis. If you move the system blowers from right to left, use the second set of foam barriers located in the accessory box.

⚠ **IMPORTANT:**
Do not run the system without the foam barriers installed properly

The Left Blower
is turned toward the
rear of the chassis

Foam Barrier

Foam Barrier

The Right Blower
is angled to the side
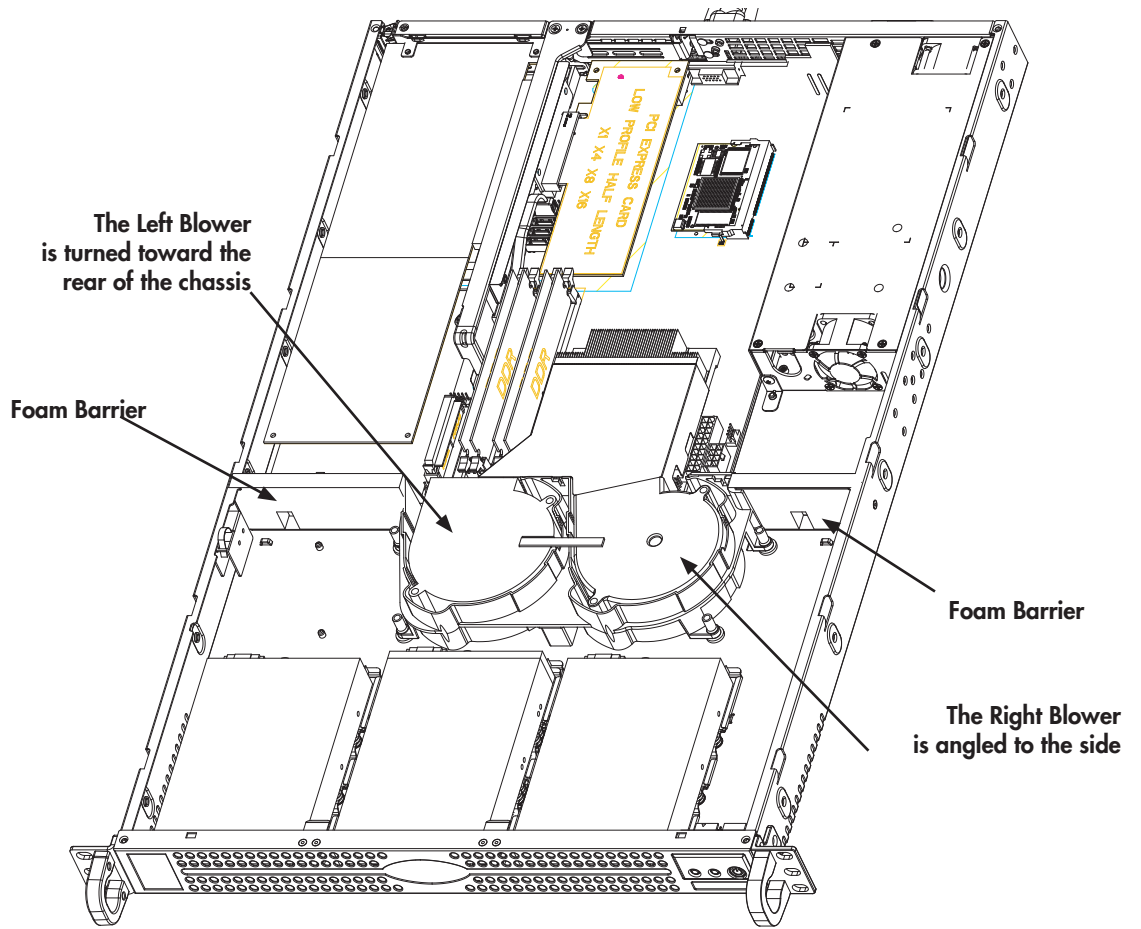
Figure 3-9: System Blowers in default position

Blower Default Position

In the NovaScale R421 server, the blowers remain in the default position. The default position is the tray in the furthest right position. The left blower is directed toward the rear of the chassis. The right blower is turned to the left.

Installation Step 5:   Installing the Air Shroud
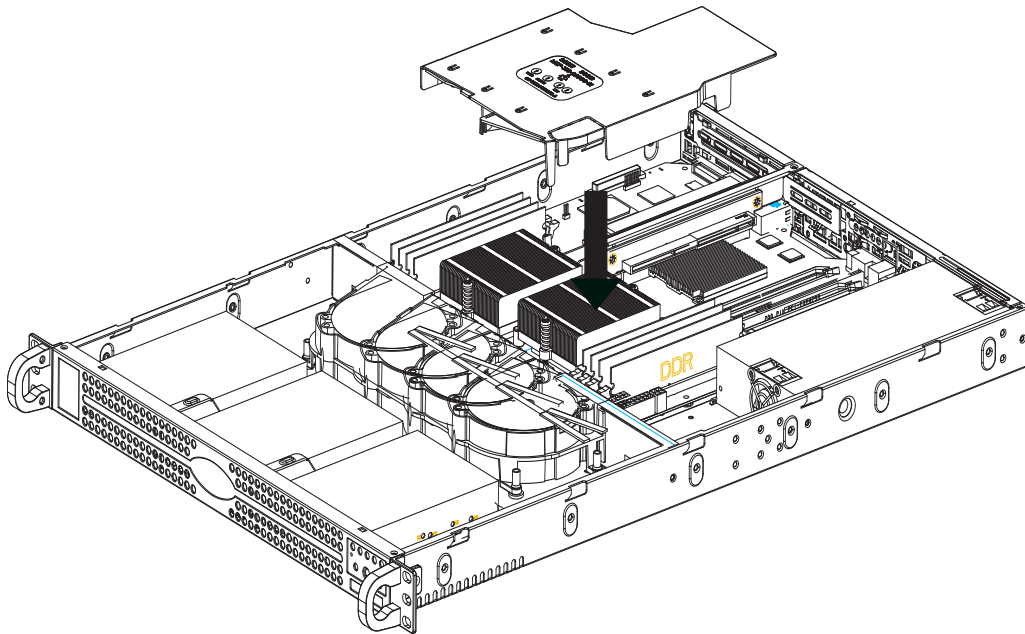
Figure 3-10: Air Shroud for the NovaScale R421 server

Air shrouds concentrate airflow to maximize blower efficiency.

To install the air shroud

Place the air shroud in the chassis. The air shroud fits behind the two blowers closest to the power supply.

To check the server air flow

1. Make sure there are no objects to obstruct airflow in and out of the server.

2. Do not operate the server without drives or drive trays in the drive bays. Use only recommended server parts.

3. Make sure no wires or foreign objects obstruct air flow through the chassis. Pull all excess cabling out of the airflow path or use shorter cables.

The control panel LEDs inform you of system status. See *Section 3-3: System Interface* for details on the LEDs and the control panel buttons.

Installation Complete

In the NovaScale R421 server, the chassis power supply and blowers are pre-installed. If you need to install blowers continue to the Systems Blower section of this chapter. If the NovaScale R421 server is to be installed into a rack, continue to the next chapter for rack installation instructions.

Power Supply

The NovaScale R421 server has a 520 watt power supply. This power supply is auto-switching capable. This enables it to automatically sense and operate at a 100v to 240v input voltage. New units can be ordered directly from Bull SAS (see contact information in the Preface)

Remove these rear screws
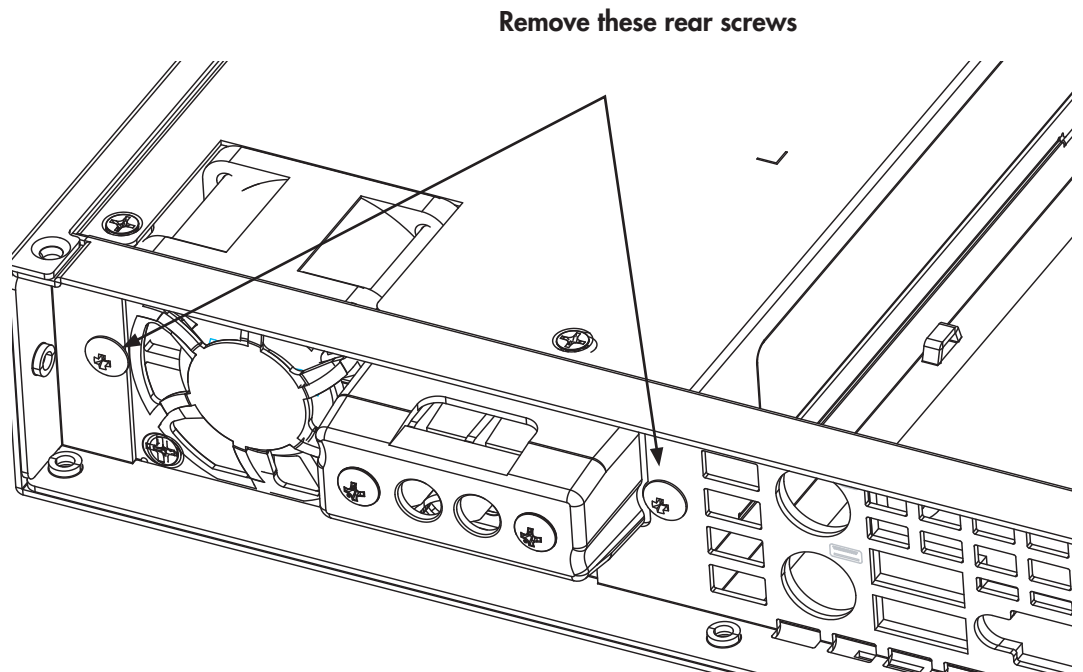
Figure 3-11: Chassis Power Supply

To change the power supply

1. Power down the server and unplug the power cord.

2. Remove power cord from the rear of the chassis and disconnect the power supply for the motherboard and other chassis components.

3. In the front, the power supply is held to the chassis by two "L" brackets. Remove the two screws that secure the "L" bracket to the chassis.

4. In the rear, the power supply is secured by two screws.

5. Lift the power supply from the chassis.

6. Replace the power supply with a new one. Secure all four screws.

3-5   Rack Installation

Overview

This chapter provides a quick setup checklist to get your chassis up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time.

Unpacking the System

You should inspect the box the chassis was shipped in and note if it was damaged in any way. If the chassis 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 your chassis. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Be sure to read the Rack and Server Precautions in the next section.

Preparing for Setup

The box your chassis 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. **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 (~25 inches).

- Leave approximately 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).

Warning 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.

General Server Precautions

- Review the electrical and general safety precautions that came with the components you are adding to your chassis.

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

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

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

- Allow the hot plug hard 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 (Tmra).

Reduced Airflow

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

Mechanical Loading

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

Circuit Overloading

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

Reliable Ground

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

Rack Mounting Instructions

This section provides information on installing the NovaScale R421 server into a rack unit with the rails provided. 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.

☞ **NOTE:** The rails will fit a rack between 29" and 35.25" deep.

Identifying the Sections of the Rack Rails

The chassis package includes 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. These sections may be attached for shipment and it may be necessary to separate the inner and outer rail for rack mounting.

To remove the fixed chassis rail

1. Pull the fixed inner rail (A) from the outer rail as far as possible - you should hear a "click" sound as a locking tab emerges from inside the rail assembly and locks the inner rail.

2. Depress the locking tab to pull the inner rail completely out.

3. Repeat steps 1 and 2 for the other side.
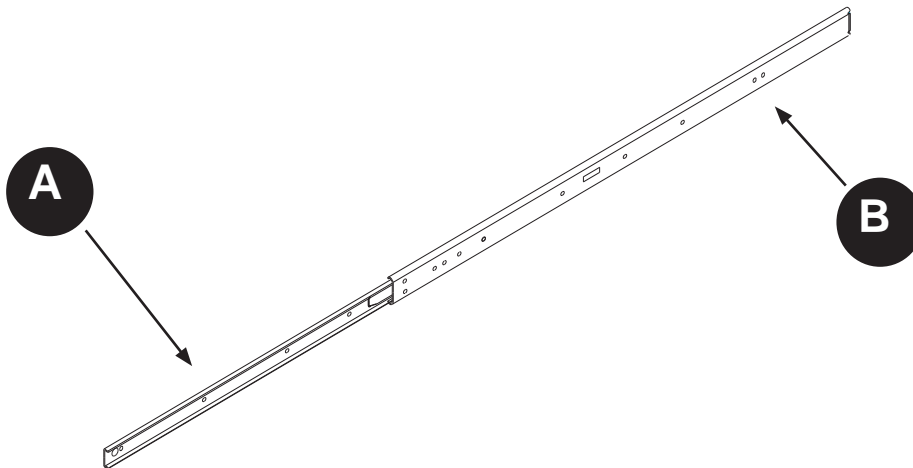
Figure 3-12: Inner and Outer Rack Rails
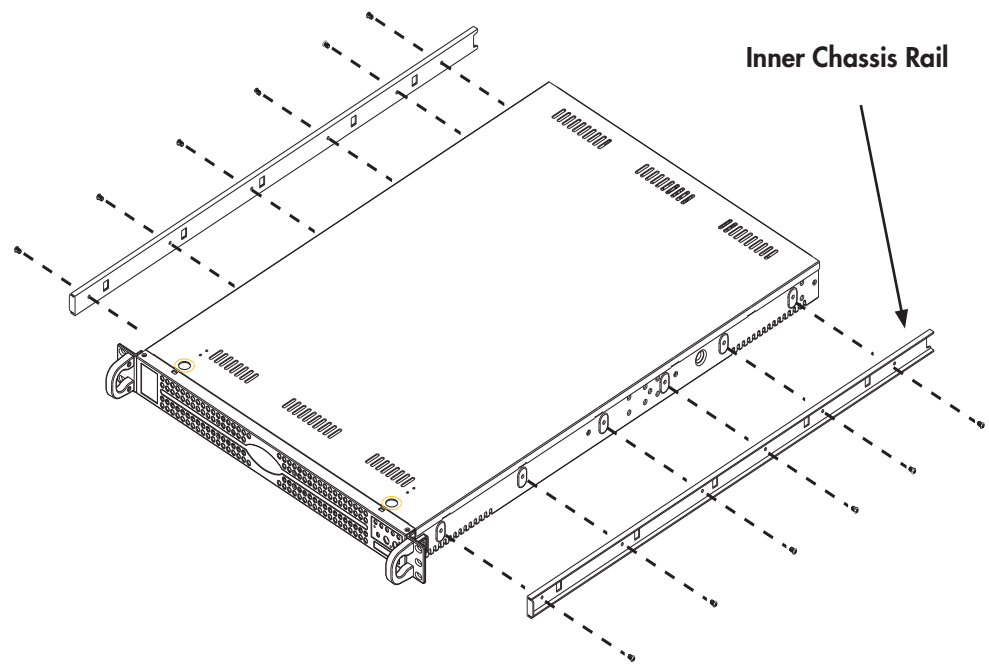
Inner Chassis Rail

Figure 3-13: Rail Installation

To install the inner rail to the chassis

1. Align the chassis rail with the side of the chassis.

2. Secure the rail to the chassis using six M5 flat head screws.

3. Repeat steps 1 and 2 for the other chassis.
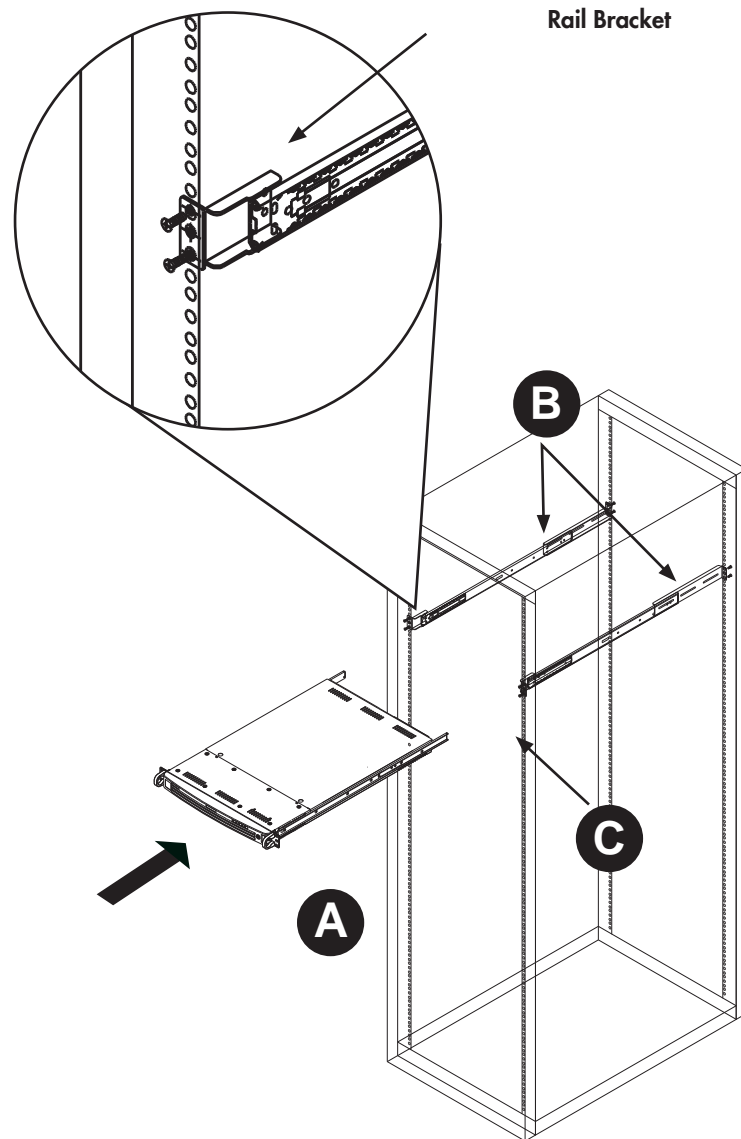
Figure 3-14. Mounting the Chassis

To install the outer rails to the rack

1. Position the fixed rack rail/sliding rail guide assemblies at the desired location in the rack. Keep the sliding rail guide facing the inside of the rack.

2. Screw the assembly securely to the rack using the brackets provided.

3. Attach the second rail to the rack, making sure that both rails are the same height.

To install the chassis into a rack

1. Confirm that chassis includes the inner rails (A) and the outer rails (B) are installed on the rack.

2. Line chassis rails (A) with the front of the rack rails (C).

3. 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). When the server has been

pushed completely into the rack, you should hear the locking tabs "click".

4. (Optional) Insert and tightening the thumbscrews that hold the front of the server to the rack.

To install the outer rails to the rack

1. Position the fixed rack rail/sliding rail guide assemblies at the desired location in the rack. Keep the sliding rail guide facing the inside of the rack.

2. Screw the assembly securely to the rack using the brackets provided.

3. Attach the second rail to the rack, making sure that both rails are the same height.

To install the chassis into a rack

1. Confirm that chassis includes the inner rails (A) and the outer rails (B) are installed on the rack.

2. Line chassis rails (A) with the front of the rack rails (C).

3. 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). When the server has been pushed completely into the rack, you should hear the locking tabs "click".

4. (Optional) Insert and tightening the thumbscrews that hold the front of the server to the rack

Chapter 4   Troubleshooting

4-1   Troubleshooting Procedures

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below, and still need assistance, refer to *section 4.2 Contacting Bull S.A.S Technical Support* in this chapter.

☞ **NOTE:** Always disconnect the power cord before adding, changing or installing any hardware components.

Before Power On

1. Make sure that there are no short circuits between the motherboard and chassis.

2. Disconnect all ribbon/wire cables from the motherboard, including those for the keyboard and mouse.

3. Remove all add-on cards.

4. Install one CPU (making sure it is fully seated) and connect the chassis speaker and the power LED to the motherboard. (Check all jumper settings as well.)

5. **Use only the correct type of CMOS onboard battery as recommended by the Manufacturer. Do not install the onboard battery upside down to avoid possible explosion.**

No Power

1. Make sure that there are no short circuits between the motherboard and chassis.

2. Verify that all jumpers are set to their default positions.

3. Check that the 115V/230V switch on the power supply is properly set.

4. Turn the power switch on and off to test the system.

5. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one (CR2032 or compatible model).

No Video

1. If the power is on but you have no video, remove all the add-on cards and memory modules.

2. Use the speaker to determine if any beep codes exist. Refer to the Appendix for details on beep codes.

Losing the System's Setup Configuration

1. Ensure that you are using a high quality power supply. A poor quality power supply may cause the system to lose the CMOS setup information. Refer to *Section 1-6* for

details on recommended power supplies.

2. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one (CR2032 or compatible model).

3. If the above steps do not fix the Setup Configuration problem, contact your vendor for repairs.

Memory Errors

1. Make sure the DIMM modules are properly and fully installed.

2. Determine if different speeds of DIMMs have been installed and verify that the BIOS setup is configured for the fastest speed of RAM used. It is recommended to use the same RAM speed for all DIMMs in the system.

3. Make sure you are using the correct type of DDR2 FBD (Fully Buffered) ECC 667/533 SDRAM (*recommended by the manufacturer.)

4. Check for bad DIMM modules or slots by swapping a single module between four slots and noting the results.

5. Make sure all memory modules are fully seated in their slots. To install memory modules, begin with Branch 0, then Branch 1, and so on *(see Page 2-6).*

4-2   Contacting Bull S.A.S technical support

For details on contacting Bull S.A.S technical support go to the web site
http://support.bull.com

Include the following information when contacting Bull S.A.S. technical support:

*   NovaScale Universal model (R421)

*   The serial number of your server, this is written on the chassis label.

*   BIOS Date and Version (This can be seen on the initial display when the system boots up).

*   System configuration:

    - Number of disks and RAID configuration

    - Add-on card

    - Memory size

    - CPU model

    - Setup options

Chapter 5   BIOS

5-1   Introduction

This chapter describes the Phoenix BIOS™ Setup utility for the Bull NovaScale R421 X7DBR-i 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.

The latest BIOS image can be downloaded from the Bull S.A.S support web site at

http://support.bull.com

⚠ **WARNING:**
Don't replace the BIOS of your server unless it is absolutely necessary.

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 5-3*, detailed descriptions are given for each parameter setting in the Setup utility.

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

5-2   Running Setup

NOTE: 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 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

5-3   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.

5-4   Main BIOS Setup Menu

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

                                                        ┌──────────────────────┐
     System Time:              [19:49:04]               │  Item Specific Help  │
     System Date:              [07-11-2006]             ├──────────────────────┤
                                                        │                      │
     BIOS Date                                          │ <Tab>, <Shift-Tab>, or│
     Legacy Diskette A:        [1.44/1.25 MB  3½"]      │ <Enter> selects field.│
                                                        │                      │
   ▶ IDE Channel 0 Master                               │                      │
     IDE Channel 0 Slave                                │                      │
   ▶ IDE Channel 1 Master                               │                      │
     IDE Channel 1 Slave                                │                      │
     SATA Port 2                                        │                      │
     SATA Port 3                                        │                      │
                                                        │                      │
     Parallel ATA:             [Channel 0]              │                      │
     Serial ATA:               [Enabled]                │                      │
     Native Mode Operation:    [Auto]                   │                      │
     SATA Controller Mode Option: [Compatible]          │                      │
     SATA RAID Enable          [Enabled]                │                      │
     ICH Raid CodeBase         [Intel]                  │                      │
     SATA AHCI Enable          [Disabled]               │                      │
                                                        │                      │
     System Memory:            [XXXX KB]                │                      │
     Extended Memory:          [XXXX KB]                │                      │
                                                        └──────────────────────┘

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

Main Setup Features

System Time

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

System Date

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

BIOS Date

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

Legacy Diskette A

This setting allows the user to set the type of floppy disk drive installed as diskette A. The options are Disabled, 360Kb 5.25 in, 1.2MB 5.25 in, 720Kb 3.5 in, 1.44/1.25MB, 3.5 in and 2.88MB 3.5 in.

▶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 sub-menu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the sub-menu are:

```
        PhoenixBIOS Setup - Copyright 1985-2004 Phoenix Technologies Ltd.
   Main

                                                       Item Specific Help
   Type:
   CHS Format
   Cylinders:                                     User = you enter
   Cylinders:                                     parameters of hard-disk
   Heads:                         [  1]           drive installed at this
   Heads:                                         connection.
   Sectors:                                       Auto = autotypes
   Sectors:                                       hard-disk drive
   Maximum Capacity:                              installed here.
   Maximum Capacity:                              CD-ROM = a CD-ROM drive
   LBA Format                                     is installed here.
   Total Sectors:                                 ATAPI Removable =
   Maximum Capacity:                              removable disk drive is
                                                  installed here.
   Multi-Sector Transfers:        [Disabled]
   LBA Mode Control:              [Disabled]
   32 Bit I/O:                    [Disabled]
   Transfer Mode:                 [Standard]
   Ultra DMA Mode:                [Disabled]


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

Type

Selects the type of IDE hard drive. The options are Auto, (which allows the BIOS to automatically determine the hard drive's capacity, number of heads, etc.), a number from 1-39 to select a predetermined type of hard drive, CDROM and ATAPI Removable. The option "**Use**r" will allow the user to enter the parameters of the HDD installed at this connection. The option "Auto" will allow the BIOS to automatically configure the parameters of the HDD installed at the connection. Choose the option 1-39 to select a predetermined HDD type. Select CDROM if a CDROM drive is installed. Select ATAPI if a removable disk drive is installed.

CHS Format

The following items will be displayed by the BIOS:

TYPE: This item displays the type of IDE or SATA Device.

Cylinders: This item indicates the status of Cylinders.

Headers: This item indicates the number of headers.

Sectors: This item displays the number of sectors.

Maximum Capacity: This item displays the maximum storage capacity of the system.

LBA Format

The following items will be displayed by the BIOS:

Total Sectors: This item displays the number of total sectors available in the LBA Format.

Maximum Capacity: This item displays the maximum capacity in the LBA Format.

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.

Parallel ATA

This setting allows the user to enable or disable the function of Parallel ATA. The options are **Channel 0** and Channel 1.

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, Both, 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: The Enhanced mode is supported by the Windows 2000 OS or a later version.)**

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

Serial ATA (SATA) RAID Enable

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

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

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

System Memory

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

Extended Memory

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

5-5   Advanced Setup

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

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

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




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

▶Boot Features

Access the submenu to make changes to the following settings.

QuickBoot Mode

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

QuietBoot Mode

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

POST Errors

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

ACPI Mode

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

Power Button Behavior

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

Resume On Modem Ring

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

Power Loss Control

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

Watch Dog

If enabled, this option will automatically reset the system if the system is not active for more than 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 the BIOS write (cache) its data into this reserved memory area. Select "**Write Protect**" to enable this function, and this area will be reserved for BIOS ROM access only. Select "Uncached" to disable this function and make this area available for other devices.

Cache Video BIOS Area

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

Cache Base 0-512K

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

Cache Base 512K-640K

If enabled, this feature will allow the data stored in the memory area: 512K-640K to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or written into L1, L2, 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 CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

Cache Extended Memory

If enabled, this feature will allow the data stored in the extended memory area to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or written into L1, L2, L3 cache inside the CPU to speed up CPU operations. Select "Uncached" to disable this function. Select "Write Through" to allow data to be cached into the buffer and written into the system memory at the same time. Select "Write Protect" to prevent data from being written into the base memory area of Block 0-512K. Select "Write Back" to allow CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

Discrete MTRR Allocation

If enabled, MTRRs (-Memory Type Range Registers) are configured as distinct, separate units and cannot be overlapped. If enabled, the user can achieve better graphic effects

when using a Linux graphic driver that requires the write-combining configuration with 4GB or more memory. The options are Enabled and **Disabled.**

▶PCI Configuration

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

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

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

Onboard SCSI OPROM Configure

Enabling this option provides the capitally to boot from SCSI HDD. The options are Disabled and **Enabled.**

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.**

Reset Configuration Data

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

Frequency for PCI-X#1-#2, MASS (-Mass Data Storage)

This option allows the user to change the bus frequency for the devices installed in the slot indicated. The options are **Auto**, PCI 33 MHz, PCI 66 MHz, PCI-X 66 MHz, and PCI-X 100 MHz

▶Slot1 PCI-X 100MHz, Slot2 PCI-X 100MHz ZCR, Slot3 PCI-Exp x8, Slot4 PCI-Exp x8 and Slot5 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-throughout device may benefit from a greater clock rate. The options are **Default**, 0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, and 00E0h. For Unix, Novell and other Operating Systems, please select the option: other. If a drive fails after the installation of a new software, you might want to change this setting and try again. A different OS requires a different Bus Master clock rate.

Large Disk Access Mode

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

▶Advanced Chipset Control

Access the submenu to make changes to the following settings.

WARNING:
Take Caution when changing the Advanced settings. Incorrect values entered may cause system malfunction. Also, a very high DRAM frequency or incorrect DRAM timing may cause system instability. When this occurs, revert 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 select the granularity of PCI hole for PCI slots. If MTRRs are not enough, this option may be used to reduce MTRR occupation. The options are: **256 MB**, 512 MB, 1GB and 2GB.

Memory Branch Mode

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

Branch 0 Rank Interleaving & Sparing

Select enable to enable the functions of Memory Interleaving and Memory Sparing for Branch 0 Rank. The options for Memory Interleaving are 1:1, 2:1 and 4:1. The options for Sparing are Enabled and **Disabled**.

Branch 1 Rank Interleaving & Sparing

Select enable to enable the functions of Memory Interleaving and Memory Sparing for Branch 1 Rank. The options for Memory Interleaving are 1:1, 2:1 and 4:1. The options for Sparing are Enabled and **Disabled.**

Enhanced x8 Detection

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

Crystal Beach Features

This feature cooperates with Intel I/O AT (Acceleration Technology) to accelerate the

NOTE: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card. For this motherboard, the TOE device is built inside the ESB 2 South Bridge chip.

performance of TOE devices. 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 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 support for Legacy USB devices. The settings are **Enabled** and Disabled.

▶Advanced Processor Options

Access the submenu to make changes to the following settings.

CPU Speed

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

Frequency Ratio (*Available when supported by the CPU)

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

Hyperthreading (*Available when supported by the CPU)

Set to Enabled to use the Hyperthreading 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)

NOTE: Please refer to Intel's web site for detailed information.

Set to Enabled to enable Enhanced Halt State to lower CPU voltage/frequency to prevent overheat. The options are Enabled and **Disabled**.

Execute Disable Bit (*Available when supported by the CPU)

NOTE: This feature is available when your OS and your CPU support the function of Execute Disable Bit. The options are **Disabled** and Enabled.
For more information regarding hardware/software support for this function, please refer to Intel's and Microsoft's web sites.

Set to Enabled to enable Execute Disable Bit and allow the processor to classify areas in memory where an application code can execute and where it cannot, and thus preventing a worm or a virus from inserting and creating a flood of codes to overwhelm the processor or damage the system during an attack.

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 default settings are **Disabled** for the Intel 5100 Series Processors and Enable for the 5000 Series Processors.

Hardware Prefetcher (Available when supported by the CPU)

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

PECI Absent Alarm Available when supported by the CPU)

If set to **Enabled**, the PECI Absent Alarm will be activated if the function of PECI (Platform Environment Control Interface) is not available for the onboard process(es) or for the motherboard. The options are Disabled and **Enabled.**

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

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are Enabled and **Disabled**.

Intel EIST Support (Available when supported by the CPU)

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

▶I/O Device Configuration

Access the submenu to make changes to the following settings.

KBC Clock Input

This setting allows you to select clock frequency for KBC. The options are 6MHz, 8MHz, 1**2MHz**, and 16MHz.

Serial Port A

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

Base I/O Address

This setting allows you to select the base I/O address for serial port A. The options are **3F8**, 2F8, 3E8, and 2E8Interrupt

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

Serial Port B

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

Base I/O Address

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

Interrupt

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

Floppy Disk Controller

This setting allows you to assign control of the floppy disk controller. The options are **Enabled** (user defined), Disabled, and Auto (BIOS and OS controlled).

Base I/O Address

This setting allows you to select the base I/O address for the Floppy port. The options are

Primary and Secondary.

▶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 to redirect the console to Onboard COM A or Onboard COM B. This setting can also be **Disabled.**

BAUD Rate

This item allows you to select 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 choose from the available options to select the console type for console redirection. The options are VT100, VT100,8bit, PC-ANSI, 7bit, **PC ANSI**, VT100+, VT-UTF8 and ASCII.

Flow Control

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

Console Connection

This item allows you to choose select the console connection: 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:** The 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 **75°C**.

CPU1 Temperature/CPU1 Second Core

CPU2 Temperature/CPU2 Second Core

Temperature Monitoring (*Available if supported by the CPU)

Highlight this and hit <Enter> to see monitor data for the following PECI (Platform Environment Control Interface) items:

PECI Agent 1 Temperature

PECI Agent 2 Temperature

PECI Agent 3 Temperature

PECI Agent 4 Temperature

System Temperature

Fan1-Fan5 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 vise versa. If the option is set to "3-pin fan", the fan speed is controlled by voltage. If the option is set to "4-pin", the fan speed will be controlled by Pulse Width Modulation (PWM). Select "3-pin" if your chassis came with 3-pin fan headers. Select "4-pin" if your chassis came with 4-pin fan headers. Select "Workstation" if your system is used as a Workstation. Select "Server" if your system is used as a Server. Select "Disable" to disable the fan speed control function to allow the onboard fans to run at the full speed (12V) at all the time. The Options are: 1. Disable, 2. 3-pin (Server), 3. 3-pin (Workstation), 4. 4-pin (Server) and 5. 4-pin (Workstation).

Voltage Monitoring

The following items will be monitored and displayed:

Vcore A:	+12V
Vcore B:	5Vsb
-12V	5VDD
P1V5	P_VTT
+3.3V	Vbat

▶IPMI

☞ **NOTE:** This option is available only when an IPMI card is installed in the system

```
Console Redirection Window - 192.168.1.133                              _ 8 x
Console Redirection  Keyboard  View  Macros  Lep

                        PhoenixBIOS Setup Utility
      Advanced

┌─────────────────────────────────────────────┬─────────────────────────────┐
│                    IPMI                       │     Item Specific Help      │
├─────────────────────────────────────────────┼─────────────────────────────┤
│                                               │                             │
│  IPMI Specification Version    2.0            │  Enable/Disable IPMI        │
│  Firmware Version              2.1            │  event logging. Disabling   │
│                                               │  will still log events      │
│  System Event Logging        [Enabled]        │  received via the system    │
│  Clear System Event Log      [Disabled]       │  interface.                 │
│  Existing Event Log number    282             │                             │
│  Event Log Control                            │                             │
│    SYS Firmware Progress     [Disabled]       │                             │
│    BIOS POST Errors          [Enabled]        │                             │
│                                               │                             │
│  BIOS POST Watchdog          [Disabled]       │                             │
│  OS boot Watchdog            [Disabled]       │                             │
│    Timer for loading OS (min) [ 10]           │                             │
│    Time out action           [No Action]      │                             │
│                                             ▼ │                             │
└─────────────────────────────────────────────┴─────────────────────────────┘
```

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

Firmware Version: This item displays the current Firmware Version.

System Event Logging

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

Clear System Event Logging

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

Existing Event Log Number

This item displays the number of the existing event log.

Event Log Control

System Firmware Progress

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

BIOS POST Errors

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

BIOS POST Watch Dog

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

OS Boot Watch Dog

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

Timer for Loading OS (Minutes)

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

Time Out Option

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

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

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

▶Realtime Sensor Data

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

```
Console Redirection Window - 192.168.1.133                                    _ | 8 | X |
Console Redirection  Keyboard  View  Macros  Help

                            Realtime Sensor Data


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




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

5-6   Security

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

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

                                                       Item Specific Help
     Supervisor Password Is:
     User Password Is:

     Set Supervisor Password
     Set User Password

     Password on boot:              [Disabled]

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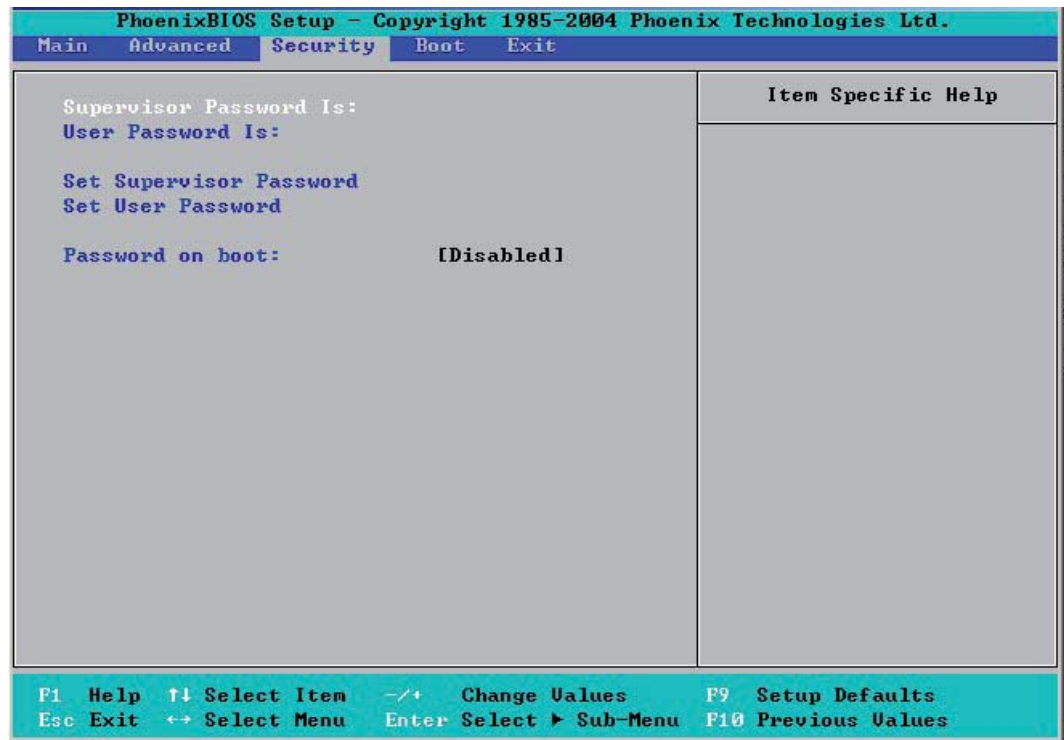
Supervisor Password Is

This 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.

5-7   Boot
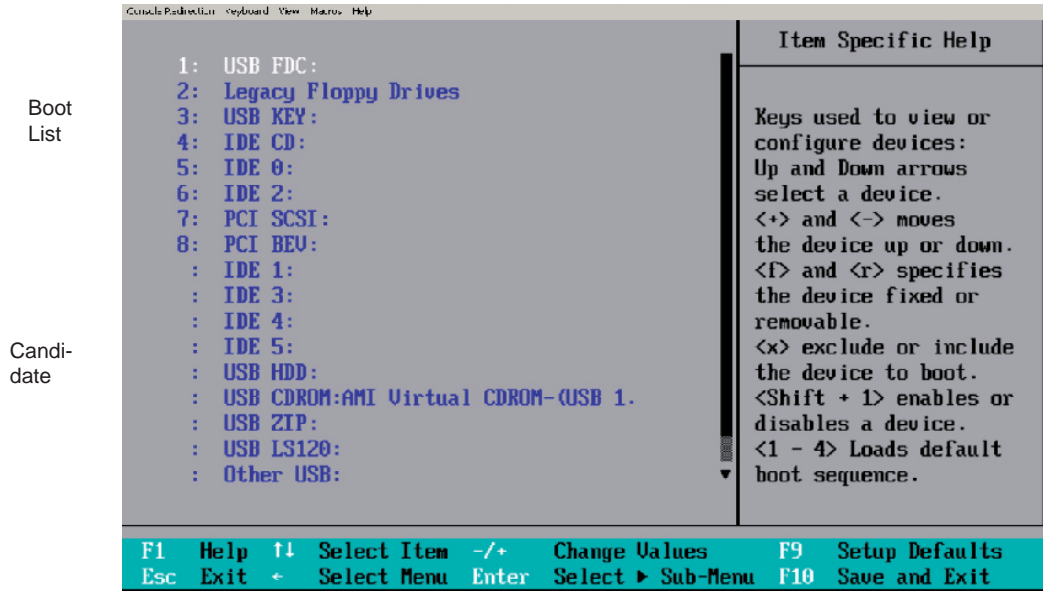
Choose Boot from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. See details on how to change the order and specs of boot devices in the Item Specific Help window. All Boot BIOS settings are described in this section.

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 how to change the priority of boot order of devices in the "Item Specific Help" window.

5-8   Exit

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

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

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




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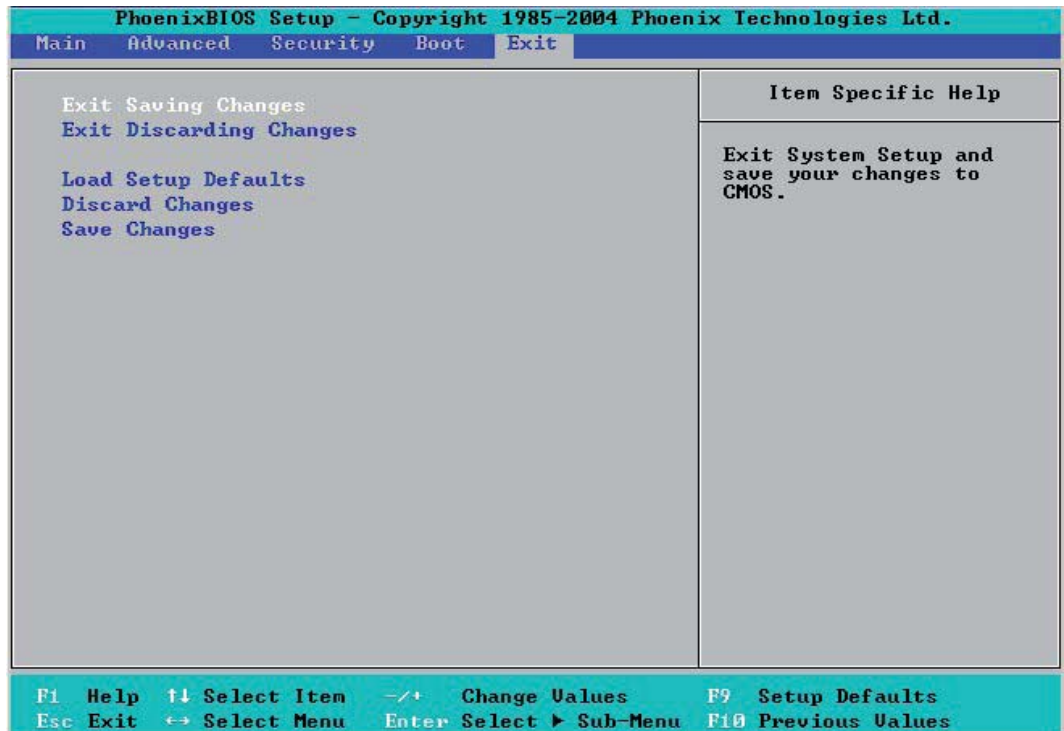
Exit Saving Changes

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

Exit Discarding Changes

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

Load Setup Defaults

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

Discard Changes

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

Save Changes

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

Appendix A   BIOS POST Messages

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

Failure Fixed Disk

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

Stuck key

Stuck key on keyboard.

Keyboard error

Keyboard not working.

Keyboard Controller Failed

Keyboard controller failed test. May require replacing keyboard controller.

Keyboard locked - Unlock key switch

Unlock the system to proceed.

Monitor type does not match CMOS - Run SETUP

Monitor type not correctly identified in Setup

Shadow Ram Failed at offset: nnnn

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

System RAM Failed at offset: nnnn

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

Extended RAM Failed at offset: nnnn

Extended memory not working or not configured properly at offset nnnn.

System battery is dead - Replace and run SETUP

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

System CMOS checksum bad - Default configuration used

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

System timer error

The timer test failed. Requires repair of system board.

Real time clock error

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

Check date and time settings

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

Previous boot incomplete - Default configuration used

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

Memory Size found by POST differed from CMOS

Memory size found by POST differed from CMOS.

Diskette drive A error

Diskette drive B error

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

Incorrect Drive A type - run SETUP

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

Incorrect Drive B type - run SETUP

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

System cache error - Cache disabled

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

CPU ID:

CPU socket number for Multi-Processor error.

EISA CMOS not writeable

ServerBIOS2 test error: Cannot write to EISA CMOS.

DMA Test Failed

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

Software NMI Failed

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

Fail-Safe Timer NMI Failed

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

Device Address Conflict

Address conflict for specified **device**.

Allocation Error for: device

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

CD ROM Drive

CD ROM Drive identified.

Entering SETUP ...

Starting Setup program

Failing Bits: nnnn

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

Fixed Disk n

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

Invalid System Configuration Data

Problem with NVRAM (CMOS) data.

I/O device IRQ conflict

I/O device IRQ conflict error.

PS/2 Mouse Boot Summary Screen:

PS/2 Mouse installed.

nnnn kB Extended RAM Passed

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

nnnn Cache SRAM Passed

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

nnnn kB Shadow RAM Passed

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

nnnn kB System RAM Passed

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

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

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

Operating system not found

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

Parity Check 1 nnnn

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

Parity Check 2 nnnn

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

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

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

Press <F2> to enter Setup

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

PS/2 Mouse:

PS/2 mouse identified.

Run the I2O Configuration Utility

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

System BIOS shadowed

System BIOS copied to shadow RAM.

UMB upper limit segment address: nnnn

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

Video BIOS shadowed

Video BIOS successfully copied to shadow RAM.

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 UserPatch1
66h	Configure advanced cache registers
67h	Initialize Multi Processor APIC
68h	Enable external and CPU caches
69h	Setup System Management Mode (SMM) area
6Ah	Display external L2 cache size
6Bh	Load custom defaults (optional)
6Ch	Display shadow-area message

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
AEh	Clear Boot flag
B0h	Check for errors
B1h	Inform RomPilot about the end of POST (optional)
B2h	POST done - prepare to boot operating system
B4h	1 One short beep before boot
B5h	Terminate QuietBoot (optional)

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

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.

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

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

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

The Intel Matrix Storage

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

Configuring BIOS settings for SATA RAID Functions (Native Mode)

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

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

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

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

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

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

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

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

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

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

C-2   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.
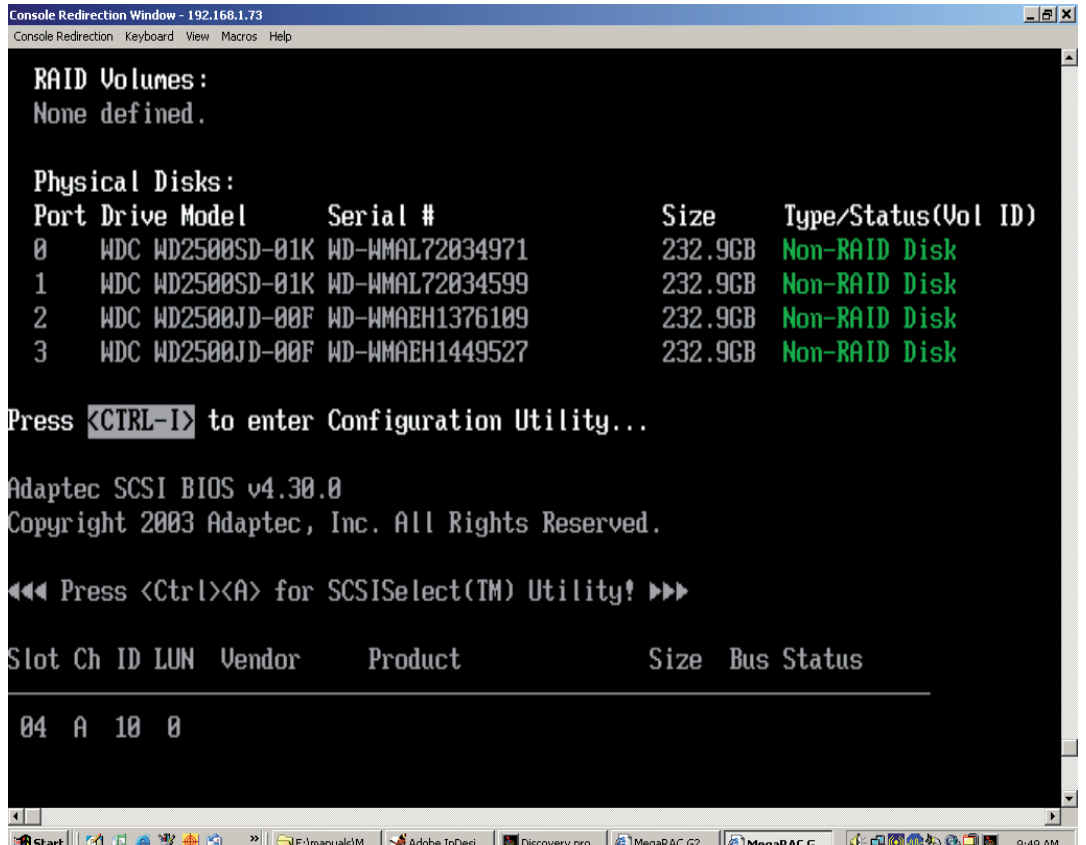
Creating a RAID 0 Volume

1. Select "*Create RAID Volume*" from the main menu and press the <Enter> key. The following screen will appear:
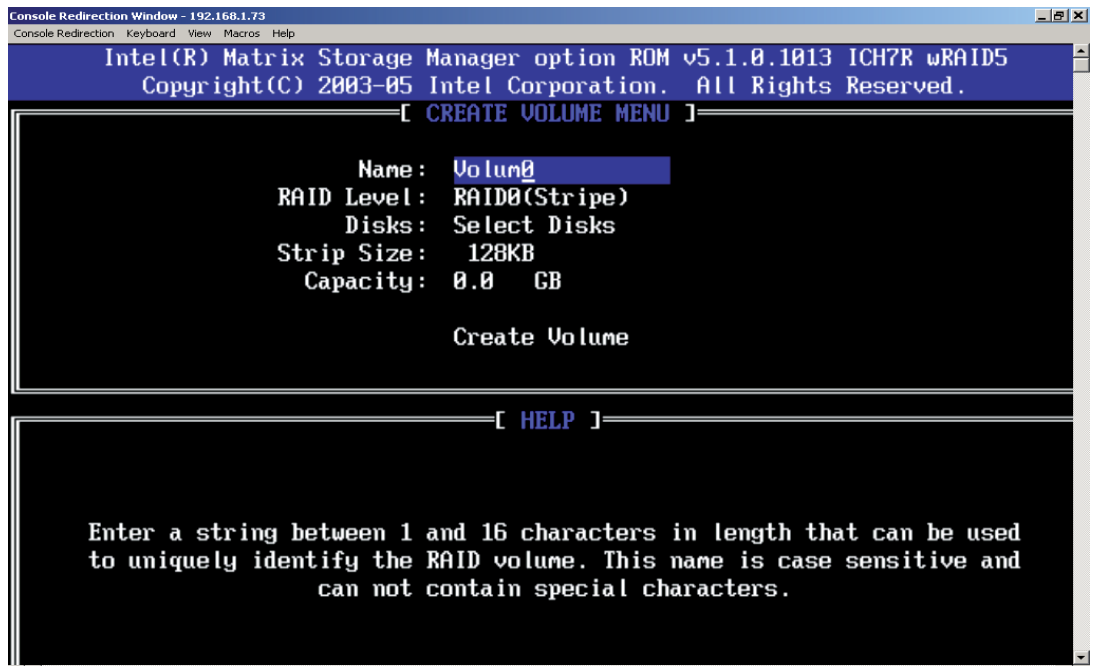
2. Specify a name for the RAID 0 set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)

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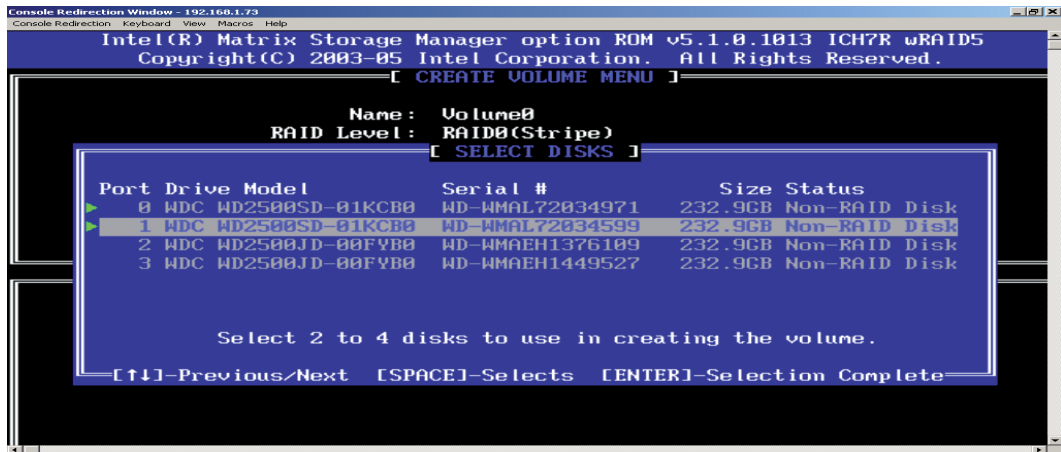
5. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to confirm the selection of the drive.

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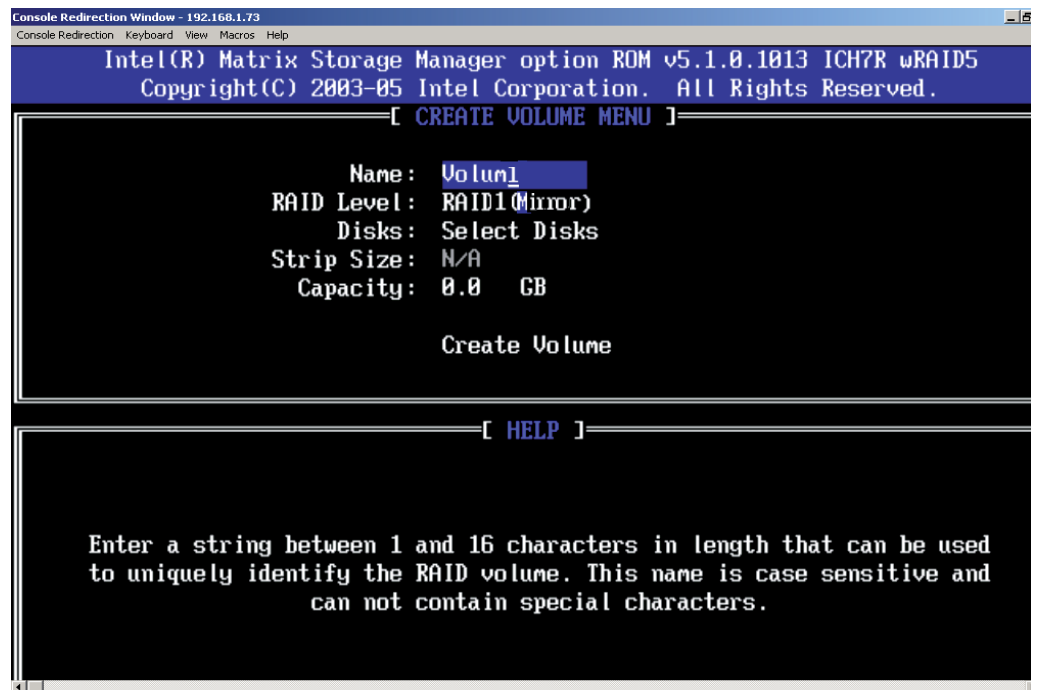
2. Specify a name for the RAID 1 set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)

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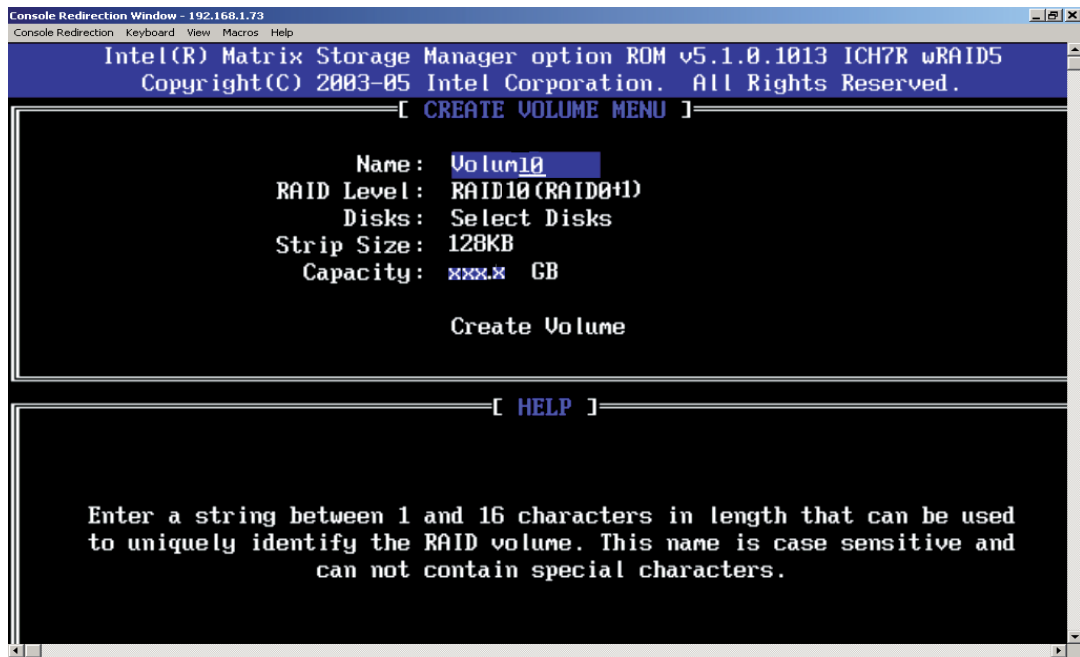
2. Specify a name for the **RAID 10** set and press <Enter>.

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:

```
Console Redirection Window - 192.168.1.73                                    _|B|x|
Console Redirection  Keyboard  View  Macros  Help
   Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
         Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
   =================[ CREATE VOLUME MENU ]=================

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

                    Create Volume

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



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

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:

```
Console Redirection Window - 192.168.1.73                                    _|B|x|
Console Redirection  Keyboard  View  Macros  Help
   Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
         Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
   =================[ CREATE VOLUME MENU ]=================
              Name:  Volume0
        RAID Level:  RAID0(Stripe)
              ===========[ SELECT DISKS ]===========

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


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

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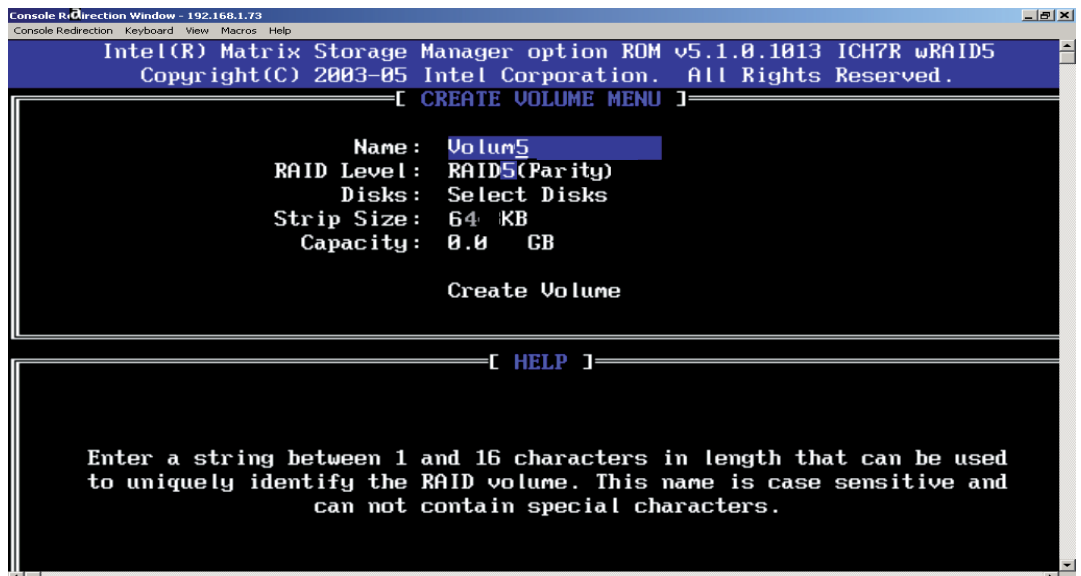```

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>.

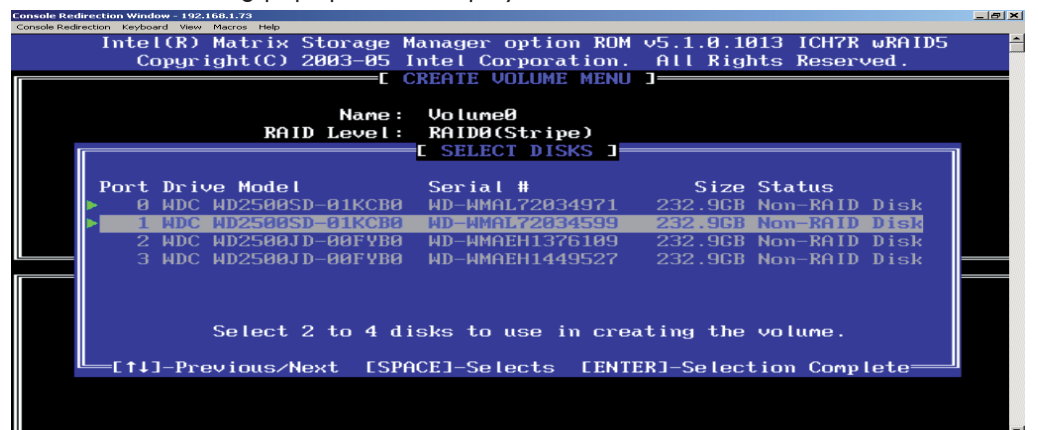☞ **Note:** For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.

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 item2-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 <Del>. 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:

```
Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
        Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
                         =[ MAIN MENU ]=
                       1.  Create RAID Volume
                         =[ RESET RAID DATA ]=
          Resetting RAID data will remove internal RAID structures
          from the selected RAID disks. By removing these structures,
          the drive will revert back to a non-RAID disk.

RA     WARNING: Resetting a disk causes all data on the disk to be lost.
ID
0      Port Drive Model        Serial #           Size Status
         0 WDC WD2500SD-01KCB0  WD-WMAL72034971   232.9GB Member Disk
Ph       1 WDC WD2500SD-01KCB0  WD-WMAL72034599   232.9GB Member Disk
Po
0
1              Select the disks that should be reset.
2
3     =[↑↓]-Previous/Next  [SPACE]-Selects  [ENTER]-Selection Complete=

      [↑↓]-Select           [ESC]-Exit          [ENTER]-Select Menu
```

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-3 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 <Del> 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.
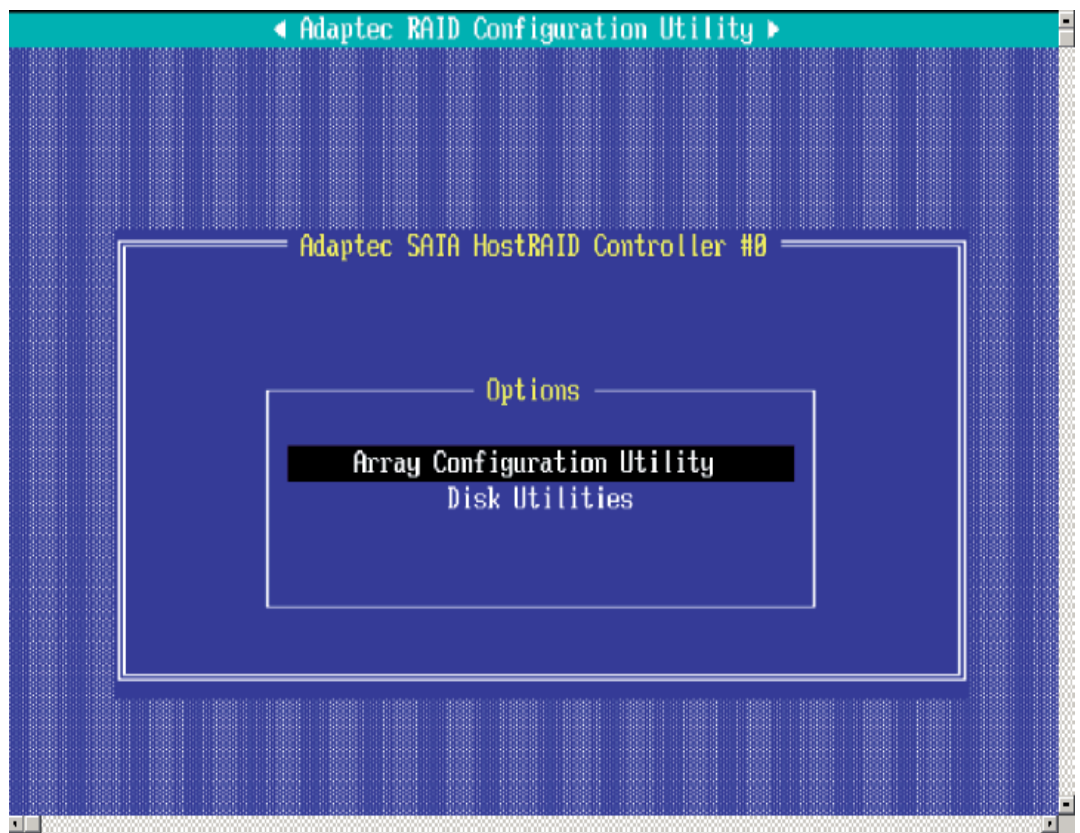
Managing Arrays

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.
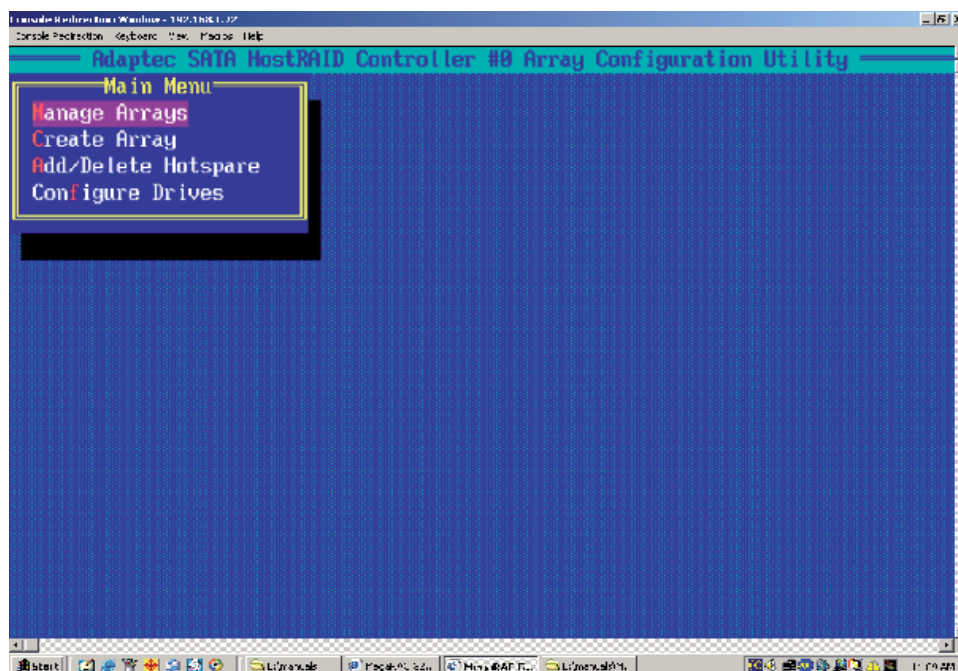
Configuring Disk Drives

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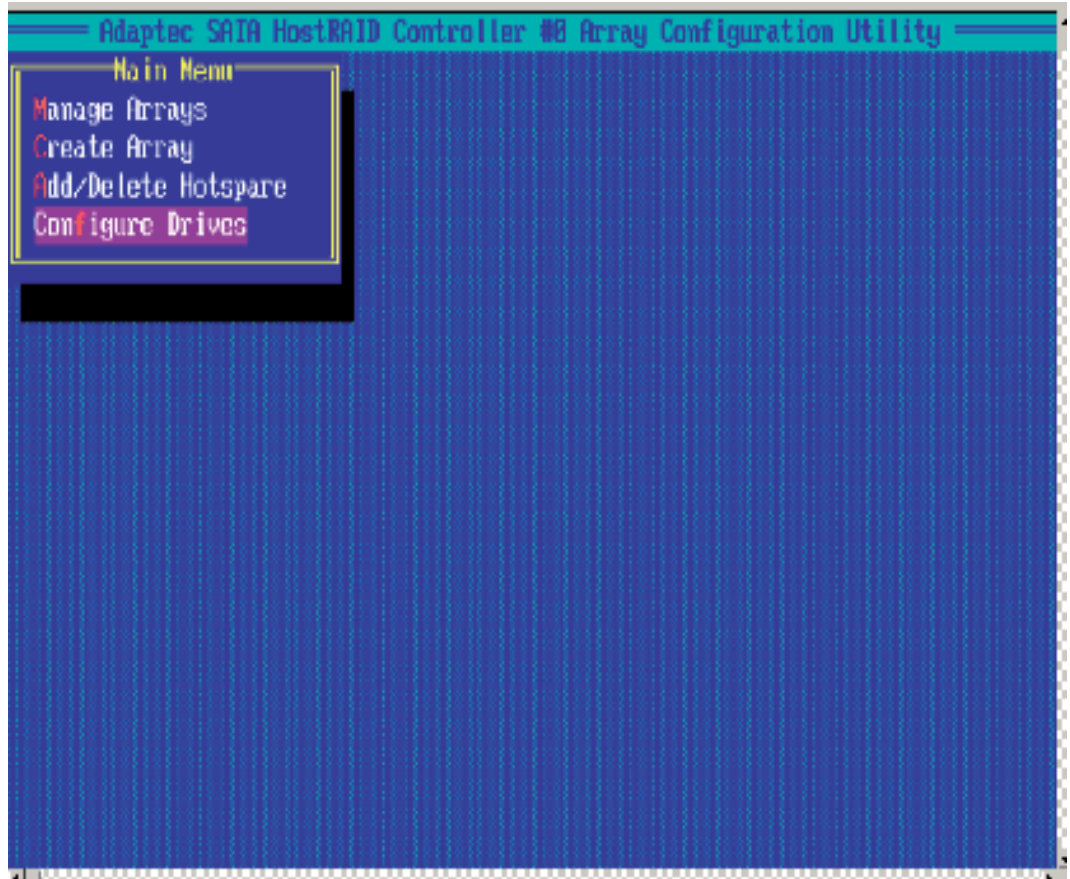
2. From the "Select Drives for Configuring" List (shown below,) select the drives you want to configure and press <Insert>.
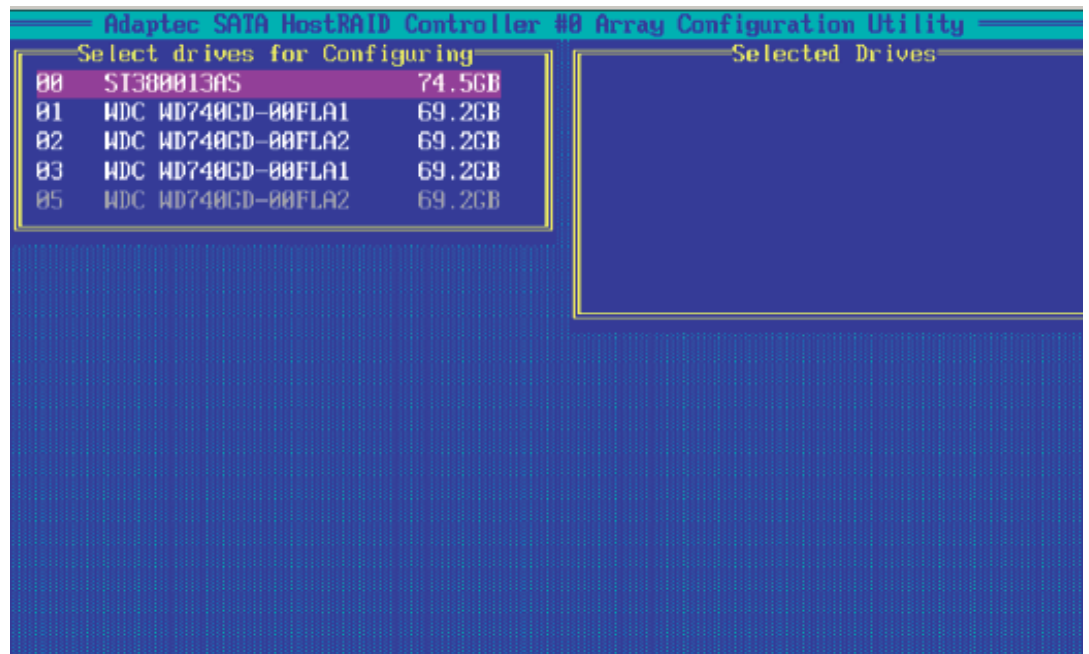
3. The drive you've selected will appear in the "Selected Drives Dialog Box" on the right (as shown below.) Repeat the same steps until all drives that you want to configure appear in the selected drives box.
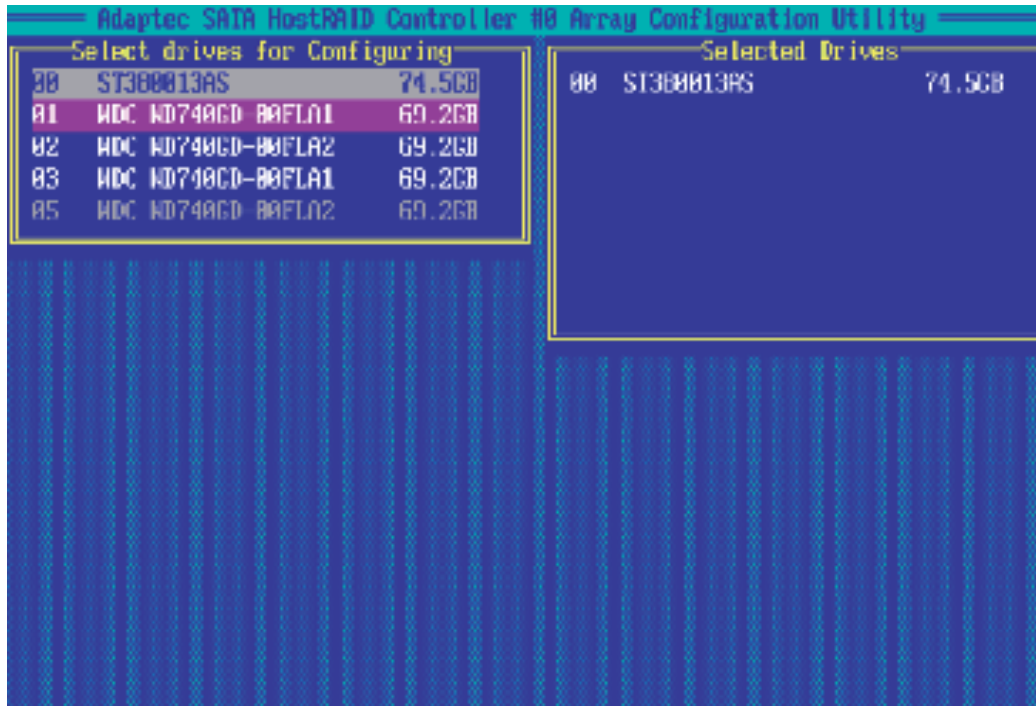
4. Once both drives display in the selected drive box, press <Enter.>

5. Read the warning message as shown in the screen below.

WARNING: Configuring drives will write Array Information on to the selected drives. Drive size will be rounded off to meet standard size.
Do you want to continue this operation?(Yes/No):_

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**.
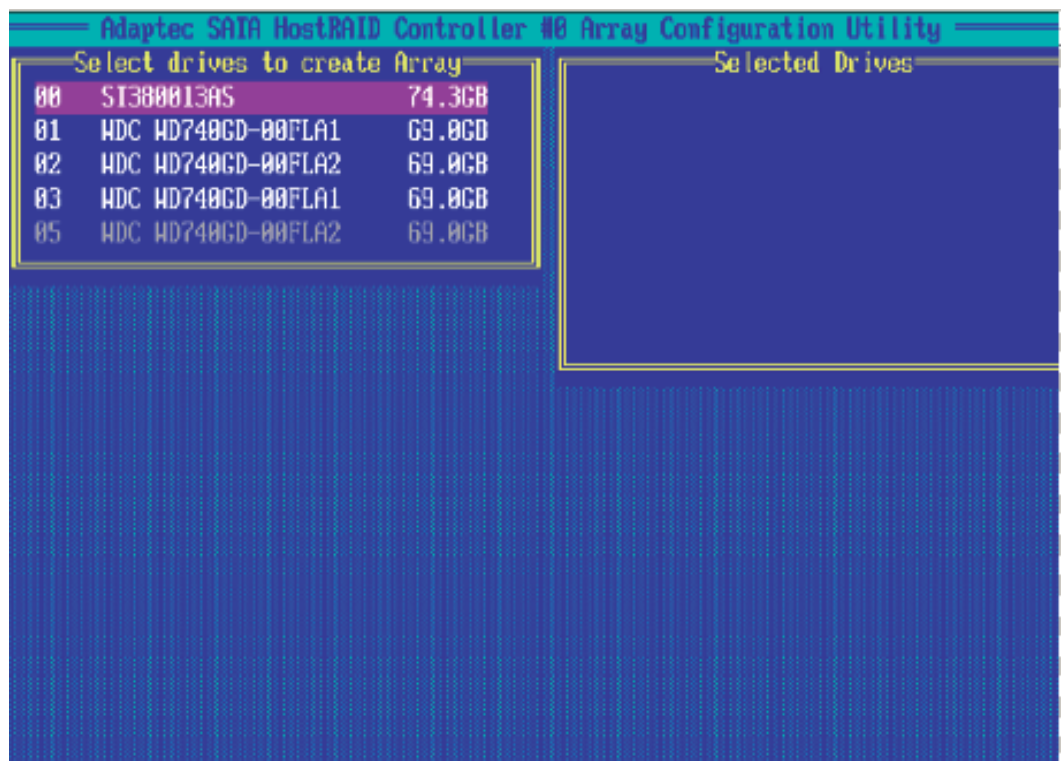
3. The arrays you have selected will appear on the Selected Drives dialog box on the right (as shown below.)

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.)
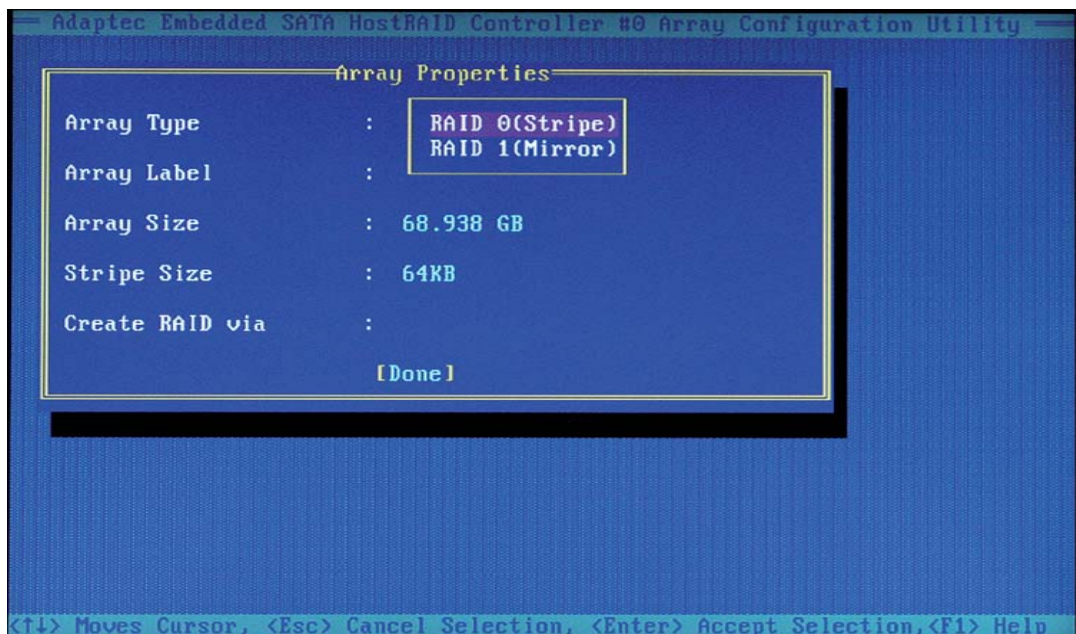
2. Under the item **"Arrays Label"**, type in a label and press **<Enter>**. The label should contain more than 15 characters.

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 c**hange 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

```
Adaptec Embedded SATA HostRAID Controller #0 Array Configuration Utility

                            Array Properties
       Array Type          :  RAID 0(Stripe)

       Array Label         :  Stripe

       Array Size          :  68.938 GB

       Stripe Size         :  64KB

       Create RAID via     :  No Init

                            [Done]



<Tab> Next Field, <Shift+Tab> Previous Field
<Enter> Accept Value, <Esc> Cancel Dialog Box, <F1> Help
```
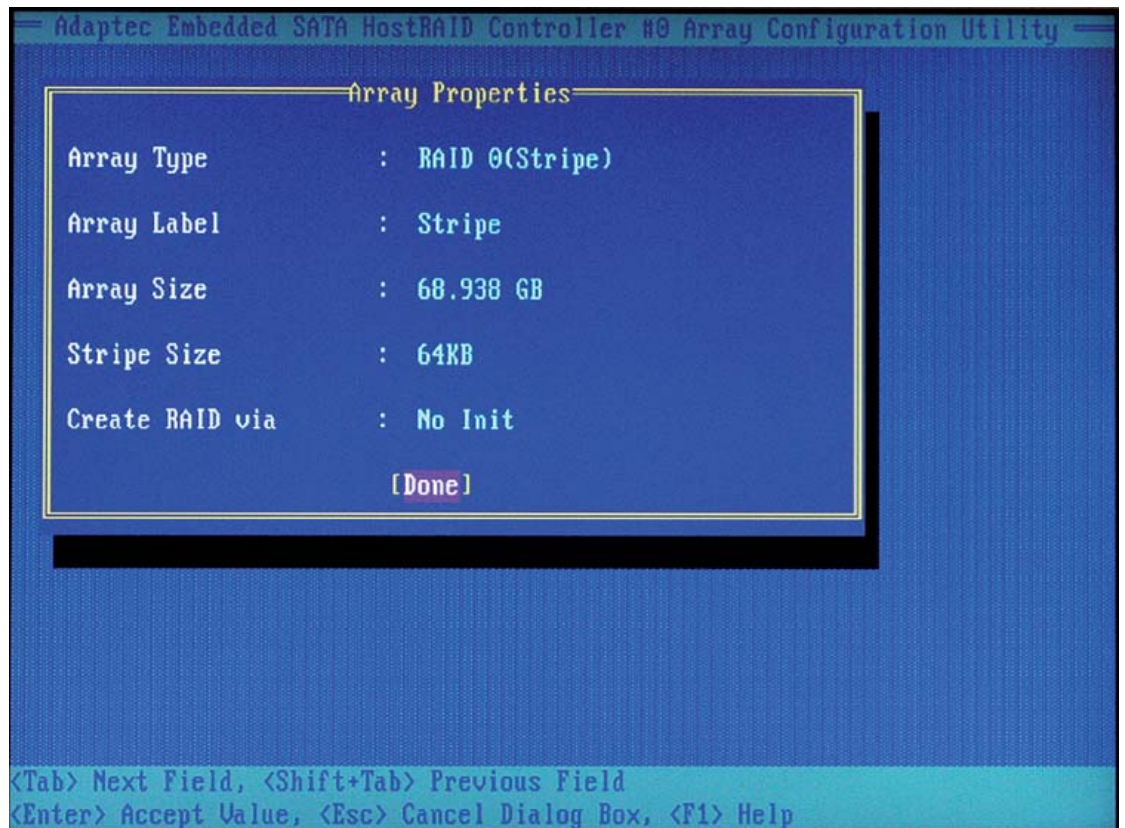
NOTE: If you select Migrate for RAID 0, or Build for RAID 1, you will be asked to select the source drive. The contents of the source drive will be preserved. However, the data on the new drive will be lost.

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


```
Adaptec Embedded SATA HostRAID Controller #0 Array Configuration Utility

                        ┌──────Array Properties──────┐
                        │                            │
    Array Type          :   RAID 0(Stripe)           │
                        │                            │
    Array Label         :   Stripe                   │
                        │                            │
    Array Size          :   68.938 GB                │
                        │                            │
    Stripe Size         :   64KB                     │
                        │                            │
    Create RAID via     :   No Init                  │
                        │                            │
                           [Done]                    │
                        │                            │
                        └────────────────────────────┘


b> Next Field, <Shift+Tab> Previous Field
ter> Accept Value, <Esc> Cancel Dialog Box, <F1> Help
```
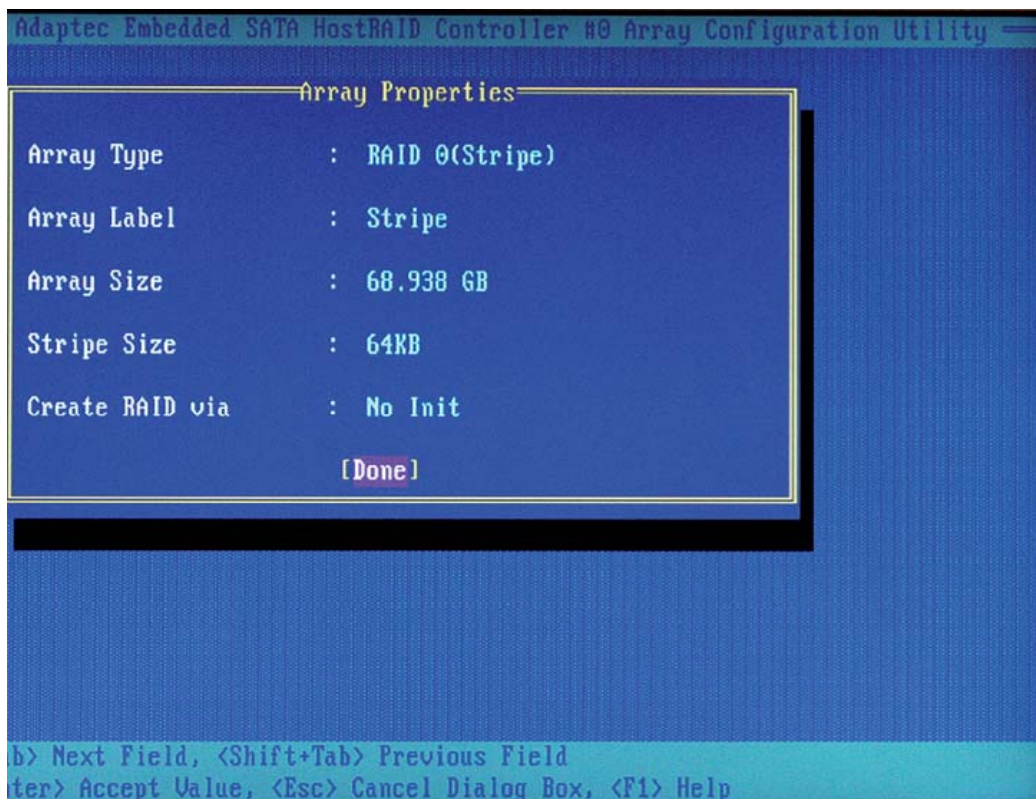
Precautions when Creating Arrays

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 **<B>.**

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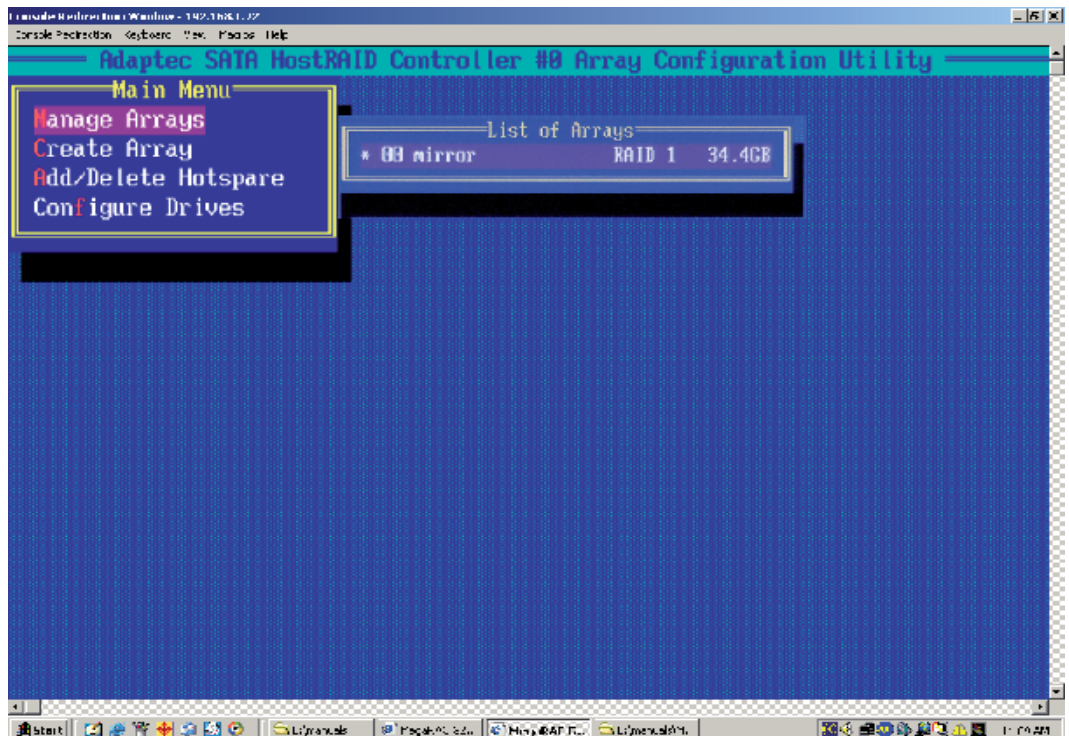
Deleting a Bootable Array

1. From the Main menu, select **Manage Arrays**.

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

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

☞ **NOTE:** Do not use the delete key to delete the bootable array.

Adding/Deleting Hotspares

☞ **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.
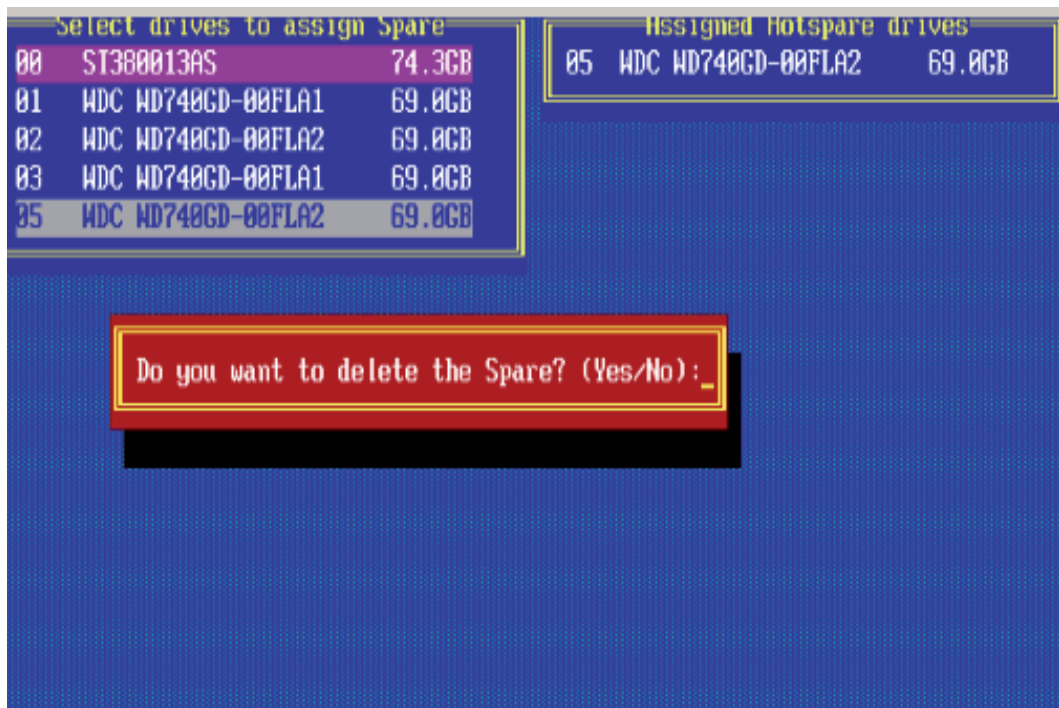
Viewing Array Properties

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.
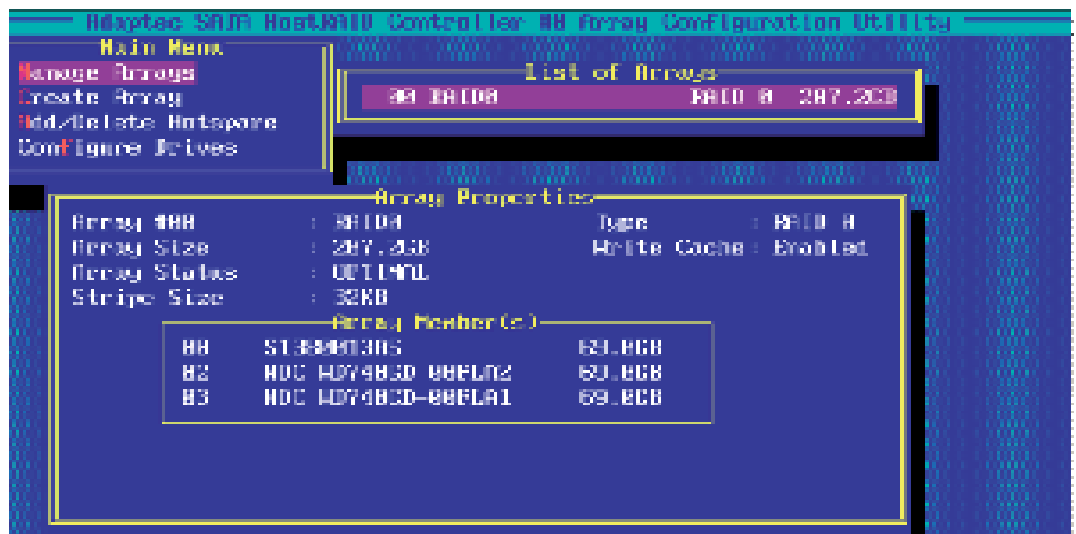
Rebuilding Arrays

☞ **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.
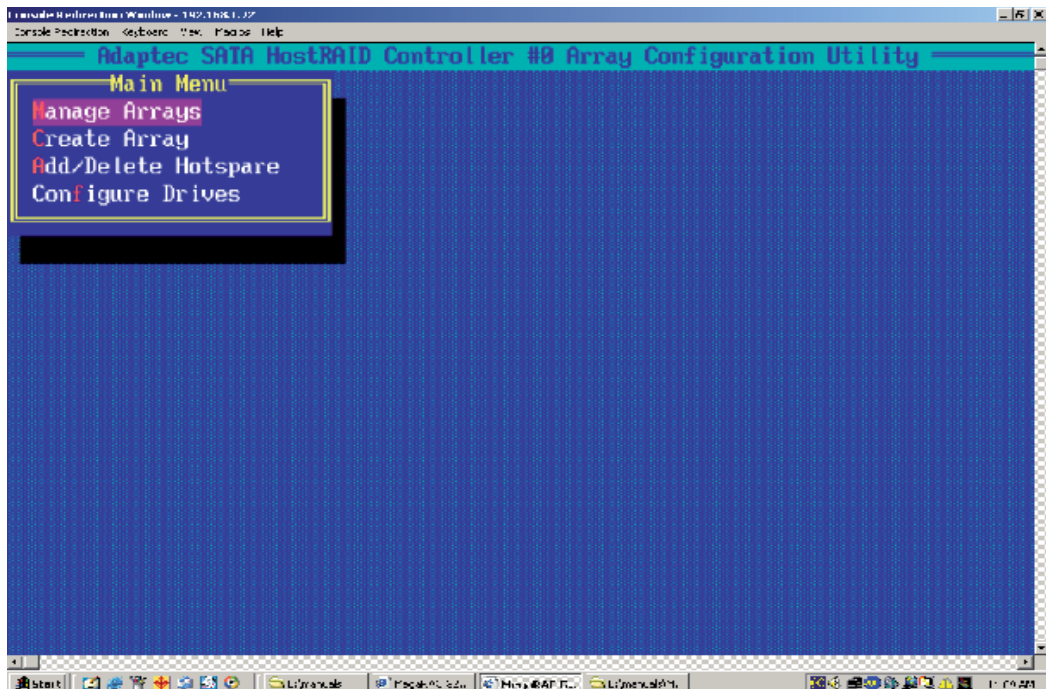
Deleting Arrays

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.
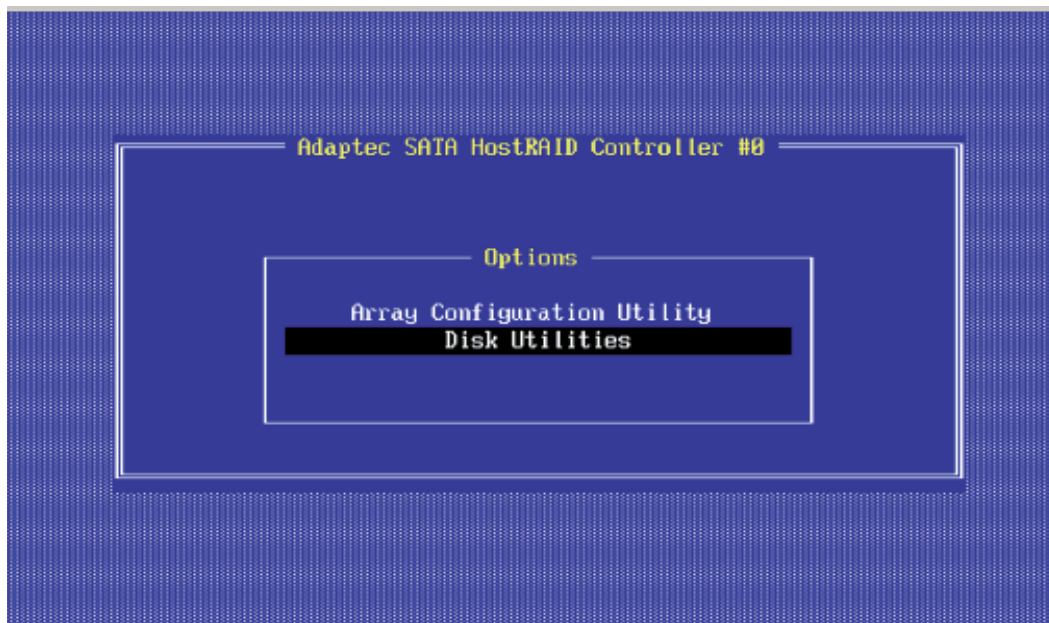
To access the disk utilities

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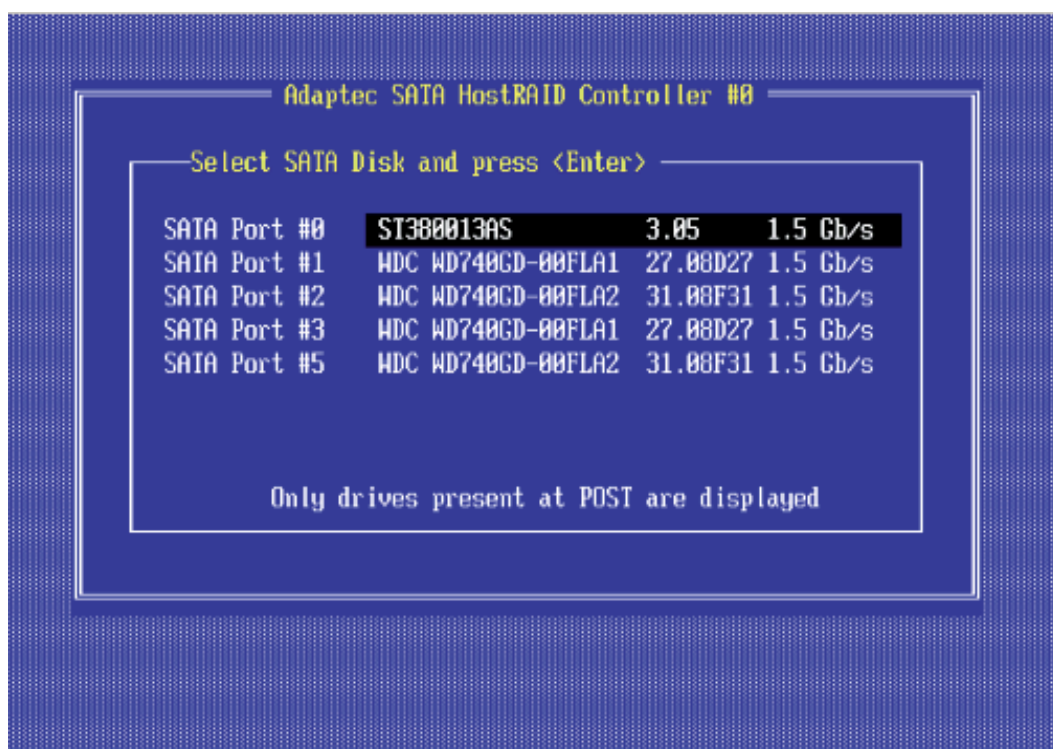
2.   Select the desired disk and press **<Enter>.** The following screen appears:

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.

```
══════════ Adaptec SATA HostRAID Controller #0 ══════════

    ┌──── Select SATA Disk and press <Enter> ────┐

    SATA Port #0    ST380013AS        3.05    1.5 Gb/s
    SATA Port #1    WDC WD740GD-00FLA1 27.08D27 1.5 Gb/s
    SATA Port #2                      ┌──────┐08F31 1.5 Gb/s
    SATA Port #3         ▐  Format Disk     ▌08D27 1.5 Gb/s
    SATA Port #5            Verify Disk Media 08F31 1.5 Gb/s


              Only drives present at POST are displayed
```
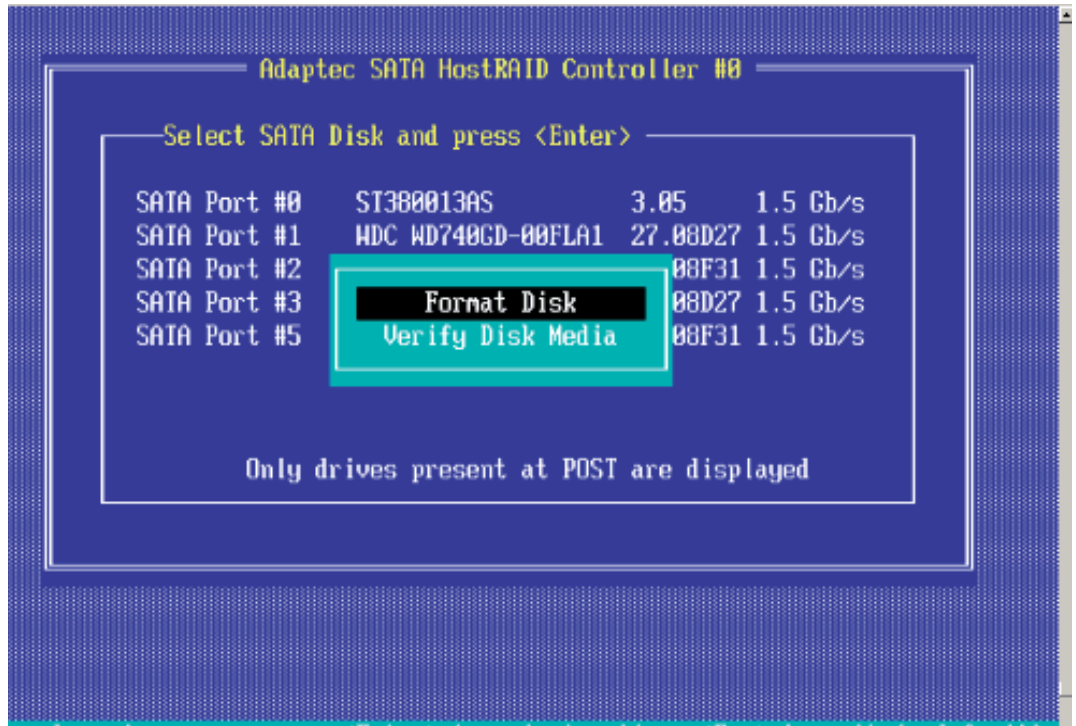
3. When the screen shown below displays, select **Format Disk** and press **<Enter>**. The following screen appears:

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.

```
══════════ Adaptec SATA HostRAID Controller #0 ══════════

    SATA Port #0 ST380013AS          3.05     1.5 Gb/s
    Capacity:        74.5 GBytes

    WARNING!!!  This drive is about to be formatted.
    All data on the disk will be erased.

              ┌──── Format Disk? ────┐
              │ ▐        Yes        ▌ │
              │         No           │
              └──────────────────────┘


Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```

To verify disk media


```
┌───────────── Adaptec SATA HostRAID Controller #0 ──────────┐
│                                                              │
│  ┌─ Select SATA Disk and press <Enter> ──────────────────┐  │
│  │                                                        │  │
│  │  SATA Port #0    ST380013AS         3.05    1.5 Gb/s   │  │
│  │  SATA Port #1    WDC WD740GD-00FLA1  27.08D27 1.5 Gb/s │  │
│  │  SATA Port #2              ┌────────────┐ 08F31 1.5 Gb/s│ │
│  │  SATA Port #3              │ Format Disk│ 08D27 1.5 Gb/s│ │
│  │  SATA Port #5              │Verify Disk Media│08F31 1.5 Gb/s│
│  │                           └────────────┘              │  │
│  │                                                        │  │
│  │        Only drives present at POST are displayed       │  │
│  └────────────────────────────────────────────────────────┘  │
│                                                              │
└──────────────────────────────────────────────────────────────┘
Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```

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>**.


```
┌───────────── Adaptec SATA HostRAID Controller #0 ──────────┐
│  ┌────────────────────────────────────────────────────────┐│
│  │ SATA Port #1 WDC WD740GD-00FLA1  27.08D27 1.5 Gb/s      ││
│  │ Capacity:      69.2 GBytes                              ││
│  │                                                        ││
│  │ This drive will be scanned for media defects.  All     ││
│  │ recoverable defects will be remapped.                  ││
│  │              ┌─ Verify Disk? ─┐                         ││
│  │              │      Yes       │                         ││
│  │              │      No        │                         ││
│  │              └────────────────┘                         ││
│  │                                                        ││
│  └────────────────────────────────────────────────────────┘│
└──────────────────────────────────────────────────────────────┘
Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```
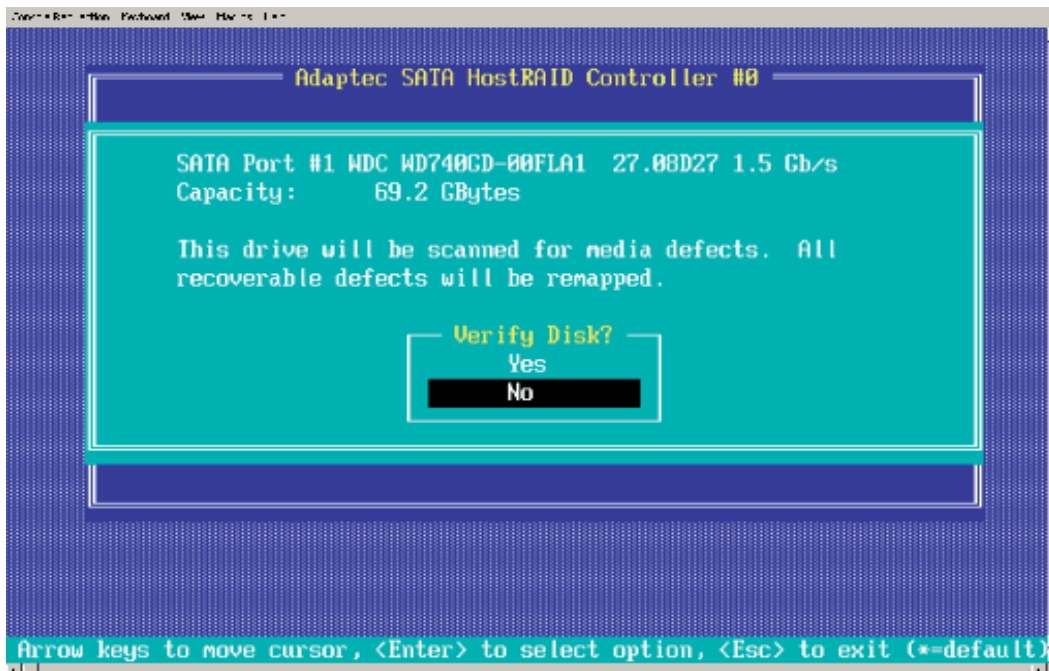
To Exit Adaptec RAID Configuration Utility

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

2. Press **Yes** to exit the Utility.

◀ Adaptec RAID Configuration Utility ▶

Exit Utility?
Yes
No

Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
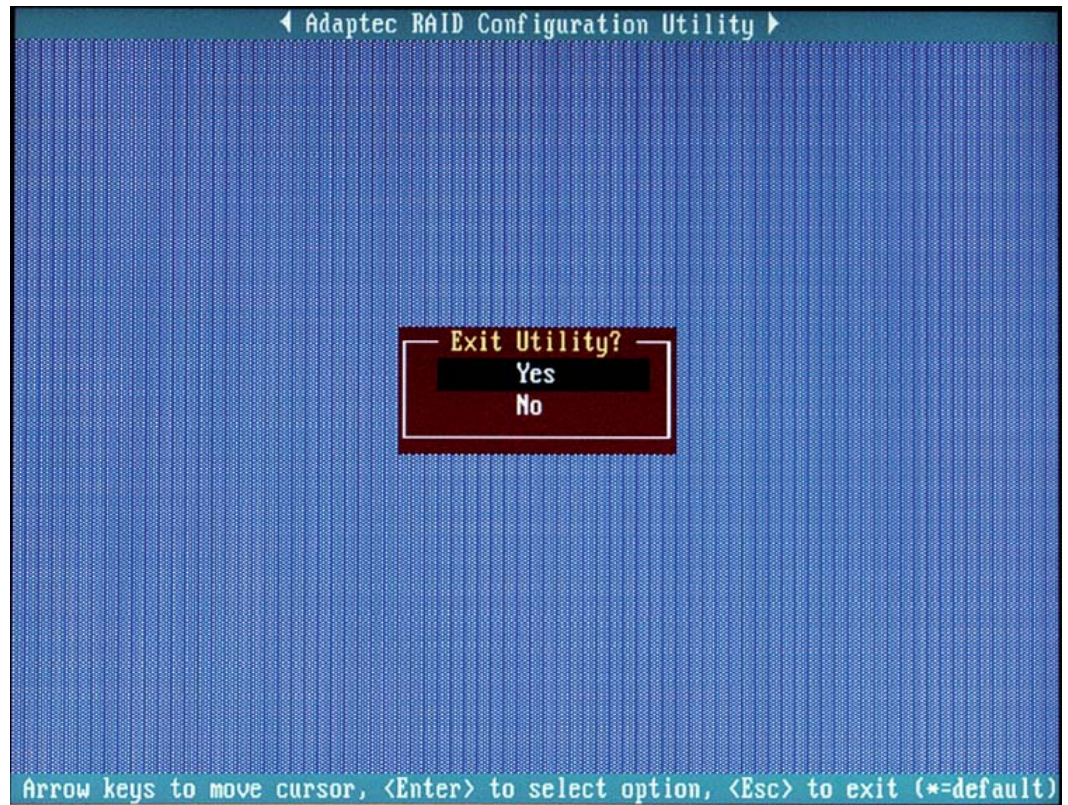
D-3   Windows driver for the "Adaptec Embedded Serial ATA RAID Controller"

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

PROCESSORS

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

ARCHITECTURE

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

BIOS

- Phoenix® 8Mb Flash EEPROM

Motherboards

- X7DBR-i

MEMORY

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

I/O SLOTS

- Bus slots 1 PCI-Express x8 or 1 PCI-X 64-bit/100Mhz

SERIAL ATA CONTROLLER (one on each server)

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

MEDIA AND STORAGE DEVICES

- Hard Disk Drives SATA2 7200 rpm 3x fixed HDD SATA2 7200 rpm (160/250/500GB)
- Maximum Internal Storage capacity 1500GB SATA2
- Zero-channel RAID support (optional)

VIDEO

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

NETWORK

- Network interface controller Intel® (ESB2/Gilgal) 82563EB Dual-port Gigabit Ethernet Controller

SECURITY

- Front door / Intrusion protection Chassis intrusion detection

I/O PORTS

- USB ports 2x USB 2.0
- PS/2 port (mouse/keyboard) 1x
- SVGA video port 1x
- System Management 1x SIMSO socket (IPMI 2.0 with virtual media-over-LAN & optional KVM-over LAN)
- Ethernet port 2x RJ45
- 1x fast UART 16550 serial port

POWER SUPPLY

- Fixed PSU 1x
- Power consumption 580 Watts w/PFC (+80% efficiency)
- Auto-sensing 110/220V – 60/50Hz

VENTILATION

- Fan specifications 2x 10cm 5K RPM blower fans

PHYSICAL SPECIFICATIONS

- Size (HxWxD) 43 x 427 x 650 mm
- Weight 15.4kg

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 a 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 R421 Installation and User's Guide

Reference:	86 A1 94ET 00		Date:	July 2007

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