

bullx

# R423-E2

## Installation and User's Guide



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## R423-E2

### Installation and User's Guide

#### Hardware

June 2010

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## Preface

### About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the bullx R423-E2. Installation and maintenance should be performed by experienced technicians only.

The bullx R423-E2 is a high-end server based on a rackmount chassis and the bullx R423-E2 serverboard. The R423-E2 supports the Intel® 5500 Series Processor platform, the first dual-processing platform that supports the Intel QuickPath Interconnect (QPI) Technology, providing the next generation point-to-point system interface to replace the current Front Side Bus. With the Intel 5520 chipset built in, the R423-E2 substantially enhances system performance with increased bandwidth and unprecedented scalability optimized for HPC/Cluster systems and intensive applications.

### Manual Organization

#### **Chapter 1: Introduction**

The first chapter provides a checklist of the main components included with the server system and describes the main features of the bullx R423-E2 serverboard and the chassis, which comprise the bullx R423-E2.

#### **Chapter 2: Server Installation**

This chapter describes the steps necessary to install the bullx R423-E2 into a rack and check out the server configuration prior to powering up the system. If your server was ordered without processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

#### **Chapter 3: System Interface**

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

## **Chapter 4: System Safety**

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the bullx R423-E2.

## **Chapter 5: Advanced Serverboard Setup**

Chapter 5 provides detailed information on the bullx R423-E2 serverboard, including the locations and functions of connections, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

## **Chapter 6: Advanced Chassis Setup**

Refer to Chapter 6 for detailed information on the bullx R423-E2 server chassis. You should follow the procedures given in this chapter when installing, removing or reconfiguring SATA or peripheral drives and when replacing system power supply units and cooling fans.

## **Chapter 7: BIOS**

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

## **Appendix A: BIOS Beep Error Codes**

## **Appendix B: Intel HostRaid Setup Guidelines**

## **Appendix C: Adaptec HostRaid Setup Guidelines**

## **Appendix D: System Specifications**

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### **Appendix C. Adaptec HostRAID Setup Guidelines**

### **Appendix D. System Specifications**

## Notes

## Chapter 1. Introduction

### 1-1 Overview

The bullx R423-E2 is a high-end server that is comprised of two main subsystems: a 2U server chassis and the bullx R423-E2 dual Intel® Xeon® processor serverboard. Please refer to our web site for information on operating systems that have been certified for use with the bullx R423-E2 (<http://www.bull.com>).

In addition to the serverboard and chassis, various hardware components have been included with the bullx R423-E2, as listed below:

- One (1) SAS/SATA backplane (BPN-SAS-825TQ)
- Two (2) 8-pin to 8-pin Ribbon Cables for SGPIO (Supports Up to 4 Drives CBL-0157L)
- Two (2) SATA Cable Sets (CBL-0180L-01)
- Three (3) 2U, 8cm 6300 RPM Fans (FAN-0094L)
- Eight (8) SATA hot-swap drive carriers (MCP-220-00001-01)  
(The chassis has eight carriers but only six SATA drives are supported.)
- One (1) rail set (MCP-290-00002-00)
- One (1) DVD-Rom Drive Dummy Cover Black (MSP-290-00007-01)
- One (1) air shroud (MCP-310-82502-0N)
- Two (2) 700W 2U power supplies (PWS-702A-1R)
- One (1) Power distributor (PDB-PT825-N24)
- Two (2) CPU passive heatsinks (SNK-P0025P)

## 1-2 Serverboard Features

At the heart of the bullx R423-E2 lies the bullx R423-E2 serverboard, a dual processor serverboard based on the Intel 5520 chipset and designed to provide maximum performance. Below are the main features of the bullx R423-E2 serverboard. (See Figure 1-1 for a block diagram of the 5520 chipset).

### CPU

The bullx R423-E2 serverboard supports two Intel® 5500 Series (LGA 1366) processors. Each processor supports two full-width Intel QuickPath Interconnect (QPI) @6.4 GT/s with a total of up to 51.2 GB/s Data Transfer Rate (6.4 GB/s per direction).

### Chipset

Intel 5520 chipset, including: two 5520 I/O Hubs (North Bridge), and one ICH10R (South Bridge) Memory

### Memory

The bullx R423-E2 serverboard has eighteen (18) 240-pin DIMM sockets. It supports up to 144 GB of DDR3 Reg. ECC 1333/1066/800 MHz Memory modules (see section 5-6 in Chapter 5 for memory population).

### Serial ATA

A SATA controller is integrated into the ESB2 (South Bridge) portion of the 5520 chipset to provide a six-port 3 Gb/s Serial ATA subsystem, which is RAID 0, 1, 10 and 5 supported. The Serial ATA drives are hot-swappable units.

**Note:** The operating system you use must have RAID support to enable the hot-swap capability and RAID function of the Serial ATA drives.

## PCI Expansion Slots

The bullx R423-E2 serverboard has:

- Three PCI-E x8 slots (Slot 1/Slot 3/Slot 7),
- Two PCI-E 2.0 x16 slots (Slot 2/Slot 6),
- One PCI-E 2.0 x4 (in x8) slot (Slot 5),
- One PCI-E 2.0 x8 (in x16) slot (Slot 4).

## UIO

The bullx R423-E2 serverboard is a specially-designed serverboard that features UIO (Universal I/O) technology. UIO serverboards have a PCI-Express x8 connector that can support any one of several types of UIO card types (low-profile only) to add SAS ports, additional LAN ports, etc. to the serverboard. This allows the user to tailor the serverboard to their own needs.

**Note:** the bullx R423-E2 does not come with a UIO card pre-installed.

## Onboard Controllers/Ports

One floppy drive connector and two onboard ATA/100 connectors (one reserved for the use of a compact flash card) are provided to support IDE hard drives or ATAPI devices. The color-coded I/O ports include one COM port (an additional COM header is located on the serverboard), a VGA (monitor) port, two USB 2.0 ports (three additional USB headers are included on the serverboard), PS/2 mouse and keyboard ports and two gigabit Ethernet ports.

## ATI Graphics Controller

The bullx R423-E2 serverboard features an integrated ATI video controller based on the ES1000 32 MB graphics chip. The ES1000 was designed specifically for servers, featuring low power consumption, high reliability and superior longevity.

## Other Features

Other onboard features that promote system health include onboard voltage monitors, a chassis intrusion header, auto-switching voltage regulators, chassis and CPU overheat sensors, virus protection and BIOS rescue.

## 1-3 Server Chassis Features

The following is a general outline of the main features of the bullx R423-E2 server chassis.

### System Power

The bullx R423-E2 server chassis features a redundant 700W power supply composed of two separate power modules. This power redundancy feature allows you to replace a failed power supply without shutting down the system.

### Serial ATA Subsystem

The bullx R423-E2 server chassis supports up to six 3 Gb/s Serial ATA drives. The Serial ATA drives are hot-swappable units and are connected to a backplane that provides power and control.

**Note:** The operating system you use must have RAID support to enable the hot-swap capability of the Serial ATA drives.

### Front Control Panel

The control panel on the bullx R423-E2 provides you with system monitoring and control. LEDs indicate system power, HDD activity, network activity, system overheat and power supply failure. A main power button and a system reset button are also included. In addition, two USB ports have been incorporated into the control panel to provide front side USB access.

### I/O Backplane

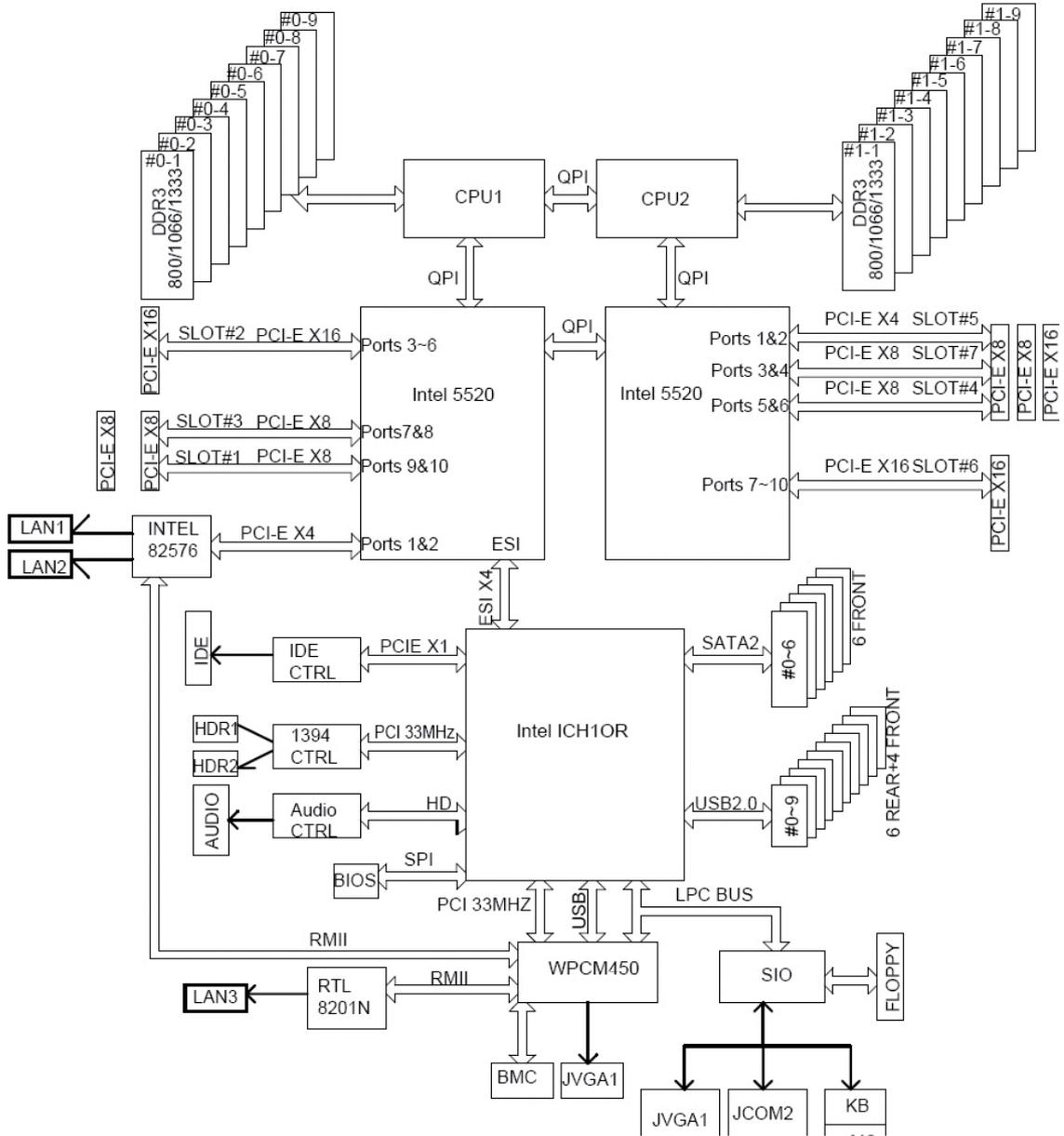
The bullx R423-E2 server chassis is an ATX form factor chassis designed to be used in a 2U rackmount configuration. The I/O backplane provides seven low-profile PCI expansion slots, one COM port, a parallel port, a VGA port, two USB 2.0 ports, PS/2 mouse and keyboard ports and two gigabit Ethernet ports.

### Cooling System

The bullx R423-E2 server chassis has an innovative cooling design that includes three 8-cm hot-plug system cooling fans located in the middle section of the chassis. An air shroud channels the airflow from the system fans to efficiently cool the processor area of the system. The power supply module also includes a cooling fan.

**Figure 1-1. Intel 5520 Chipset: System Block Diagram**

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



## Notes

## Chapter 2. Server Installation

### 2-1 Overview

This chapter provides a quick setup checklist to get your bullx R423-E2 up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components.

### 2-2 Unpacking the System

You should inspect the box the bullx R423-E2 was shipped in and note if it was damaged in any way. If the server itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the bullx R423-E2. 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. Read the Rack and Server Precautions in the next section.

### 2-3 Preparing for Setup

The box the bullx R423-E2 was shipped in should include two sets of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Follow the steps in the order given to complete the installation process in a minimum amount of time. Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

#### Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (about 65 cm / 25 inches) and approximately 75 cm / 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.



## Warnings and Precautions!



- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).
- This product is not suitable for use with visual display work place devices according to §2 of the the German Ordinance for Work with Visual Display Units.

### Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

### Server Precautions

- Review the electrical and general safety precautions in Chapter 4.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components on the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.
- Allow the hot plug SATA drives and power supply modules to cool before touching them.
- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

## **Rack Mounting Considerations**

### **Ambient Operating Temperature**

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (T<sub>mra</sub>): 10° to 35° C (50° to 95° F).

### **Reduced Airflow**

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

### **Mechanical Loading**

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

### **Circuit Overloading**

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

### **Reliable Ground**

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

## 2-4 Installing the System into a Rack

This section provides information on installing the bullx R423-E2 into a rack unit. If the bullx R423-E2 has already been mounted into a rack, you can skip ahead to Sections 2-5 and 2-6. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. The following is a guideline for installing the system into a rack with the rack rails provided. You should also refer to the installation instructions that came with the rack unit you are using.

### Identifying the Sections of the Rack Rails

You should have received a total of six rack rail sections with the bullx R423-E2. Two of these sections secure directly to the bullx R423-E2 and the third (which actually consists of two joined sections) secures directly to the rack itself. All screws and hardware mentioned in the installation steps should be included in the hardware kit.

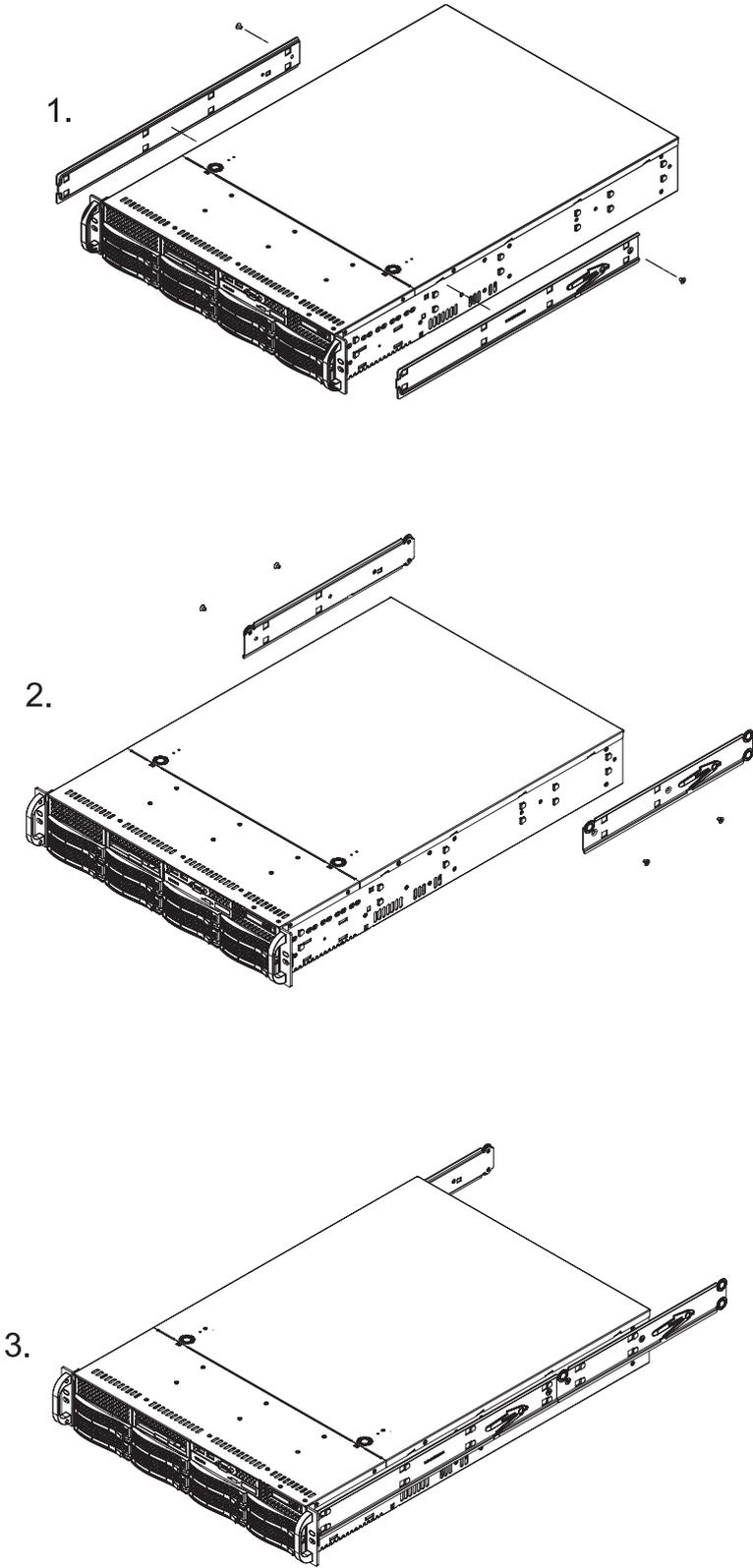
Refer to Figure 2-1 to determine which rail section gets attached to the front of the chassis and which gets attached to the rear of the chassis. (The longer of the two is the front section. The third rail section attaches to the rack.)

### Installing the Chassis Rails

Position the front and rear chassis rail sections along the side of the bullx R423-E2 making sure the screw holes line up. Note that these two rails are left/right specific. Screw the front chassis rail (the long piece) securely to the side of the chassis (see Figure 2-1, step 1). There should be two screws for each side. Repeat this procedure for the other rail on the opposite side of the chassis. Then attach the two rear chassis rails to the chassis in the same manner, again keeping in mind that the rails are left/right specific. (You will also need to attach the rail brackets when installing into a rack.)

**Locking Tabs:** Both front chassis rails and the rack rails have a locking tab, which serves two functions. The first is to lock the server into place when installed and pushed fully into the rack, which is its normal position. Secondly, these tabs also lock the server in place when fully extended from the rack. This prevents the server from coming completely out of the rack when you pull it out for servicing.

Figure 2-1. Installing Chassis Rails



## **Installing the Rack Rails:**

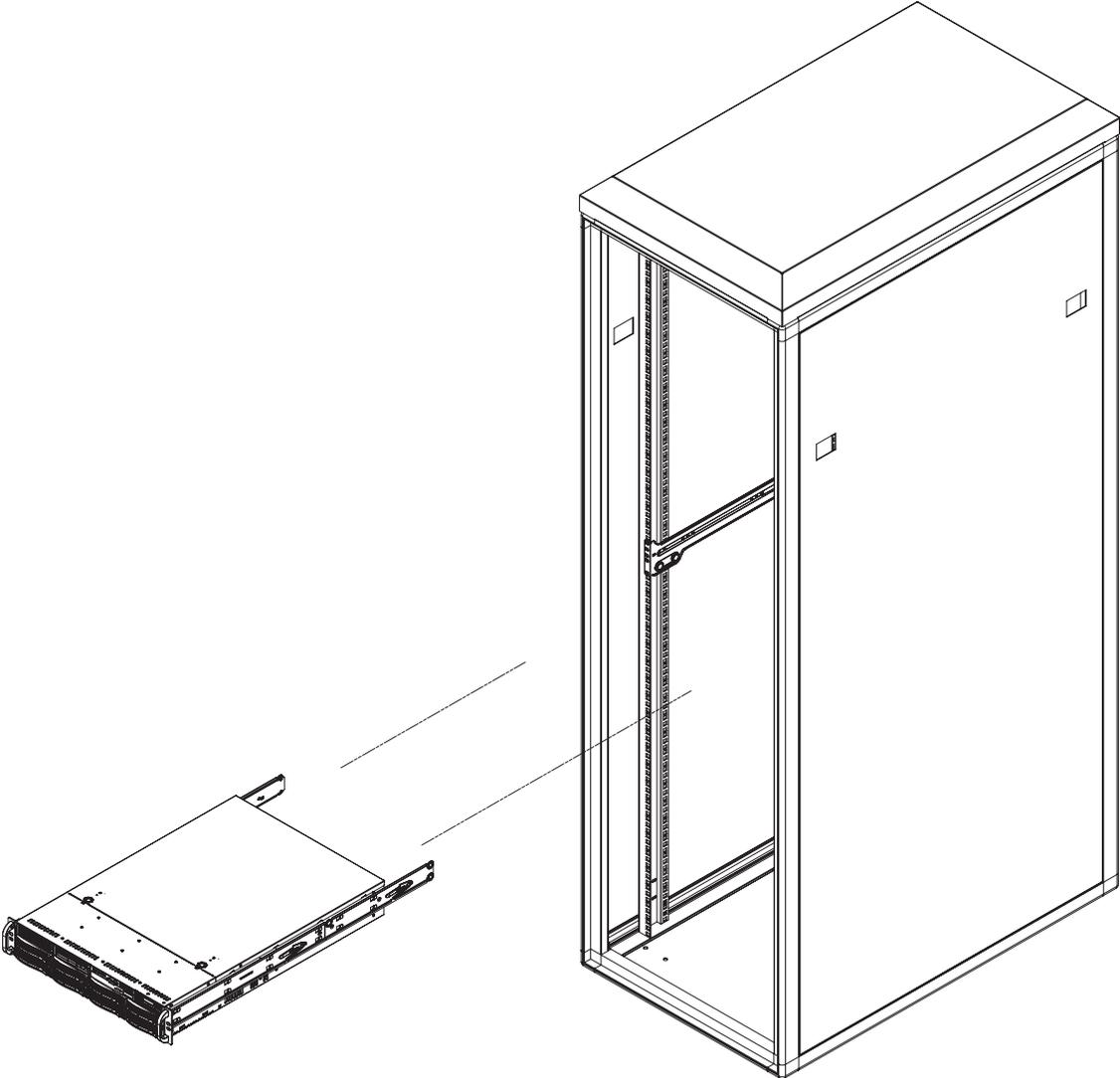
Determine where you want to place the bullx R423-E2 in the rack. (See Rack and Server Precautions in Section 2-3.) Position the fixed rack rail/sliding rail guide assemblies (made up of two inter-locking sections) at the desired location in the rack, keeping the sliding rail guide facing the inside of the rack and the rollers toward the front of the rack. Screw the assembly securely to the rack. Attach the other assembly to the other side of the rack, making sure both are at the exact same height and with the rail guides facing inward.

## **Installing the Server into the Rack**

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

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

Figure 2-2. Installing the Server into a Rack



## 2-5 Checking the Serverboard Setup

After you install the bullx R423-E2 in the rack, you will need to open the unit to make sure the serverboard is properly installed and all the connections have been made.

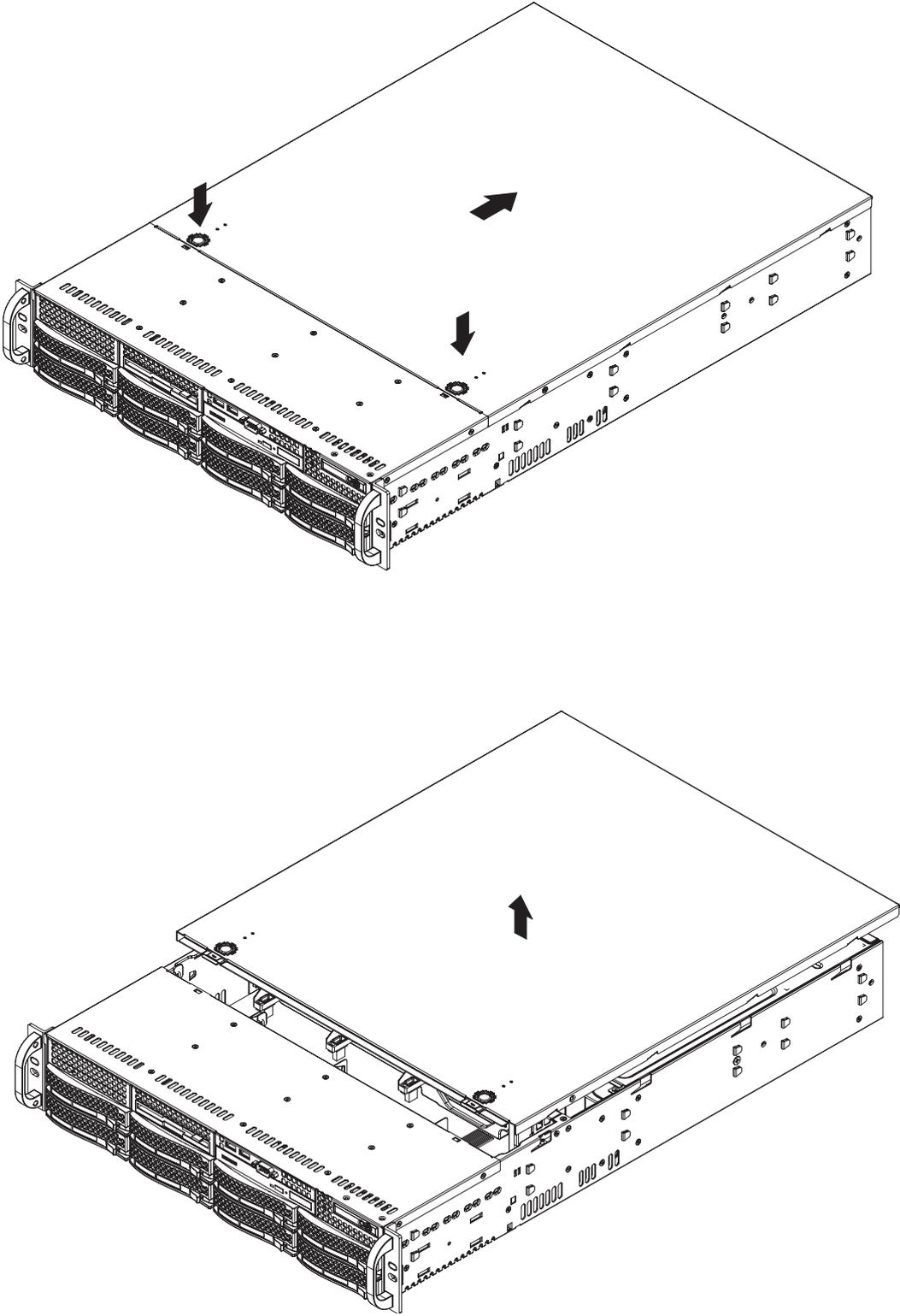
### ***Accessing the inside of the System***

1. First, grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").
2. Next, depress the two buttons on the top of the chassis to release the top cover.
3. You can then lift the top cover from the chassis to gain full access to the inside of the server.

### ***Checking the Components and Setup***

1. You may have one or two processors already installed into the serverboard. Each processor needs its own heat sink. See Chapter 5 for instructions on processor and heat sink installation.
2. Your bullx R423-E2 server system may have come with system memory already installed. Make sure all DIMMs are fully seated in their slots. For details on adding system memory, refer to Chapter 5.
3. If desired, you can install add-on cards to the system. See Chapter 5 for details on installing PCI add-on cards.
4. Make sure all power and data cables are properly connected and not blocking the chassis airflow. Also make sure that no cables are positioned in front of the fans. See Chapter 5 for details on cable connections.

Figure 2-3. Accessing the Inside of the System



## 2-6 Checking the Drive Bay Setup

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

### ***Checking the Drives***

1. All drives are accessible from the front of the server. For servicing the DVD-ROM and floppy drives, you will need to remove the top chassis cover. The Serial ATA disk drives can be installed and removed from the front of the chassis without removing the top chassis cover.
2. A slim DVD-ROM and a floppy drive should be preinstalled in your server. Refer to Chapter 6 if you need to reinstall a DVD-ROM and/or floppy disk drive to the system.
3. Depending upon your system's configuration, your system may have one or more drives already installed. If you need to install SATA drives, please refer to Chapter 6.

### ***Checking the Airflow***

1. Airflow is provided by four 8-cm center chassis cooling fans. An air shroud is also included in the system to maximize airflow. The system component layout was carefully designed to direct sufficient cooling airflow to the components that generate the most heat.
2. Note that all power and data cables have been routed in such a way that they do not block the airflow generated by the fans.

### ***Providing Power***

1. Plug the power cord(s) from the power supply unit(s) into a high-quality power strip that offers protection from electrical noise and power surges. It is recommended that you use an uninterruptible power supply (UPS).
2. Depress the power on button on the front of the chassis.

## Chapter 3. System Interface

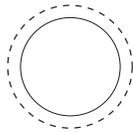
### 3-1 Overview

There are several LEDs on the control panel as well as others on the Serial ATA drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. There are also two buttons on the chassis control panel.

### 3-2 Control Panel Buttons

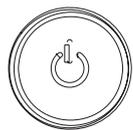
The two push-buttons located on the front of the chassis are (in order from left to right) a reset button and a power on/off button.

RESET



**Reset**

Use the reset button to reboot the system.



**Power**

This is the main power button, which is used to apply or turn off the main system power. Turning off system power with this button removes the main power but keeps standby power supplied to the system.

### 3-3 Control Panel LEDs

The control panel located on the front of the chassis has several 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.



#### Power Fail

Indicates a power supply module has failed. The second power supply module will take the load and keep the system running but the failed module will need to be replaced. Refer to Chapter 6 for details on replacing the power supply. This LED should be off when the system is operating normally.



#### Overheat/Fan Fail:

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



#### NIC1

Indicates network activity on the JLAN1 port when flashing.



#### NIC2

Indicates network activity on the JLAN2 port when flashing.



## HDD

Indicates IDE channel activity. On the bullx R423-E2, this LED indicates SATA and/or DVD-ROM 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 Drive Carrier LEDs

#### SATA Drives

Each SATA drive carrier has two LEDs:

- **Green:** When illuminated, the green LED on the Serial ATA drive carrier indicates drive activity. A connection to the SATA backplane enables this LED to blink on and off when that particular drive is being accessed. Please refer to Chapter 6 for instructions on replacing failed SATA drives.
- **Red:** The red LED to indicate an SATA drive failure. If one of the SATA drives fails, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed SATA drives.

## Notes

## Chapter 4. System Safety

### 4-1 Electrical Safety Precautions



Basic electrical safety precautions should be followed to protect yourself from harm and the bullx R423-E2 from damage:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.
- Do not work alone when working with high voltage components.
- Power should always be disconnected from the system when removing or installing main system components, such as the serverboard, memory modules and floppy drive. When disconnecting power, you should first power down the system with the operating system first and then unplug the power cords of all the power supply units in the system.
- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power if necessary.
- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.
- Do not use mats designed to decrease static electrical discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.
- The power supply power cords must include a grounding plug and must be plugged into grounded electrical outlets.

- Serverboard Battery: **CAUTION** - There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarities (see Figure 4-1). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
- CD-ROM Laser: **CAUTION** - this server may have come equipped with a CD-ROM drive. To prevent direct exposure to the laser beam and hazardous radiation exposure, do not open the enclosure or use the unit in any unconventional way.
- Mainboard replaceable soldered-in fuses: Self-resetting PTC (Positive Temperature Coefficient) fuses on the mainboard must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact technical support for details and support.

## 4-2 General Safety Precautions



Follow these rules to ensure general safety:

- Keep the area around the bullx R423-E2 clean and free of clutter.
- The bullx R423-E2 weighs approximately 57 lbs (25.9 kg.) when fully loaded. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.
- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.
- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.

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

### 4-3 ESD Precautions



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

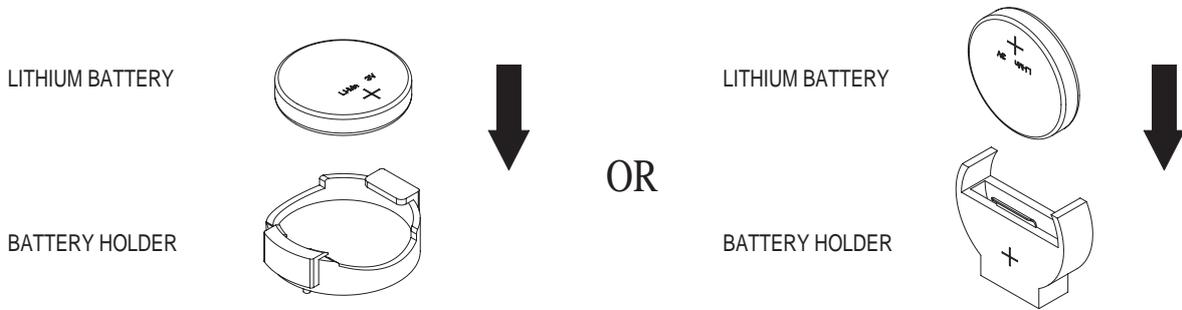
- Use a grounded wrist strap designed to prevent static discharge.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

## 4-4 Operating Precautions



Care must be taken to assure that the chassis cover is in place when the bullx R-23-E2 is operating to assure proper cooling. Out of warranty damage to the system can occur if this practice is not strictly followed.

**Figure 4-1. Installing the Onboard Battery**



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

## Chapter 5. Advanced Motherboard Setup

This chapter covers the steps required to install the bullx R423-E2 mother-board into the chassis, connect the data and power cables and install add-on cards. All motherboard jumpers and connections are also described. A layout and quick reference chart are included in this chapter for your reference. Remember to completely close the chassis when you have finished working with the motherboard to better cool and protect the system.

### 5-1 Handling the Motherboard

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

#### Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the motherboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the motherboard.

## Unpacking

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

## 5-2 Motherboard Installation

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

### *Installing to the Chassis*

1. Access the inside of the system by removing the screws from the back lip of the top cover of the chassis, then pull the cover off.
2. The motherboard requires a chassis big enough to support a 13.68" x 13.05" motherboard.
3. Make sure that the I/O ports on the motherboard align properly with their respective holes in the I/O shield at the back of the chassis.
4. Carefully mount the motherboard to the motherboard tray by aligning the board holes with the raised metal standoffs that are visible in the chassis.
5. Insert screws into all the mounting holes on your motherboard that line up with the standoffs and tighten until snug (if you screw them in too tight, you might strip the threads). Metal screws provide an electrical contact to the motherboard ground to provide a continuous ground for the system.
6. Finish by replacing the top cover of the chassis.

## 5-3 Connecting the Motherboard

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

### Connecting Data Cables

The cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the flow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). The following data cables (with their locations noted) should be connected. (See the layout figure 5-4 on page 5-13 for connector locations.)

- SATA drive data cables (I-SATA0 ~ I-SATA5)
- Control Panel cable (JF1)
- DVD-ROM drive cable (IDE#1)
- USB cable (USB2/3)
- COM Port cable (COM2)

**Important!** Make sure the cables do not come into contact with the fans.

### Connecting Power Cables

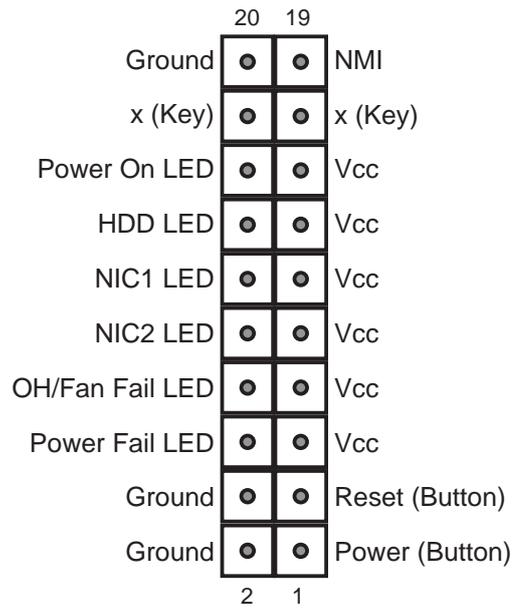
The bullx R423-E2 motherboard has a 24-pin primary power supply connector (JPW1) for connection to the ATX power supply. In addition, there is a 4-pin secondary power connector (JPW2) as well as an 8-pin processor power connector (JPW3) that must be connected to your power supply. See Section 5-9 for power connector pin definitions.

### Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators.

All JF1 wires have been bundled into a single cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis. See figure 5-1 on page 5-4 for details and pin descriptions.

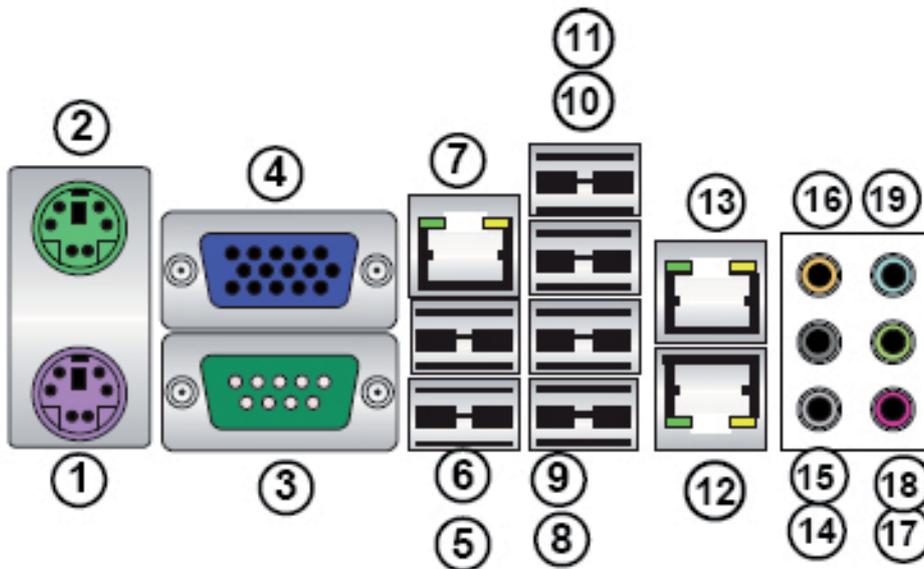
**Figure 5-1. Control Panel Header Pins**



## 5-4 Back Panel Connectors/IO Ports

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

**Figure 5-2. Back Panel Connectors/IO Ports**



| <b>Back Panel Connectors</b> |                        |
|------------------------------|------------------------|
| 1                            | Keyboard (Purple)      |
| 2                            | PS/2 Mouse (Green)     |
| 3                            | COM Port 1 (Turquoise) |
| 4                            | VGA (Blue)             |
| 5                            | USB 0                  |
| 6                            | USB 1                  |
| 7                            | IPMI_Dedicated LAN     |
| 8                            | USB 2                  |
| 9                            | USB 3                  |
| 10                           | USB 4                  |
| 11                           | USB 5                  |
| 12                           | LAN 1                  |
| 13                           | LAN 2                  |
| 14                           | Side_surround          |
| 15                           | Black_surround         |
| 16                           | CEN/LFE                |
| 17                           | Microphone_In          |
| 18                           | Front                  |
| 19                           | Line_In                |

## 5-5 Installing the Processors and Heat Sinks



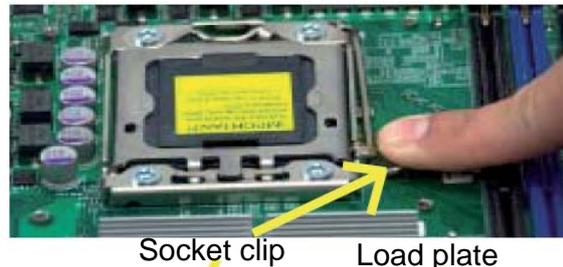
When handling the processor package, avoid placing direct pressure on the label area of the fan.

### Notes:

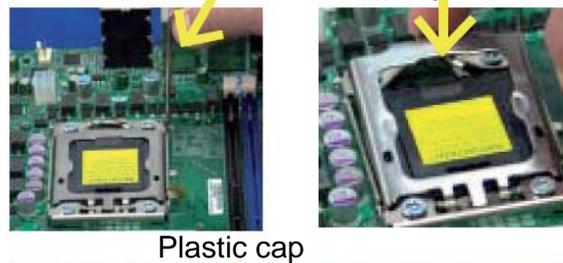
1. Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.
2. Make sure to install the motherboard into the chassis before you install the CPU heatsink and heatsink fans.
3. When purchasing a 5500 Series processor or when receiving a motherboard with a 5500 Series processor 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.
4. Refer to the **Serverboard Features** Section on page 1-2 for more details on CPU support.

### Installing an LGA 1366 Processor

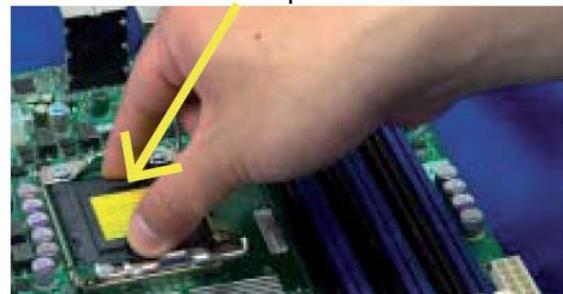
1. Press the socket clip to release the load plate, which covers the CPU socket, from its locking position..



2. Gently lift the socket clip to open the load plate.



3. Hold the plastic cap at its north and south center edges to remove it from the CPU socket.



4. After removing the plastic cap, using your thumb and the index finger, hold the CPU at the north and south center edges.

5. Align the CPU key, the semi-circle cutout, against the socket key, the notch below the gold color dot on the side of the socket.

6. Once both the CPU and the socket are aligned, carefully lower the CPU straight down into the socket. (Do not rub the CPU against the surface of the socket or its pins to avoid damaging the CPU or the socket.)

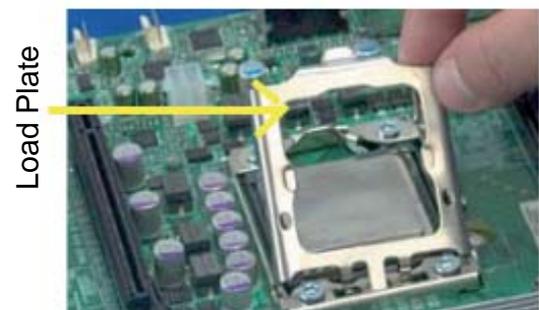
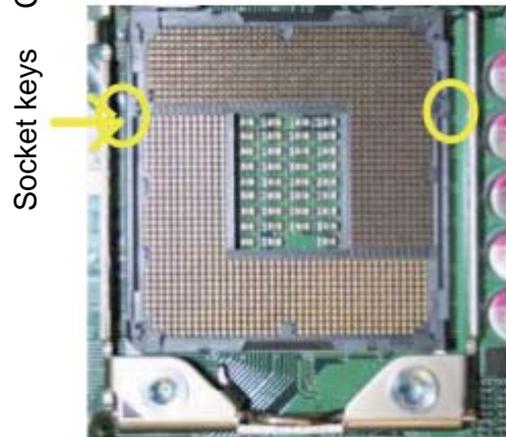
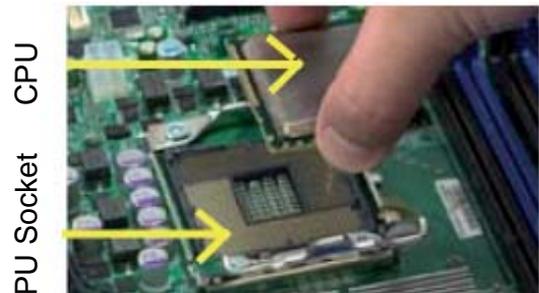
7. With the CPU inside the socket, inspect the four corners of the CPU to make sure that the CPU is properly installed..

8. Once the CPU is securely seated on the socket, lower the CPU load plate to the socket.

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

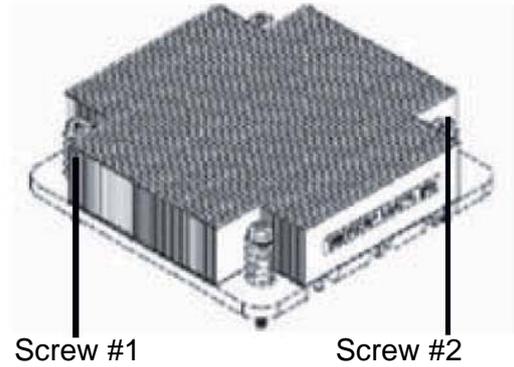


**Warning:** Please save the plastic cap. The motherboard must be shipped with the plastic cap properly installed to protect the CPU socket pins. Shipment without the plastic cap properly installed will cause damage to the socket pins..

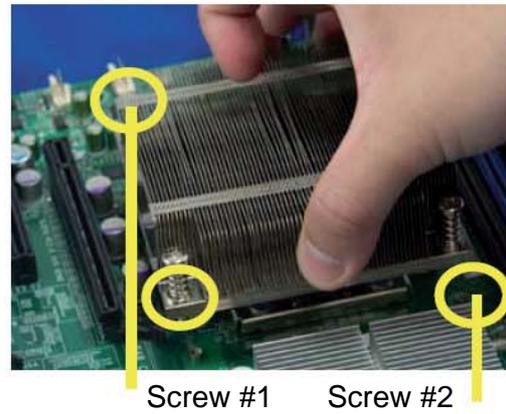


## Installing a CPU Heatsink

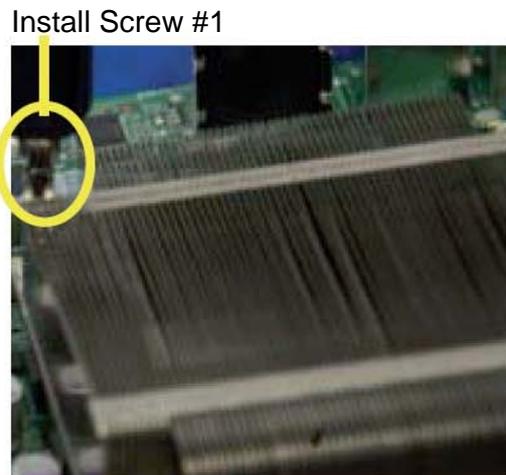
1. Do not apply any thermal grease to the heatsink or the CPU die because the required amount has already been applied.



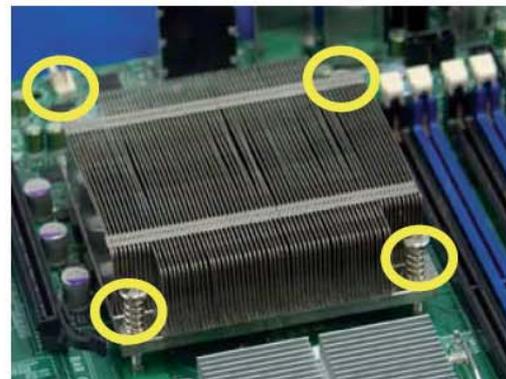
2. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the retention mechanism.



3. Install two diagonal screws (ie the #1 and the #2 screws) and tighten them until just snug (-do not fully tighten the screws to avoid possible damage to the CPU.)



4. Finish the installation by fully tightening all four screws.



## Removing the Heatsink



**Warning:** We do not recommend that the CPU or the heatsink be removed. However, if you do need to remove the heatsink, please follow the instructions below to uninstall the heatsink and prevent damage to the CPU or other components.

1. Unplug the power cord from the power supply.

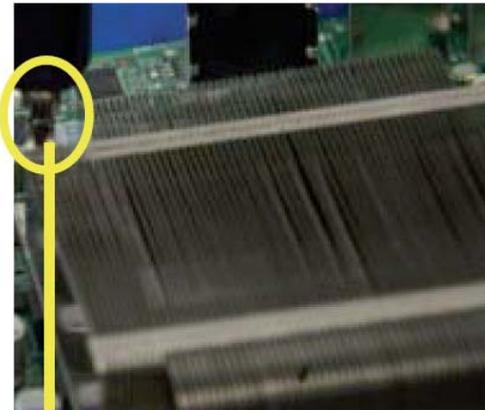
2. Disconnect the heatsink fan wires from the CPU fan header.

3. Using a screwdriver, loosen and remove the heatsink screws from the motherboard in the sequence as show in the picture on the right.

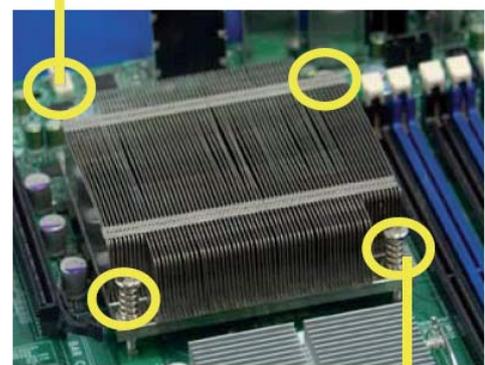
4. Hold the heatsink as shown in the picture on the right and gently wriggle the heatsink to loosen it from the CPU. (Do not use excessive force when wriggling the heatsink.)

5. Once the heatsink is loosened, remove it from the CPU socket.

6. To reinstall the CPU and the heatsink, 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 reinstalling them on the motherboard.



Using a screwdriver to remove Screw #1



Remove Screw #2



## 5-6 Installing Memory



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

### Memory Support

The bullx R423-E2 motherboard supports up to 144 GB Registered ECC DDR3 1333 MHz/1066 MHz/800 MHz in 18 DIMMs.

**Note:** Memory speed support depends on the type of CPU used.

#### Installing Memory Modules

For memory to work properly, follow the tables below for memory installation:

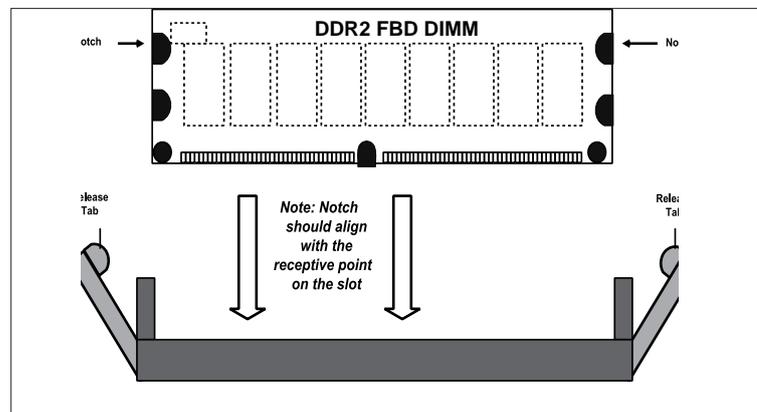
| Memory Population for Optimal Performance<br>For a motherboard with One CPU (CPU1) installed<br>(to populate P1-DIMM slots) |          |       |       |          |       |       |          |       |       |
|---|----------|-------|-------|----------|-------|-------|----------|-------|-------|
|   | Branch 0 |       |       | Branch 1 |       |       | Branch 2 |       |       |
| 3 DIMMs   | P1-1A    |       |       | P1-1B    |       |       | P1-1C    |       |       |
| 6 DIMMs   | P1-1A    | P1-2A |       | P1-1B    | P1-2B |       | P1-1C    | P1-2C |       |
| 9 DIMMs   | P1-1A    | P1-2A | P1-3A | P1-1B    | P1-2B | P1-3B | P1-1C    | P1-2C | P1-3C |

| Memory Population for Optimal Performance<br>For a motherboard with One CPU (CPU2) installed<br>(to populate P2-DIMM slots) |          |       |       |          |       |       |          |       |       |
|---|----------|-------|-------|----------|-------|-------|----------|-------|-------|
|   | Branch 0 |       |       | Branch 1 |       |       | Branch 2 |       |       |
| 3 DIMMs   | P2-1A    |       |       | P2-1B    |       |       | P2-1C    |       |       |
| 6 DIMMs   | P2-1A    | P2-2A |       | P2-1B    | P2-2B |       | P2-1C    | P2-2C |       |
| 9 DIMMs   | P2-1A    | P2-2A | P2-3A | P2-1B    | P2-2B | P2-3B | P2-1C    | P2-2C | P2-3C |

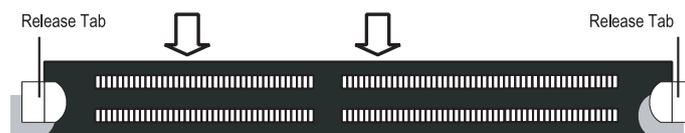
| Memory Population for Optimal Performance<br>For a motherboard with Two CPUs installed |                             |    |    |          |    |    |         |    |    |                             |    |    |          |    |    |          |    |    |
|--|-----------------------------|----|----|----------|----|----|---------|----|----|-----------------------------|----|----|----------|----|----|----------|----|----|
|  | CPU1 (to populate P1-DIMMs) |    |    |          |    |    |         |    |    | CPU2 (to populate P2-DIMMs) |    |    |          |    |    |          |    |    |
|  | Branch 0                    |    |    | Branch 1 |    |    | Branch2 |    |    | Branch 0                    |    |    | Branch 1 |    |    | Branch 2 |    |    |
| 6 DIMMs  | 1A                          |    |    | 1B       |    |    | 1C      |    |    | 1A                          |    |    | 1B       |    |    | 1C       |    |    |
| 12 DIMMs   | 1A                          | 2A |    | 1B       | 2B |    | 1C      | 2C |    | 1A                          | 2A |    | 1B       | 2B |    | 1C       | 2C |    |
| 18 DIMMs   | 1A                          | 2A | 3A | 1B       | 2B | 3B | 1C      | 2C | 3C | 1A                          | 2A | 3A | 1B       | 2B | 3B | 1C       | 2C | 3C |

| Memory Population Table |                             |                              |                 |   |
|-------------------------|-----------------------------|------------------------------|-----------------|---|
| DIMM Slots per Channel  | DIMMS Populated per Channel | DIMM Type<br>Reg.=Registered | Speeds (in MHz) | Ranks per DIMM<br>Any combination:<br>SR=Single Rank,<br>DR=Dual Rank,<br>QR=Quad Rank. |
| 3                       | 1                           | Reg. DDR3 ECC                | 800, 1066, 1333 | SR, DR  |
| 3                       | 1                           | Reg. DDR3 ECC                | 800, 1066       | QR  |
| 3                       | 2                           | Reg. DDR3 ECC                | 800, 1066       | SR, DR  |
| 3                       | 2                           | Reg. DDR3 ECC                | 800             | SR, DR, QR  |
| 3                       | 3                           | Reg. DDR3 ECC                | 800             | SR, DR  |

Figure 5-3. DIMM Installation



Top View of DDR2 Slot



**To Install:** Insert module vertically and press down until it snaps into place. Pay attention to the bottom notches.

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

## 5-7 Adding PCI Add-On Cards

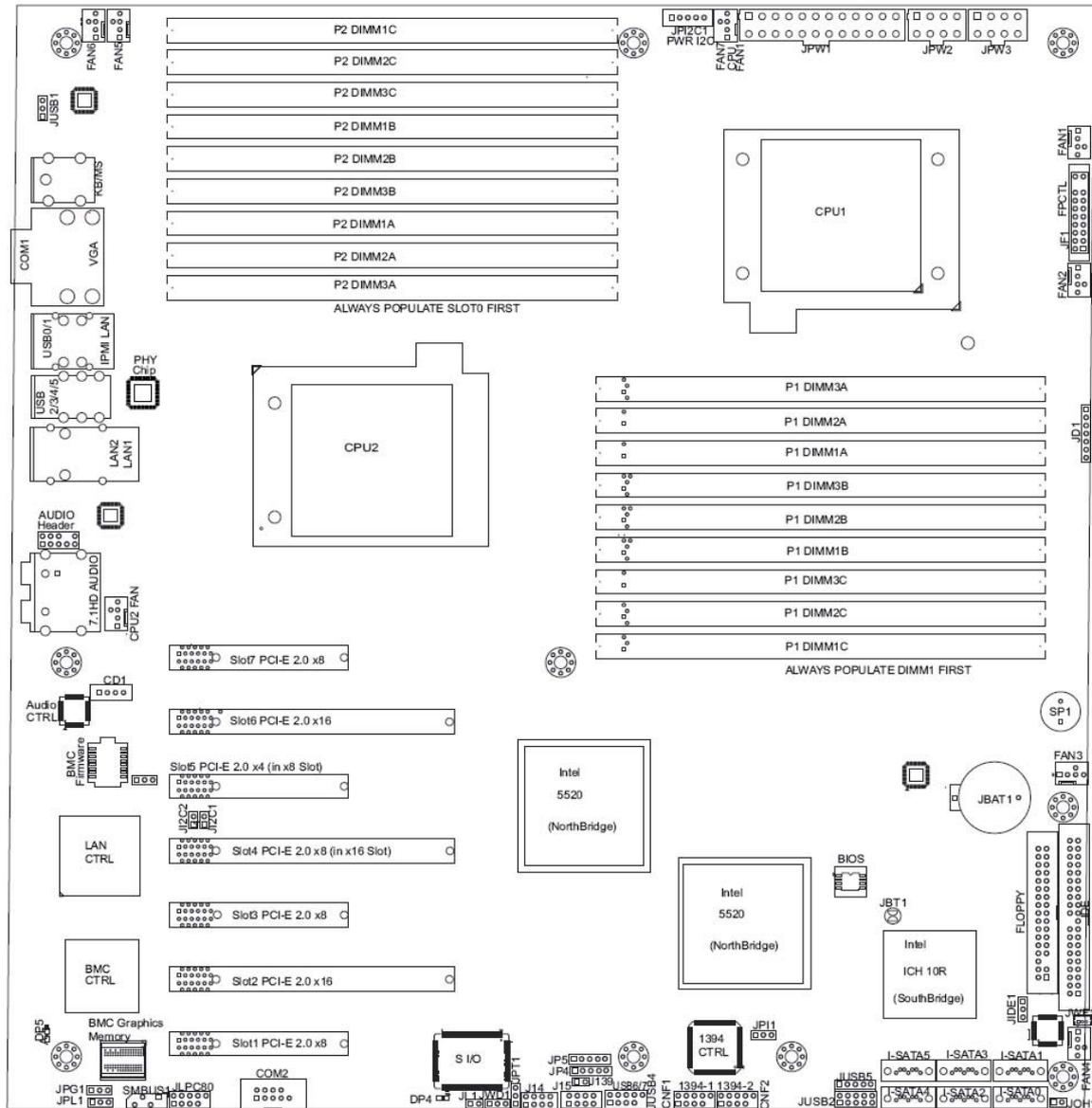
The bullx R423-E2 can accommodate four PCI-E 2.0 x8 (Slots 1, 3, 7 and 4), two PCI-E 2.0 x16 (Slots 2 and 6) and one PCI-E 2.0 x4 (Slot 5). All cards must be low-profile.

### *Installing an Add-on Card*

1. Begin by removing the shield for the PCI slot you wish to populate.
2. Fully seat the card into the slot, pushing down with your thumbs evenly on both sides of the card.
3. Finish by using a screw to secure the top of the card shield to the chassis. The PCI slot shields protect the motherboard and its components from EMI and aid in proper ventilation, so make sure there is always a shield covering each unused slot.

## 5-8 Motherboard Details

Figure 5-4. bullx R423-E2 Motherboard Layout  
(not drawn to scale)



- Notes:**
1. Jumpers not indicated are for test purposes only.
  2. "■" indicates the location of Pin 1.
  3. When DP4 is on, the onboard power connection is on. Make sure to unplug the power cables before removing or installing components.



**WARNING:**

1. To prevent damage to the power supply or motherboard, please use a power supply that contains a 24-pin and two 8-pin power connectors. Be sure to connect these connectors to the 24-pin (JPW1) and the two 8-pin (JPW2,JPW3) power connectors on the motherboard.
2. To prevent system overheating, be sure to provide adequate airflow to the system.

**bullx R423-E2 Motherboard Quick Reference**

| <b>Jumper</b>                         | <b>Description</b>     | <b>Default Setting</b> |
|---------------------------------------|------------------------|------------------------|
| JBT1                                  | CMOS Clear             | Open (Normal)          |
| JIDE1                                 | Compact Flash Enabled  | Pins 1-2 (Enabled)     |
| JI <sup>2</sup> C1/JI <sup>2</sup> C2 | SMB to PCI/PCI-E Slots | Open/Open (Disabled)   |
| JPG1                                  | VGA Enable             | Pins 1-2 (Enabled)     |
| JPI1                                  | 1394-1/1394 Enable     | Pins 1-2 (Enabled)     |
| JPL1                                  | LAN1/2 Enable          | Pins 1-2 (Enabled)     |
| JPUSB1                                | Backpanel USB Enable   | Pins 2-3 (Disabled)    |
| JWD1                                  | Watch Dog              | Pins 1-2 (Reset)       |

| <b>Connector</b>         | <b>Description</b>   |
|--------------------------|--|
| CNF1/CNF2                | 1394a-1/2 Ports  |
| Audio Connections        | BP 7.1 HD Audio, BP Audio Header, CD_In  |
| COM1/COM2                | Backplane Serial Port/FP Serial Header   |
| FAN 1-8                  | System/CPU Fan Headers (Fans 7~8: CPU Fans 1/2)  |
| Floppy                   | Floppy Drive   |
| IDE                      | IDE Drive  |
| JD1                      | PWR LED/Speaker Header (Pins 1~3: Power LED, Pins 6~7: Onboard Buzzer, Pins 4~7: External Speaker) |
| JF1                      | Front Panel Connector  |
| JL1                      | Chassis Intrusion Header   |
| JOH1                     | Overheat LED Header  |
| JPPC                     | Power Supply SMBbus I <sup>2</sup> C Header  |
| JPW1, JPW2/JPW3          | 24-pin ATX PWR, 8-pin Secondary PWR  |
| LAN1/2,<br>Dedicated LAN | G-LAN (RJ45) Ports   |
| I-SATA0 ~I-SATA5         | (Intel South Bridge) SATA Ports  |
| SMBUS1                   | System Management Bus Header   |
| SP1                      | Onboard Buzzer/Internal Speaker  |
| USB 0/1, 2~5             | Backpanel Universal Serial Bus (USB) Ports 1/1, 2~5  |
| USB 6/7, 8, 9            | Front Panel (Accessible) USB Ports 6/7 (JUSB4), USB 8 (JUSB2), USB 9 (JUSB5)                       |
| VGA                      | VGA Connector  |
| <b>LED</b>               | <b>Description</b>   |
| DP4                      | Onboard Standby Power LED Indicator  |
| DP5                      | BMC Heartbeat LED Indicator  |

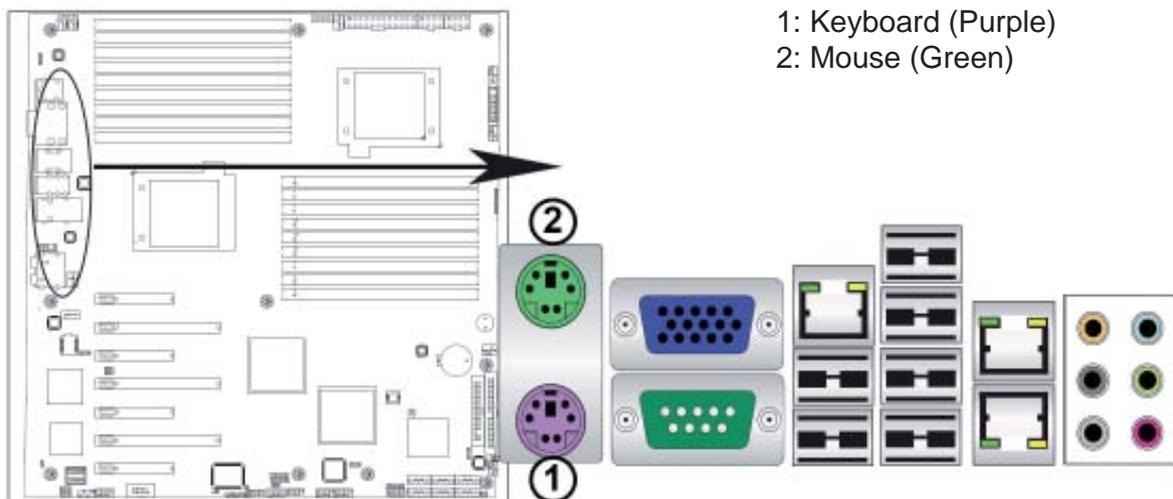
## 5-9 Back Panel Connector Pin Definitions

### ATX PS/2 Keyboard and PS/2 Mouse Ports)

The ATX PS/2 keyboard and PS/2 mouse are located next to the Back Panel COM Port1 and VGA port on the motherboard. See the table at right for pin definitions.

| PS/2 Keyboard/Mouse Pin Definitions |                    |           |                    |
|-------------------------------------|--------------------|-----------|--------------------|
| PS2 Keyboard                        |                    | PS2 Mouse |                    |
| Pin#                                | Definition         | Pin#      | Definition         |
| 1                                   | KB Data            | 1         | Mouse Data         |
| 2                                   | No Connection      | 2         | No Connection      |
| 3                                   | Ground             | 3         | Ground             |
| 4                                   | Mouse/KB VCC (+5V) | 4         | Mouse/KB VCC (+5V) |
| 5                                   | KB Clocl           | 5         | Mouse Clock        |
| 6                                   | No Connection      | 6         | No Connection      |

VCC: with 1.5A PTC (current limit)



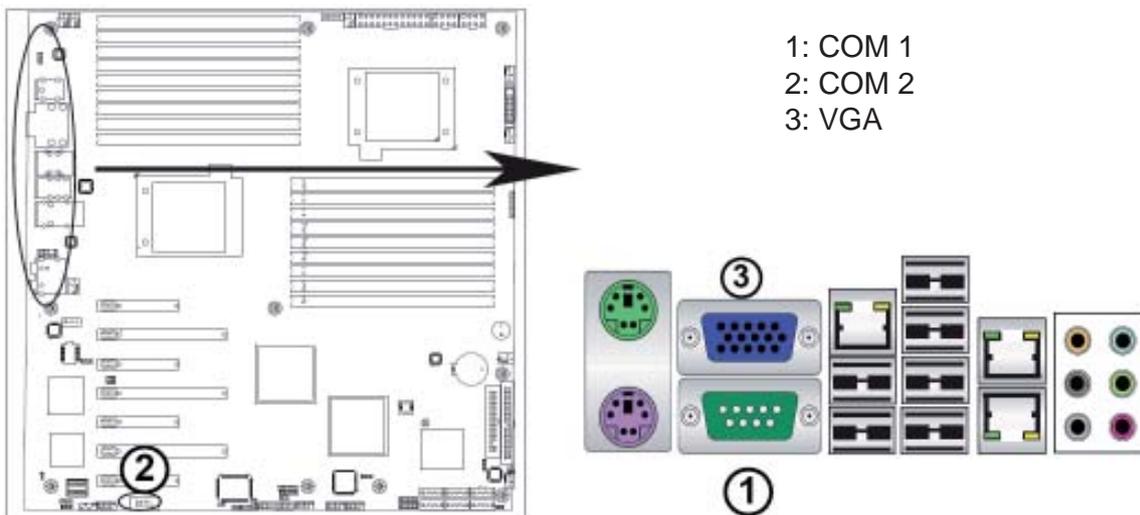
### Serial Ports

Two COM connections (COM1 & COM2) are located on the motherboard. COM1 is located on the Back-plane IO panel. COM2 is located next to PCI-E Slot 1 to provide additional serial connection support. See the table on the right for pin definitions.

| Serial Ports (COM1/COM2)<br>Pin Definitions |            |       |            |
|---|------------|-------|------------|
| Pin #                                       | Definition | Pin # | Definition |
| 1   | DCD        | 6     | DSR        |
| 2   | RXD        | 7     | RTS        |
| 3   | TXD        | 8     | CTS        |
| 4   | DTR        | 9     | RI         |
| 5   | Ground     | 10    | N/A        |

### Video Connector

A Video (VGA) connector is located above COM Port1 on the IO back-plane. This connector is used to provide video display. Refer to the board layout below for the location.



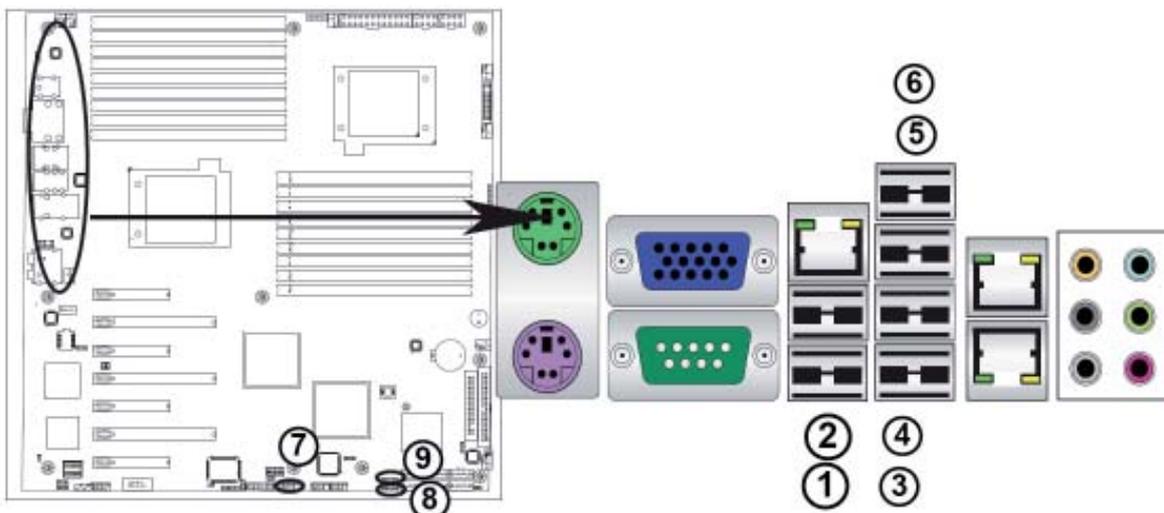
### Universal Serial Bus (USB)

Six Universal Serial Bus ports (USB 0/1, 2~5) are located on the I/O back panel. Additionally, four USB connections (USB 6/7, 8, 9) are on the motherboard to provide front chassis access. (Cables are not included). See the tables on the right for pin definitions.

| Back Panel USB (USB 0/1, 2~5) Pin Definitions |            |
|---|------------|
| Pin #   | Definition |
| 1   | +5V        |
| 2   | PO-        |
| 3   | PO+        |
| 4   | Ground     |
| 5   | N/A        |

| Front Panel USB Pin Definitions (USB6/7, 8/9) |            |         |               |
|---|------------|---------|---------------|
| USB 6/8                                       |            | USB 7/9 |               |
| Pin#  | Definition | Pin #   | Definition    |
| 1   | +5V        | 1       | +5V           |
| 2   | PO-        | 2       | PO-           |
| 3   | PO+        | 3       | PO+           |
| 4   | Ground     | 4       | Ground        |
| 5   | Key        | 10      | No Connection |

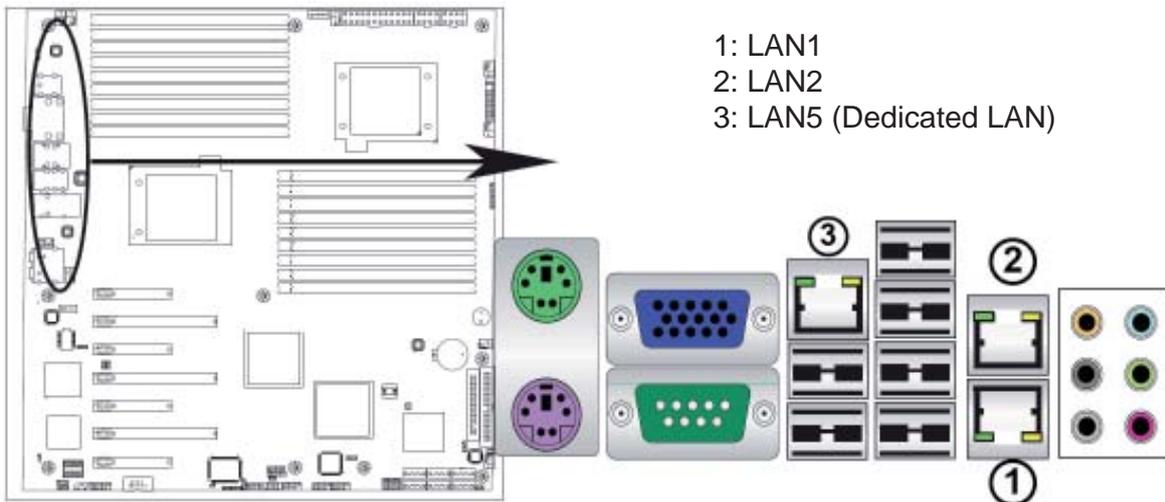
- 1: Backpanel USB 0
- 2: Backpanel USB 1
- 3: Backpanel USB 2
- 4: Backpanel USB 3
- 5: Backpanel USB 4
- 6: Backpanel USB 5
- 7: (JUSB4) front Panel USB 6/7
- 8: (JUSB2) front Panel USB 8
- 9: (JUSB5) front Panel USB 9



**Ethernet Ports**

Two Ethernet ports (LAN 1/LAN2) are located at on the IO backplane. In addition, a dedicated LAN is also located on the R423-E2 to provide KVM support for IPMI 2.0. All these ports accept RJ45 type cables. **(Note:** Please refer to the LED Indicator Section for LAN LED information.)

| LAN Ports Pin Definitions |            |       |                                |
|---------------------------|------------|-------|--------------------------------|
| Pin #                     | Definition | Pin # | Definition                     |
| 1                         | P2V5SB     | 10    | SGND                           |
| 2                         | TD0+       | 11    | Act LED                        |
| 3                         | TD0-       | 12    | P3V3SB                         |
| 4                         | TD1+       | 13    | Link 100 LED (Yellow, +3V3SB)  |
| 5                         | TD1-       | 14    | Link 1000 LED (Yellow, +3V3SB) |
| 6                         | TD2+       | 15    | Ground                         |
| 7                         | TD2-       | 16    | Ground                         |
| 8                         | TD3+       | 17    | Ground                         |
| 9                         | TD3-       | 18    | Ground                         |



**(Back\_Panel) High Definition Audio (HD Audio)**

This motherboard features a 7.1+2 Channel High Definition Audio (HDA) codec that provides 10 DAC channels. The HD Audio connections simultaneously supports multiple-streaming 7.1 sound playback with 2 channels of independent stereo output through the front panel stereo out for front L&R, rear L&R, center and subwoofer speakers. Use the Advanced software included in the CD-ROM with your motherboard to enable this function.

| (BP) HD Audio |                |
|---------------|----------------|
| Conn #        | Signal         |
| 1             | Side_Surround  |
| 2             | Back_Surround- |
| 3             | CEN/LFE        |
| 4             | Microphone_In  |
| 5             | Front          |
| 6             | Line_In        |

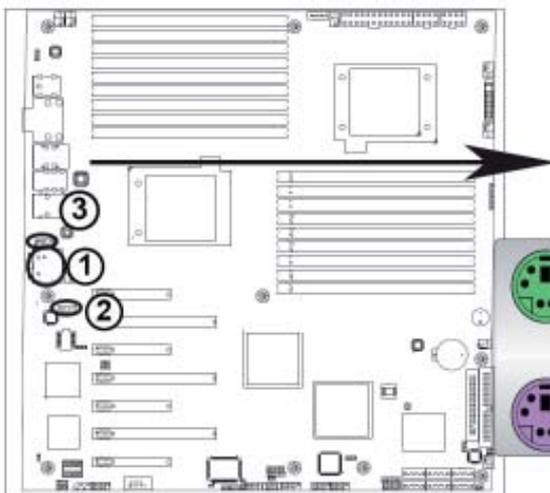


**CD & 10-pin Audio Headers**

A 4-pin CD header (CD1) and a 10-pin Audio header are also located on the motherboard. These headers allow you to use the onboard sound for audio CD playback. Connect an audio cable from your CD drive to the CD header that fits your cable's connector. See the tables at right for pin definitions for these headers..

| CD1 Pin Definition |            |
|--------------------|------------|
| Pin #              | Definition |
| 1                  | Left       |
| 2                  | Ground-    |
| 3                  | Ground     |
| 4                  | Right      |

| (BP) HD Audio |                  |
|---------------|------------------|
| Pin #         | Signal           |
| 1             | Microphone_Left  |
| 2             | Audio_Ground-    |
| 3             | Microphone_Right |
| 4             | Audio_Select     |
| 5             | Line_2_Right     |
| 6             | Ground           |
| 7             | Jack_Detect      |
| 8             | Key              |
| 9             | Line_2_Left      |
| 10            | Ground           |

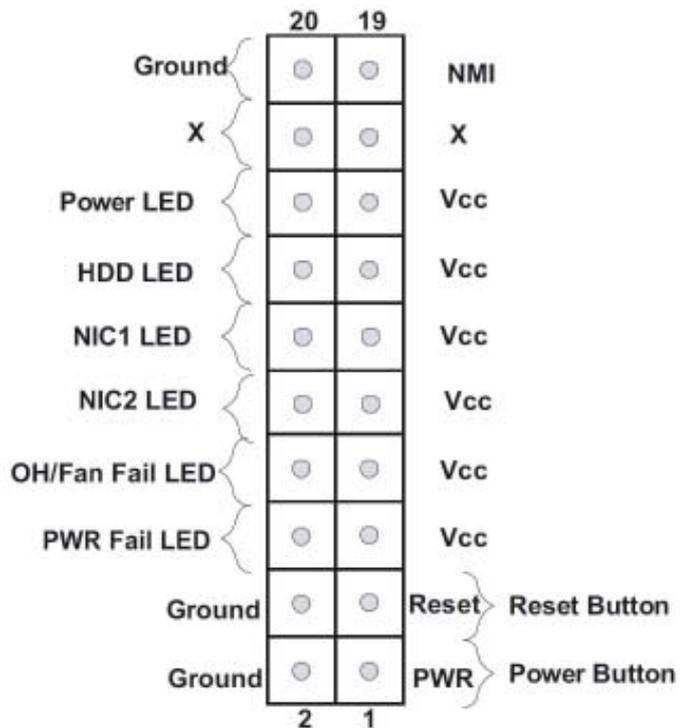
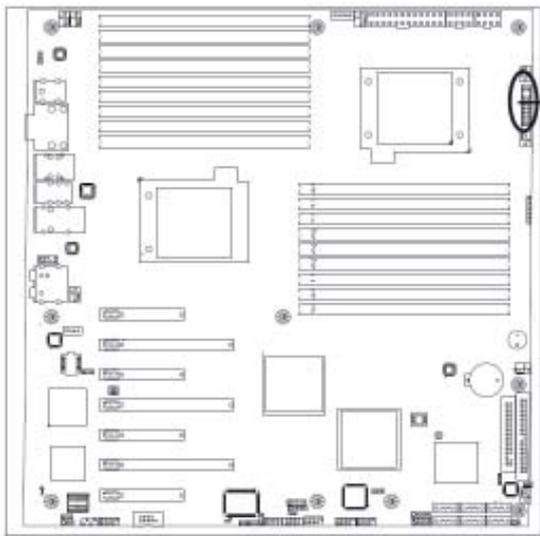


- 1: HD Audio (See the graphics above for details)
- 2: CD1
- 3: 10-pin Audio



## 5-10 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 the R423-E2 server chassis. See the figure below for the descriptions of the various control panel buttons and LED indicators. Refer to the following section for descriptions and pin definitions.



### NMI Button

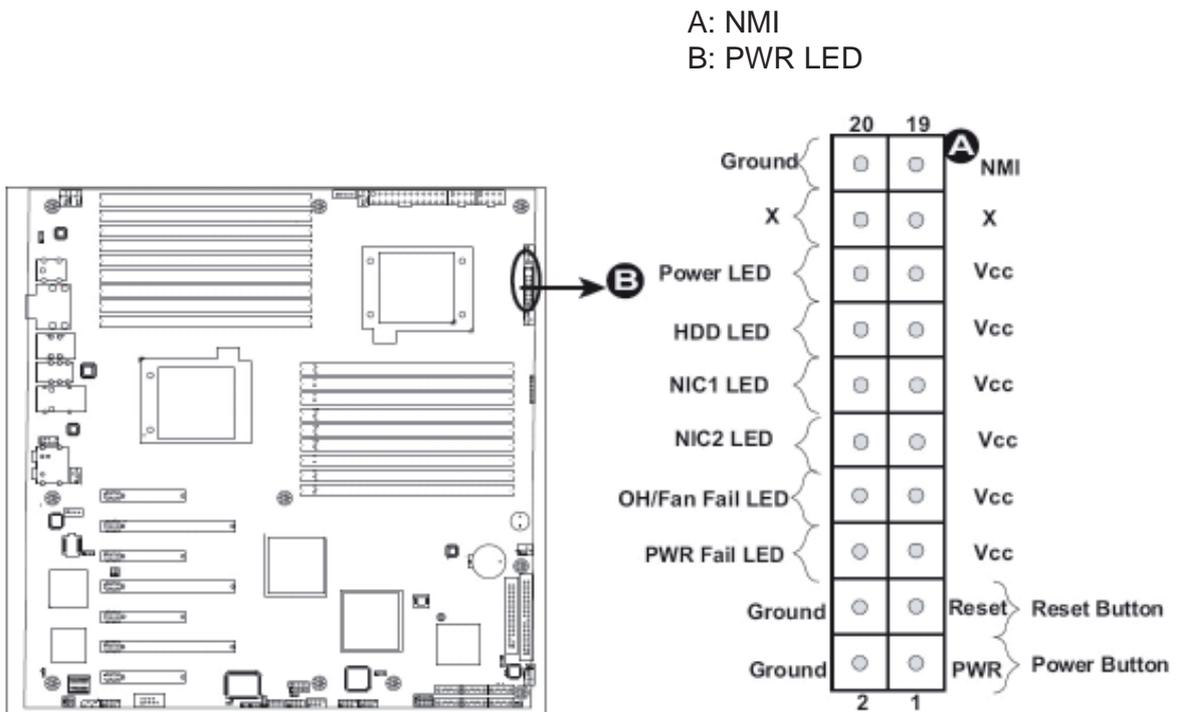
The non-maskable interrupt button header is located on pins 19 and 20 of JF1. Refer to the table on the right for pin definitions.

| NMI Button<br>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<br>Pin Definitions (JF1) |            |
|------------------------------------|------------|
| Pin#                               | Definition |
| 15                                 | +5V        |
| 16                                 | Ground     |



### HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. Attach a cable here to indicate HDD activities. See the table on the right for pin definitions.

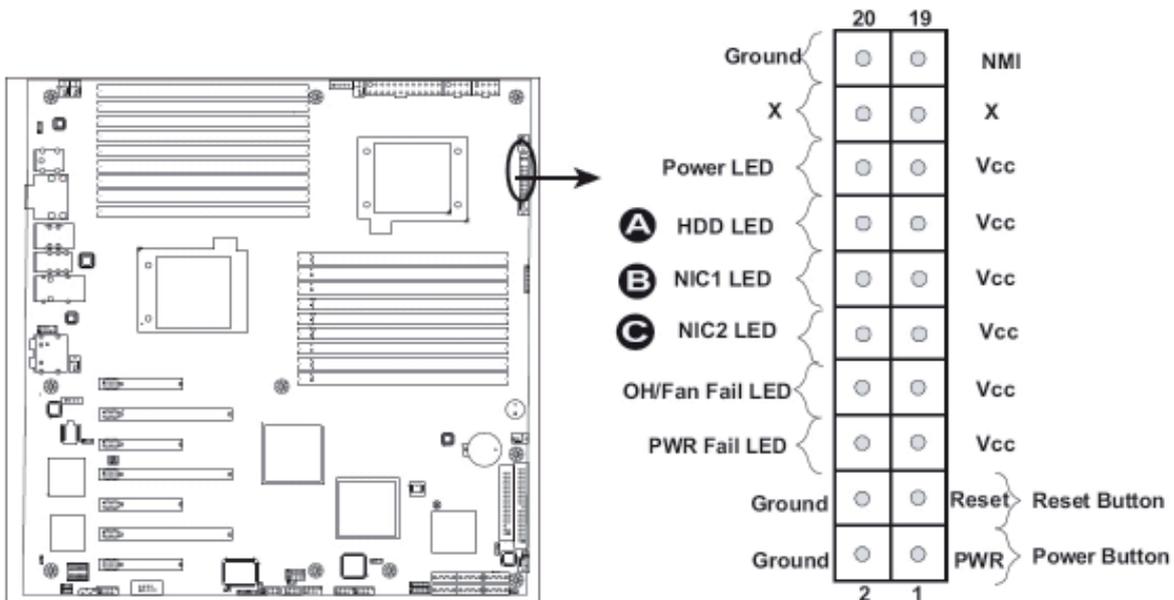
| HDD LED<br>Pin Definitions (JF1) |            |
|----------------------------------|------------|
| Pin#                             | Definition |
| 13                               | +5V        |
| 14                               | HD Active  |

### NIC1/NIC2 LED Indicators

The NIC (Network Interface Controller) LED connection for GLAN port 1 is located on pins 11 and 12 of JF1, and the LED connection for GLAN Port 2 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<br>Pin Definitions (JF1) |            |
|--------------------------------------|------------|
| Pin#                                 | Definition |
| 9/11                                 | Vcc        |
| 10/12                                | Ground     |

A: HDD LED  
B: NIC1 LED  
C: NIC2 LED



### Overheat (OH)/Fan Fail/UID LED

Connect an LED cable to the Front UID and OH/Fan Fail connections on pins 7 and 8 of JF1 to provide advanced warnings for chassis overheat/ fan failure. Refer to the table on the right for pin definitions.

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

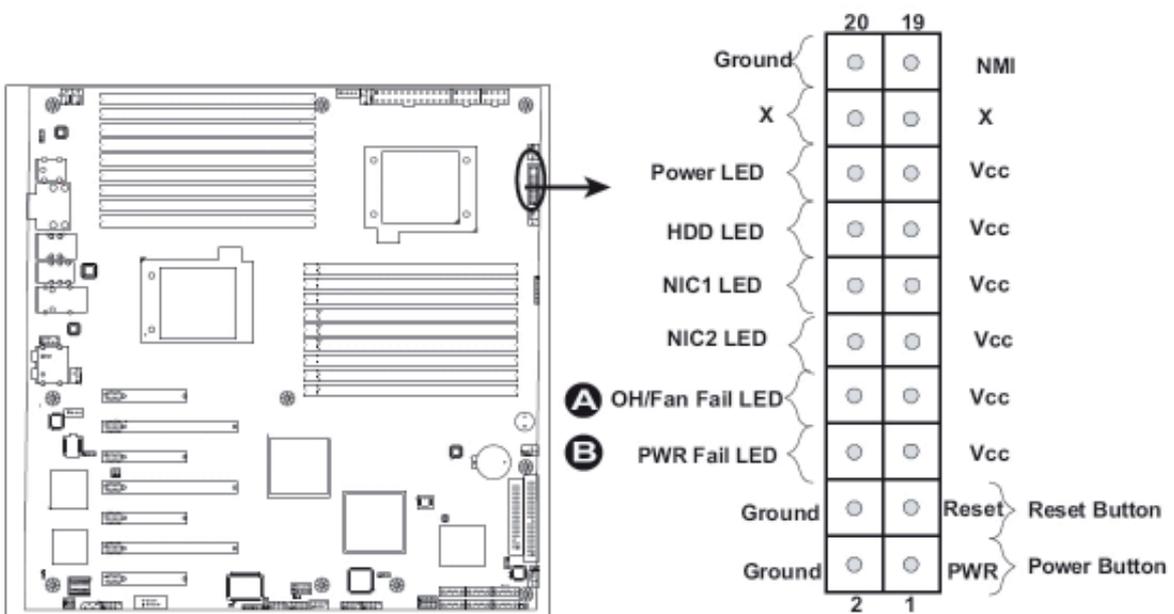
| OH/Fan Fail Indicator Status |            |
|------------------------------|------------|
| State                        | Definition |
| Off                          | Normal     |
| On                           | Overheat   |
| Flashing                     | Fan Fail   |

### 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: OH/Fan Fail & UID LED  
 B: PWR Supply Fail



### Reset Button

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

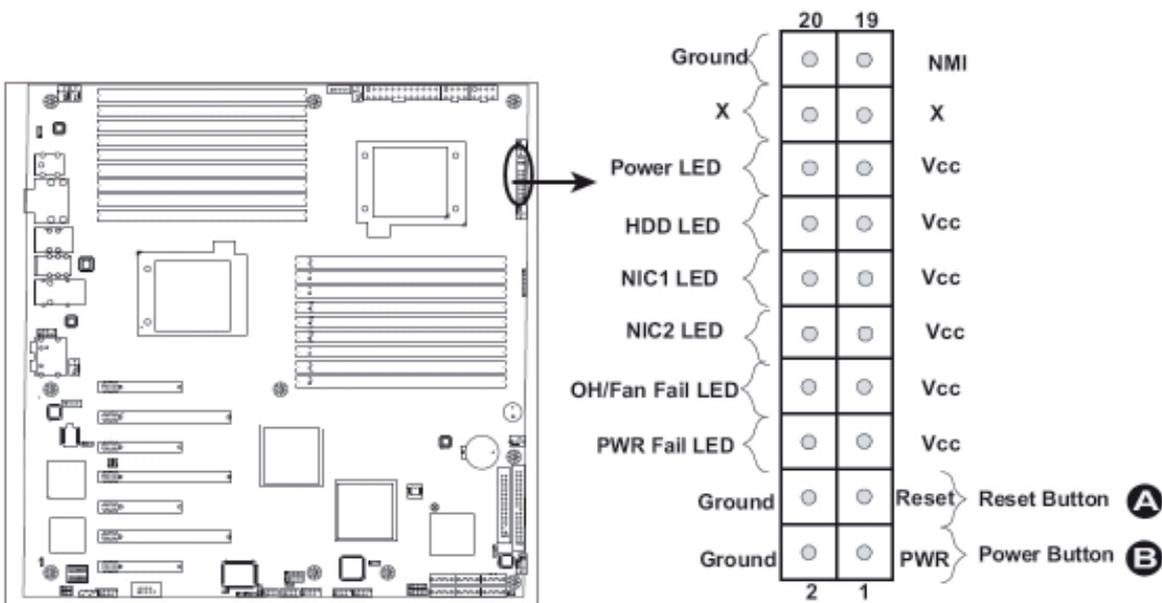
| Reset Button Pin Definitions (JF1) |            |
|------------------------------------|------------|
| Pin#                               | Definition |
| 3                                  | Reset      |
| 4                                  | Ground     |

### 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 the BIOS). 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 |

A: Reset Button  
 B: PWR Button



## 5-11 Connecting Cables

### Power Connectors

A 24-pin main power supply connector (JPW1) and two 8-pin CPU PWR connectors (JPW2/JPW3) on the motherboard. These power connectors meet the SSI EPS 12V specification. In addition to the 24-pin ATX power connector, the 12V 8-pin CPU PWR connectors at JPW2/JPW3 must also be connected to your power supply. See the table on the right for pin definitions.



**Warning:** To prevent damage to the power supply or motherboard, please use a power supply that contains a 24-pin and two 8-pin power connectors. Be sure to connect these connectors to the 24-pin (JPW1) and the two 8-pin (JPW2,JPW3) power connectors on the motherboard. Failure in doing so will void the manufacturer warranty on your power supply and motherboard.

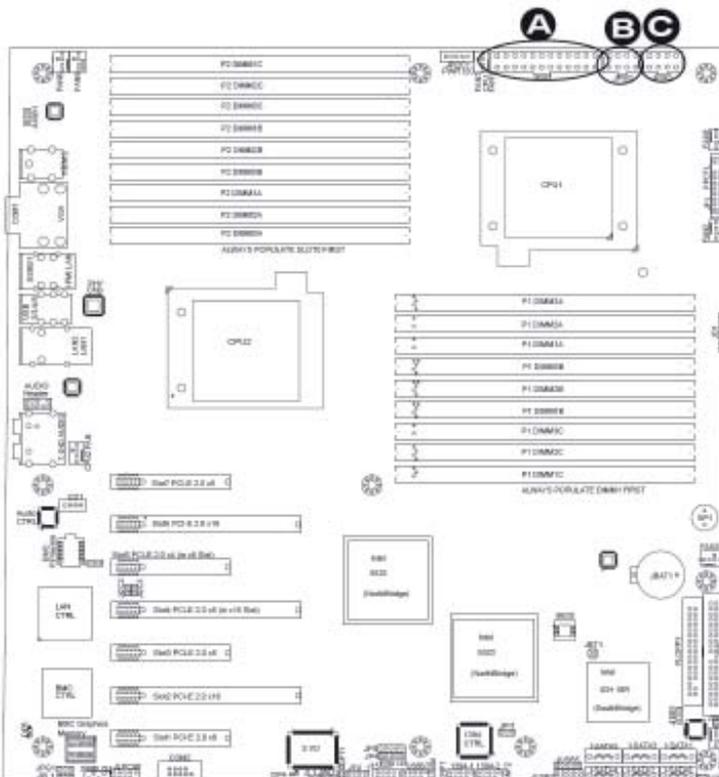
**ATX Power 24-pin Connector  
Pin Definitions**

| Pin# | Definition | Pin # | Definition |
|------|------------|-------|------------|
| 13   | +3.3V      | 1     | +3.3V      |
| 14   | -12V       | 2     | +3.3V      |
| 15   | COM        | 3     | COM        |
| 16   | PS_ON      | 4     | +5V        |
| 17   | COM        | 5     | COM        |
| 18   | COM        | 6     | +5V        |
| 19   | COM        | 7     | COM        |
| 20   | Res (NC)   | 8     | PWR_OK     |
| 21   | +5V        | 9     | 5VSB       |
| 22   | +5V        | 10    | +12V       |
| 23   | +5V        | 11    | +12V       |
| 24   | COM        | 12    | +3.3V      |

**+12V 8-pin Power Connector-  
Pin Definitions**

| Pins        | Definition |
|-------------|------------|
| 1 through 4 | Ground     |
| 5 through 8 | +12V       |

#### Required Connection



A: 24-pin ATX PWR (Required)  
B/C: 8-pin Processor PWR  
(Required)

### Fan Headers

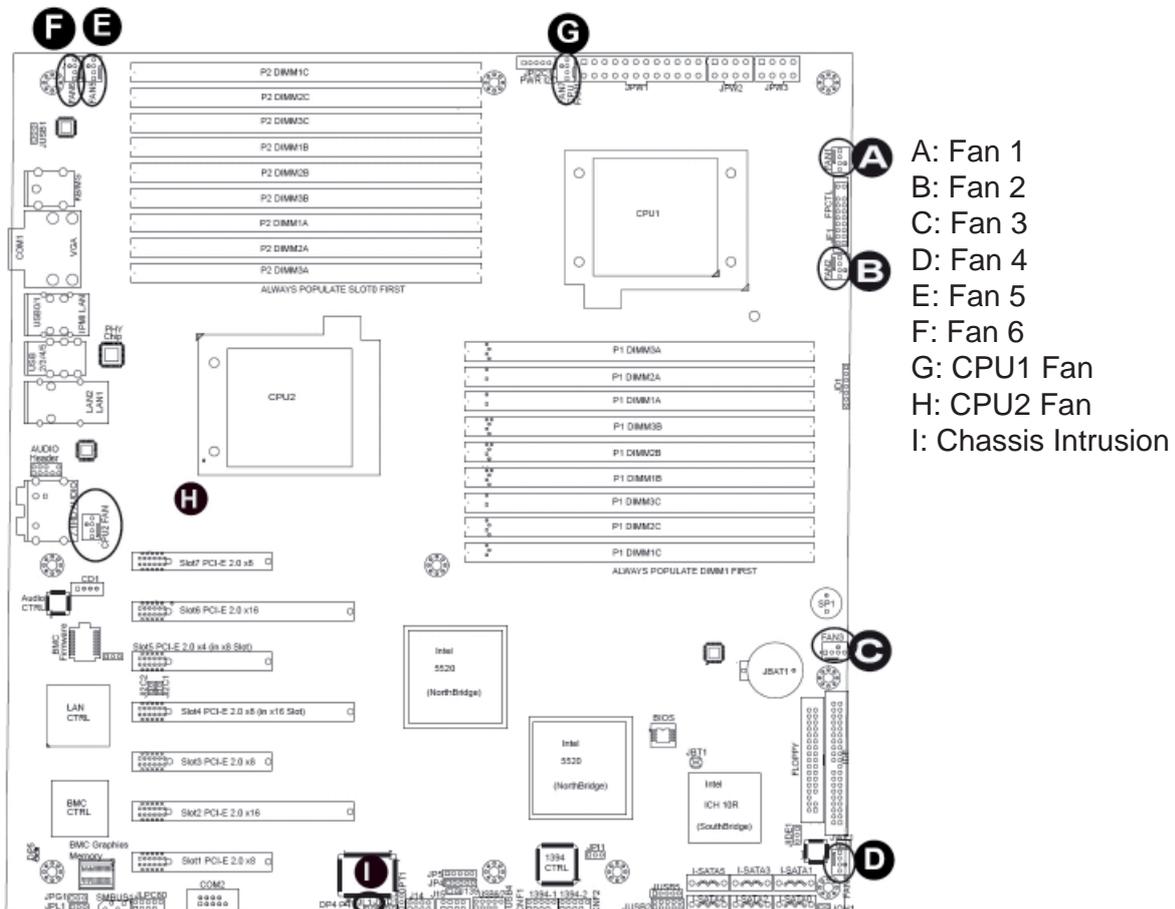
This motherboard has six chassis/system fan headers (Fan 1 to Fan6) and two CPU fans (CPU1 Fan/CPU2 Fan) on the motherboard. All these 4-pin fans headers are backward compatible with the traditional 3-pin fans. However, fan speed control is available for 4-pin fans only. The fan speeds are controlled by Thermal Management via Hardware Monitoring in the Advanced Setting in the BIOS. (The Default setting is Disabled.) See the table on the right for pin definitions..

| Fan Header Pin Definitions |                |
|----------------------------|----------------|
| Pin#                       | Definition     |
| 1                          | Ground         |
| 2                          | +12V           |
| 3                          | Tachometer     |
| 4                          | PWR Modulation |

### Chassis Intrusion

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

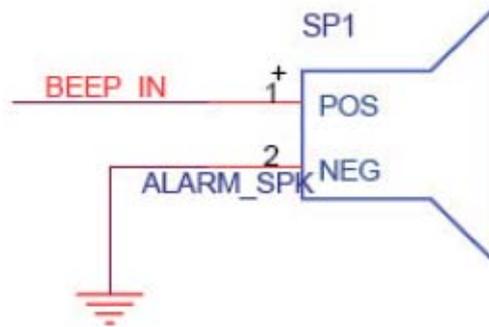
| Chassis Intrusion Pin Definitions (JL1) |                 |
|---|-----------------|
| Pin#                                    | Definition      |
| 1                                       | Intrusion Input |
| 2                                       | Ground          |



### Internal Speaker

The Internal Speaker, located at SP1, can be used to provide audible alarms for various beep codes. See the table on the right for pin definitions. Refer to the layout below for the locations of the Internal Buzzer (SP1).

| Internal Buzzer Pin Definitions |            |               |
|---------------------------------|------------|---------------|
| Pin#                            | Definition |               |
| 1                               | Pos. (+)   | Beep In       |
| 2                               | Neg. (-)   | Alarm Speaker |

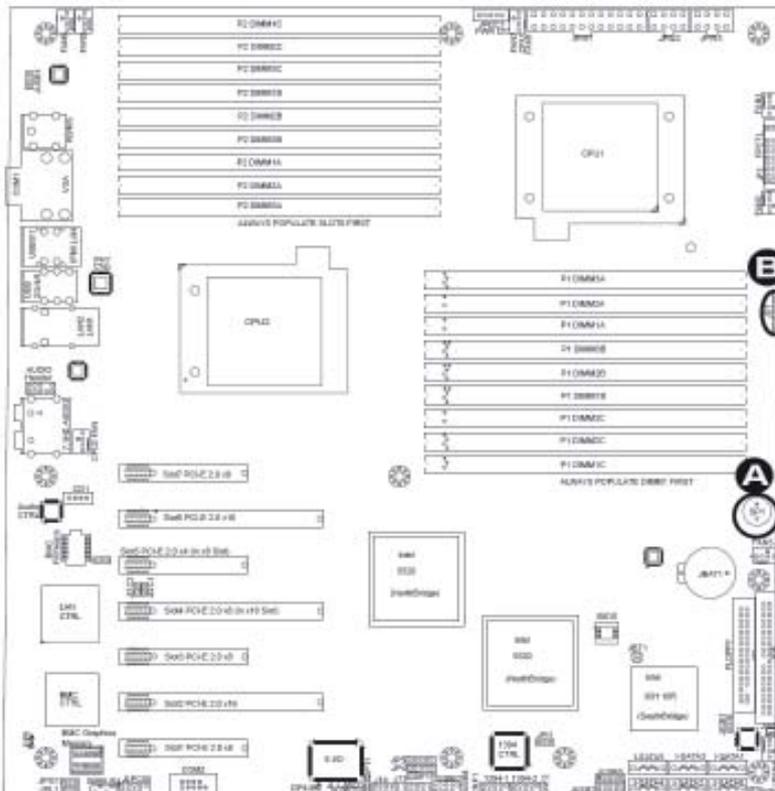


### Power LED/Speaker

On the JD1 header, pins 1-3 are used for power LED indication, and pins 4-7 are for the speaker. See the tables on the right for pin definitions. Please note that the speaker connector pins (4-7) are for use with an external speaker. If you wish to use the onboard speaker, you should close pins 6-7 with a jumper.

| PWR LED Connector Pin Definitions (JF1) |             |
|---|-------------|
| Pin Setting                             | Definition  |
| Pin 1                                   | Anode (+)   |
| Pin 2                                   | Cathode (-) |
| Pin 3                                   | NA          |

| PWR LED Connector Pin Definitions (JF1) |                  |
|---|------------------|
| Pin Setting                             | Definition       |
| Pins 4-7                                | External Speaker |
| Pins 6-7                                | Internal Speaker |



A: Internal Speaker (Buzzer)  
 B: PWR LED/Speaker

### IEEE 1394a Connection

CNF1 and CNF2 provide the IEEE 1394a connections on the motherboard. See the tables on the right for pin definitions..

| CNF1 Pin Definitions |            |      |            |
|----------------------|------------|------|------------|
| Pin#                 | Definition | Pin# | Definition |
| 1                    | PTPA0+     | 2    | PRPA0-     |
| 3                    | GND        | 4    | GNS        |
| 5                    | PTPB0+     | 6    | PTPB0-     |
| 7                    | PWR 1394a  | 8    | PWR 1394a  |
|                      |            | 10   | ZX         |

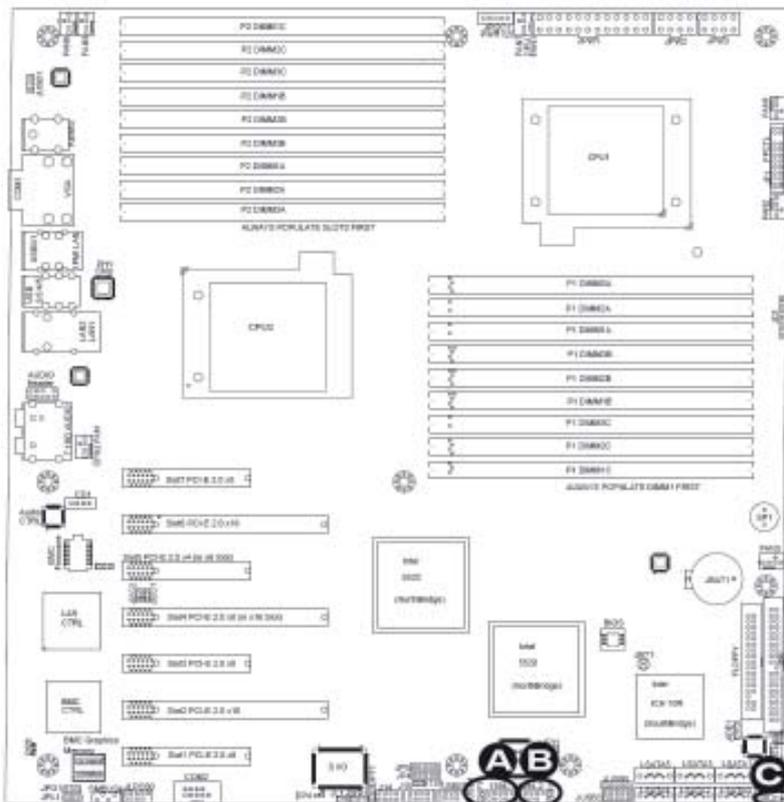
| CNF2 Pin Definitions |            |      |            |
|----------------------|------------|------|------------|
| Pin#                 | Definition | Pin# | Definition |
| 1                    | PTPA1+     | 2    | PRPA1-     |
| 3                    | GND        | 4    | GNS        |
| 5                    | PTPB1+     | 6    | PTPB1-     |
| 7                    | PWR 1394a  | 8    | PWR 1394a  |
|                      |            | 10   | ZX         |

### IOOverheat LED/Fan fail (JOH1)

The JOH1 header is used to connect a LED indicator to provide warnings of chassis overheating or fan failure. This LED will blink when a fan failure occurs. Refer to the tables below for pin definitions..

| OH/Fan Fail LED Pin Definitions |            |
|---------------------------------|------------|
| State                           | Definition |
| Solid                           | Overheat   |
| Blinking                        | Fan fail   |

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



- A: CNF1 (1394a-1)
- B: CNF2 (1394a-2)
- C: Overheat LED (JOH1)

### System Management Bus

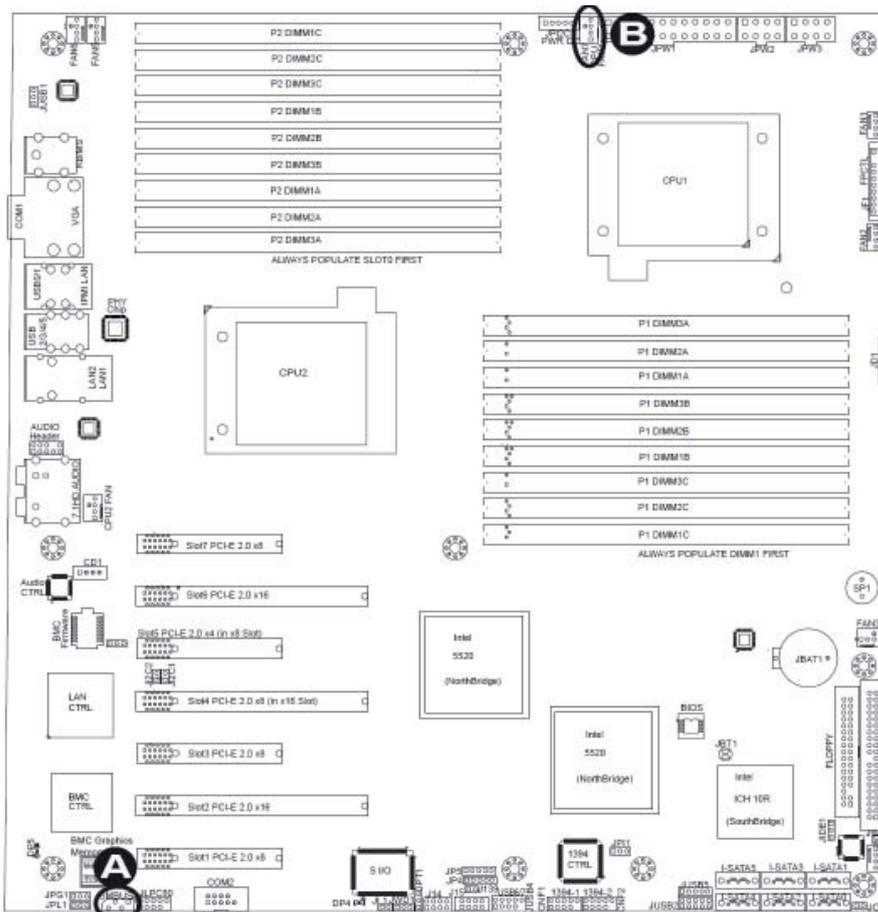
A System Management Bus header is located at SUB-US1 on the motherboard. Connect the appropriate cable here to use the SMB connection on your system.

| SMB Header Pin Definitions |               |
|----------------------------|---------------|
| Pin#                       | Definition    |
| 1                          | Data          |
| 2                          | Ground        |
| 3                          | Clock         |
| 4                          | No connection |

### Power SMB (I<sup>2</sup>C) Connector

Power System Management Bus (I<sup>2</sup>C) Connector (JPI<sup>2</sup>C) monitors power supply, fan and system temperatures. See the table on the right for pin definitions..

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

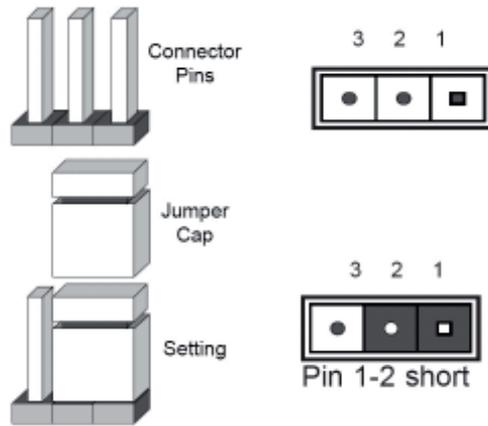


A: SMB)  
B: PWR SMB

## 5-12 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.

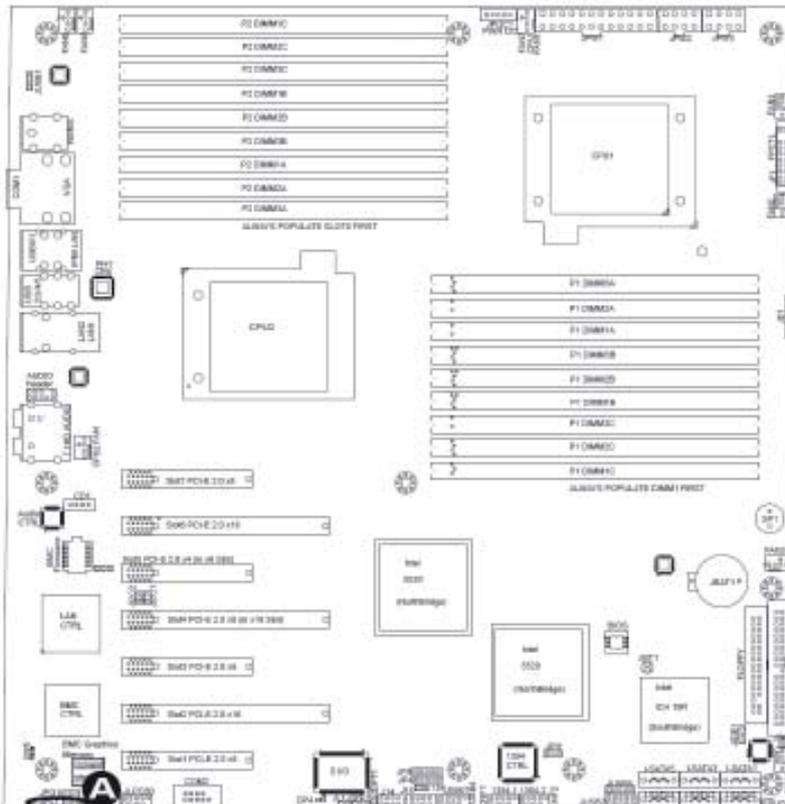


**Note:** On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.

### GLAN Enable/Disable

Use JPL1 to enable or disable GLAN Port1/GLAN Port2 on the motherboard. See the table on the right for jumper settings. The default setting is **Enabled**.

| GLAN Enable/Disable Jumper Settings |                   |
|-------------------------------------|-------------------|
| Jumper Setting                      | Definition        |
| Pins 1-2                            | Enabled (default) |
| Pins 2-3                            | Disabled          |



A: GLAN Port 1/2 Enable

### CMOS Clear

JBT1 is used to clear CMOS. Instead of pins, this "jumper" consists of contact pads to prevent accidentally clearing the contents 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.

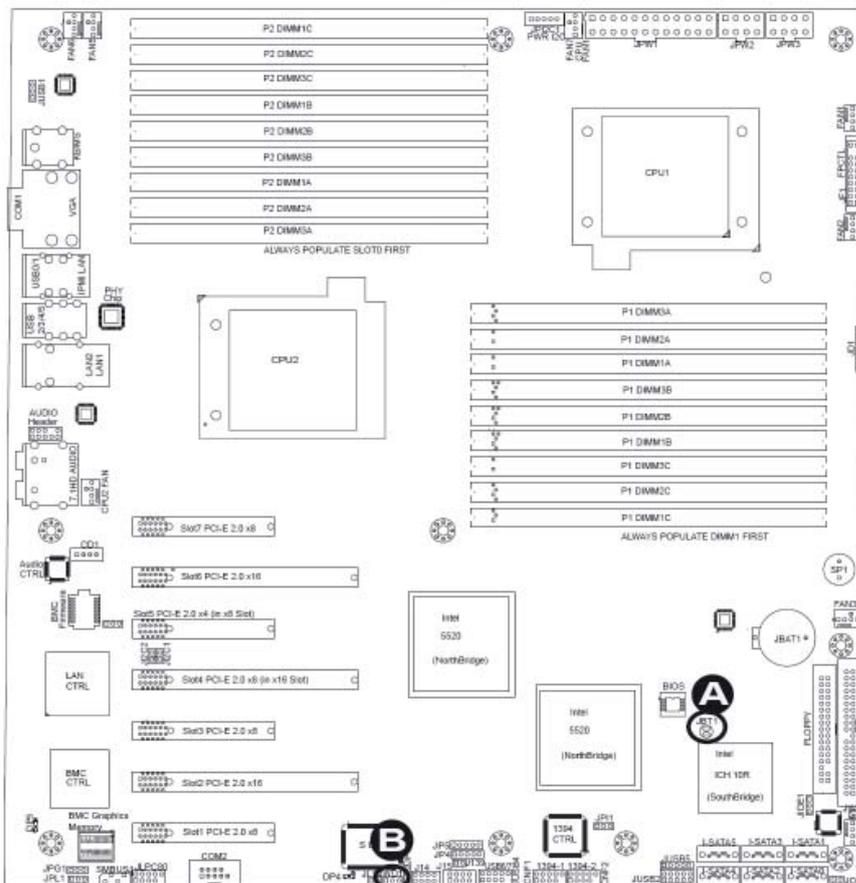
**Note:** For an ATX power supply, you must completely shut down the system, remove the AC power cord and then short JBT1 to clear CMOS.



### Watch Dog Enable/Disable

Watch Dog (JWD) is a system monitor that can reboot the system when a software application hangs. Close Pins 1-2 to reset the system if an application hangs. Close Pins 2-3 to generate a non-maskable interrupt signal for the application that hangs. See the table on the right for jumper settings. Watch Dog must also be enabled in the BIOS.

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



A: Clear CMOS)  
B: Watch Dog Enable

### I<sup>2</sup>C Bus to PCI-Exp. Slots

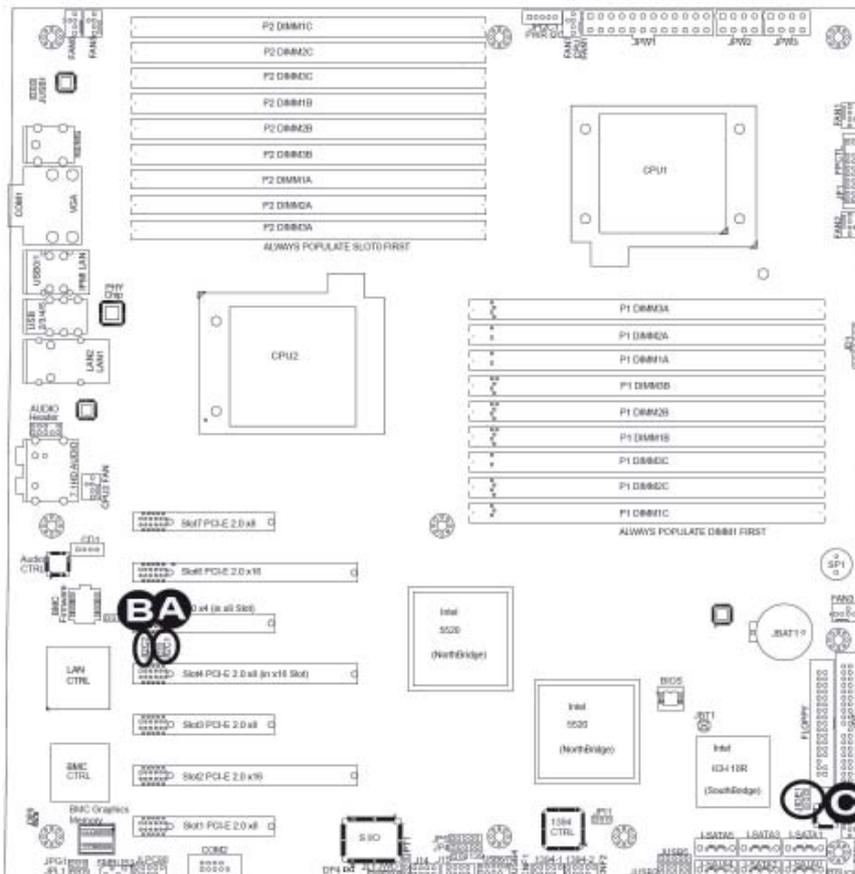
Jumpers JI<sup>2</sup>C1 and JI<sup>2</sup>C2 allow you to connect the System Management Bus (I<sup>2</sup>C) to the PCI-Express slots. These two jumpers must be set at the same time. The default setting is Open to disable the connections. See the table on the right for jumper settings.

| I <sup>2</sup> C for PCI/PCI-E Slots Jumper Settings |                    |
|--|--------------------|
| Jumper Setting                                       | Definition         |
| Closed   | Enabled            |
| Open   | Disabled (default) |

### Compact Flash Enable

A Compact Flash Jumper is located at JIDE1. To use a Compact Flash Card on this motherboard, you will need to close Pins 1~2 on this jumper to enable it. For the Compact Flash Card to work properly, please connect the Compact Flash Card power cable to JWF1 first. Refer to the board layout below for the location.

| Compact Flash Card Enable Jumper Settings |            |
|---|------------|
| Jumper                                    | Definition |
| Open                                      | Disabled   |
| Closed                                    | Enabled    |



- A: JI<sup>2</sup>C1
- B: JI<sup>2</sup>C2
- C: Compact Flash Enable

### VGA Enable

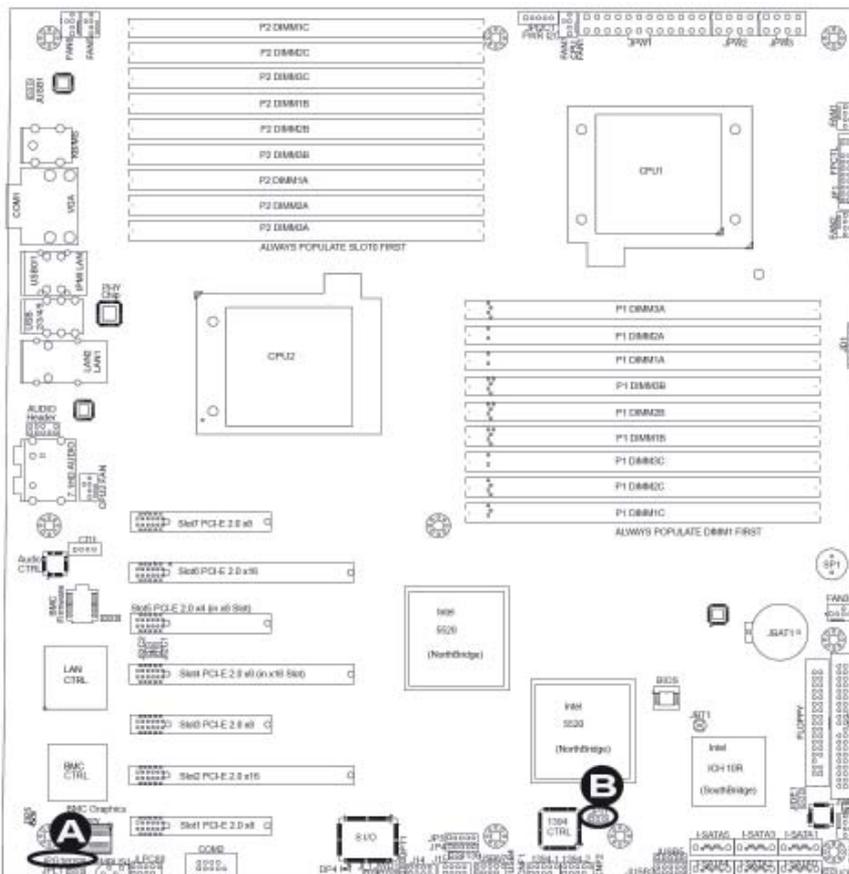
Jumper JPG1 allows you to enable video connections on the motherboard. See the table on the right for jumper settings.

| VGA Enable Jumper Settings |                   |
|----------------------------|-------------------|
| Jumper Setting             | Definition        |
| 1-2                        | Enabled (default) |
| 2-3                        | Disabled          |

### 1394a-1/1394a-2 Enable

Use Jumper JPI1 to enable the 1394a connections at CNF1(1394a-1)/CNF2 (1394a-2) on the motherboard. See the table on the right for jumper settings.

| 1394a 1/2 Enable Jumper Settings |                   |
|----------------------------------|-------------------|
| Jumper Setting                   | Definition        |
| 1-2                              | Enabled (default) |
| 2-3                              | Disabled          |

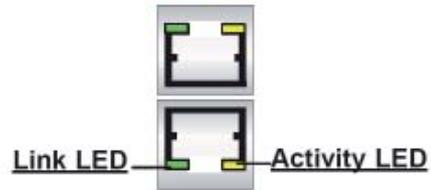


A: VGA Enable  
B:1394a 1/2 Enable

## 5-13 Onboard LED Indicators

### GLAN LEDs

Two LAN ports (LAN 1/LAN 2) are located on the IO Backplane of the motherboard. Each Ethernet LAN port has two LEDs. The green LED indicates activity, while the other Link LED may be green, amber or off to indicate the speed of the connections. See the tables at right for more information.



Rear View (when facing the rear side of the chassis)

| LAN 1/LAN 2 Activity LED (Right) LED State |          |            |
|--|----------|------------|
| Color                                      | Status   | Definition |
| Green                                      | Flashing | Active     |

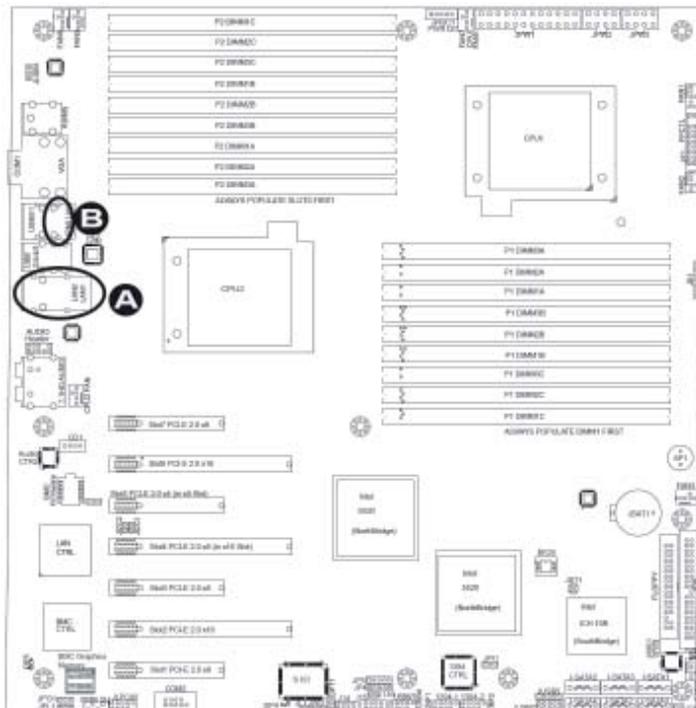
| LAN 1/LAN 2 Link LED (Left) LED State |                          |
|---------------------------------------|--------------------------|
| LED Color                             | Definition               |
| Off                                   | No connection or 10 Mbps |
| Green                                 | 100 Mbps                 |
| Amber                                 | 1 Gbps                   |

### IPMI Dedicated LAN LEDs

In addition to LAN 1/LAN 2, an IPMI Dedicated LAN is also located on the IO Backplane. The amber LED on the right indicates activity, while the green LED on the left indicates the speed of the connection. See the tables at right for more information.



| IPMI LAN Link LED (Left) & Activity LED (Right) |                 |            |
|---|-----------------|------------|
| Color   | Status          | Definition |
| Link (Left)                                     | Green: Solid    | 100 Mbps   |
| Activity (Right)                                | Amber: Blinking | Active     |



A: LAN1/2 LEDs  
B: Dedicated LAN LEDs

### Onboard Power LED

An Onboard Power LED is located at DP4 on the motherboard. When this LED is lit, the system is on. Be sure to turn off the system and unplug the power cord before removing or installing components. See the table at right for more information.

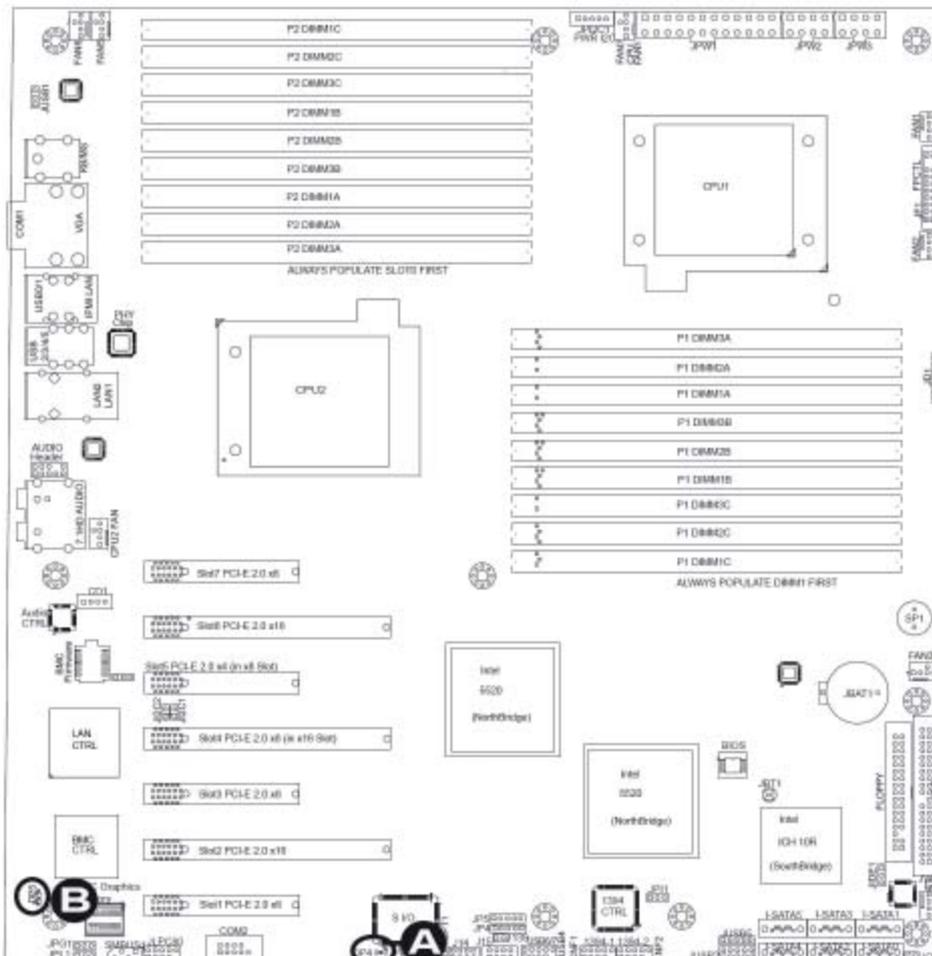
| Onboard PWR LED (DP4) Settings |                                      |
|--------------------------------|--------------------------------------|
| LED Color                      | Definition                           |
| Off                            | System Off (PWR cable not connected) |
| On                             | System Power On                      |

### BMC Heartbeat LED

A BMC Heartbeat LED is located at DP5 on the motherboard. When DP5 is blinking, BMC functions normally. See the table at right for more information.

| BMC Heartbeat LED Indicator (DP5) Settings |             |
|--|-------------|
| LED Color                                  | Definition  |
| Blinking                                   | BMC: Normal |

A: Onboard PWR LED  
B: BMC Heartbeat LED



## 5-14 Floppy, Serial ATA and SAS Connections

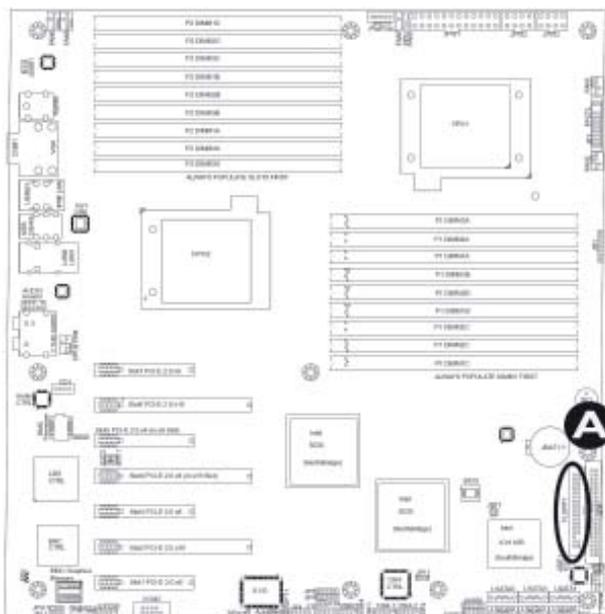
Note the following when connecting the floppy and hard disk drive cables:

- 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 34 wires and 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 next to the Super I/O chip on the motherboard. See the table on the right for pin definitions.

| Floppy Drive Connector<br>Pin Definitions |            |       |                |
|---|------------|-------|----------------|
| 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       |

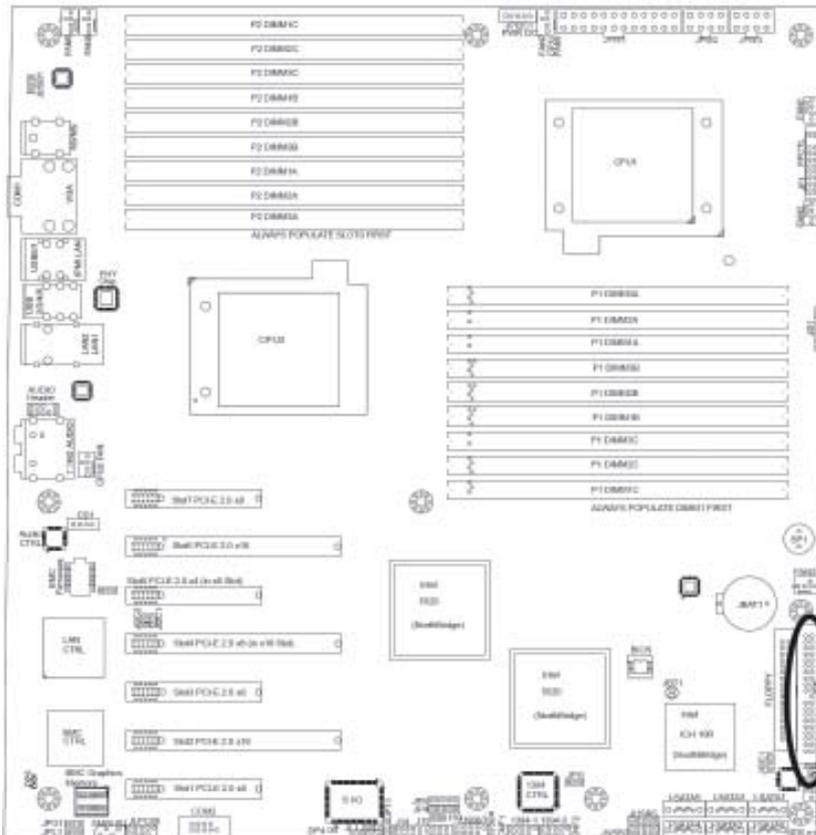


A: Floppy

### IDE Connector

AN IDE Connector is located on the motherboard. This connector can be used for a Compact Flash card. To use a Compact Flash card on this connector, you will need to enable the jumper located at JPIDE1. See the table on the right for pin definitions.

| IDE Drive Connector 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        |

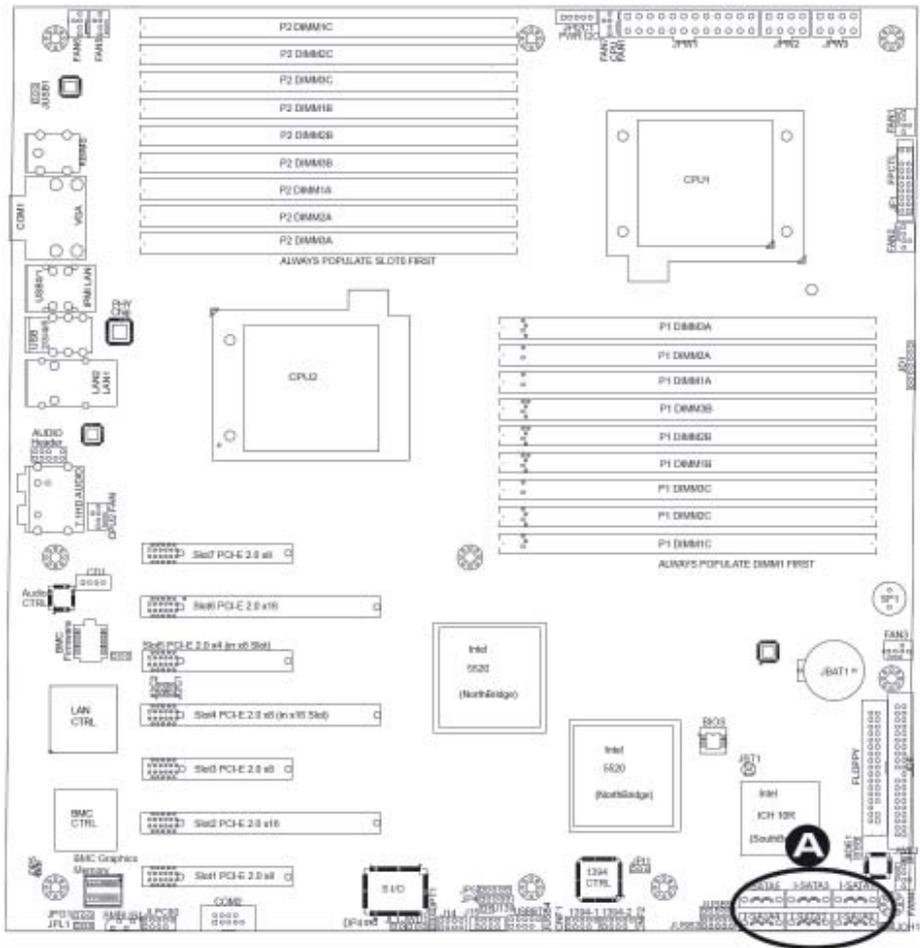


A: IDE

### Serial ATA Ports

There are Six Serial ATA Ports (ISATA0~I-SATA 5) located on the motherboard. These ports provide serial-link signal connections, which are faster than the connections of Parallel ATA. See the table on the right for pin definitions.

| Serial ATA Port Pin Definitions |            |
|---------------------------------|------------|
| Pin #                           | Definition |
| 1                               | Ground     |
| 2                               | TX_P       |
| 3                               | TX_N       |
| 4                               | Ground     |
| 5                               | RX_N       |
| 6                               | RX_P       |
| 7                               | Ground     |



A: SATA 0-5

## Chapter 6. Advanced Chassis Setup

This chapter covers the steps required to install components and perform maintenance on the SC825TQ-R700LP chassis. For component installation, follow the steps in the order given to eliminate the most common problems encountered. If some steps are unnecessary, skip ahead to the step that follows.

**Tools Required:** The only tool you will need to install components and perform maintenance is a Philips screwdriver.

### 6-1 Static-Sensitive Devices

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

#### **Precautions**

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the motherboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

#### **Unpacking**

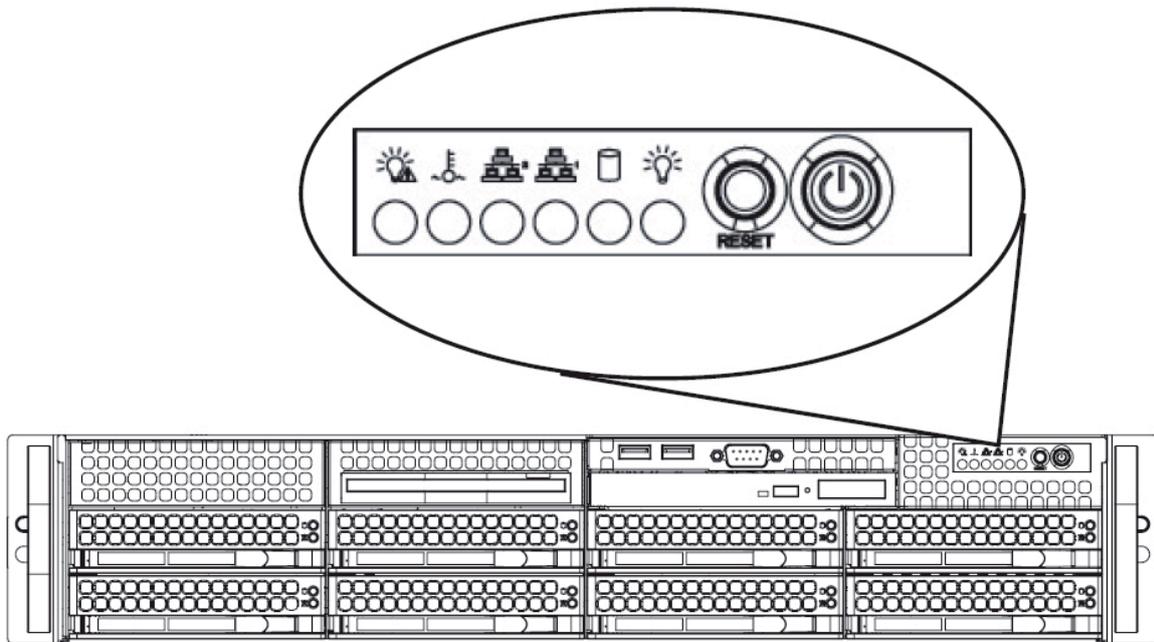
The serverboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure the person handling it is static protected.

---

## 6-2 Control Panel

The control panel (located on the front of the chassis) must be connected to the JF1 connector on the serverboard to provide you with system status indications. A ribbon cable has bundled these wires together to simplify the connection. Connect the cable from JF1 on the serverboard to JP4 on the Control Panel PCB (printed circuit board). Make sure the red wire plugs into pin 1 on both JF1 and JP4. Pull all excess cabling out of the airflow path. The LEDs inform you of system status. See **Control Panel LEDs** on page 3-2 for details on the LEDs and the control panel buttons. See **Front Control Panel** on page 5-20 for details on JF1.

Figure 6-1. R423-E2 Control Panel



## 6-3 System Fans

Three 8-cm hot-swap fans provide the cooling for the bullx R423-E2. It is very important that the chassis top cover is properly installed and making a good seal in order for the cooling air to circulate properly through the chassis and cool the components. See Figure 6-2.

### System Fan Failure

Fan speed is controlled by system temperature via a BIOS setting. If a fan fails, the remaining fans will ramp up to full speed and the overheat/fan fail LED on the control panel will turn on. Replace any failed fan at your earliest convenience with the same type and model (the system can continue to run with a failed fan). Remove the top chassis cover while the system is still running to determine which of the fans has failed.

### Replacing System Fans

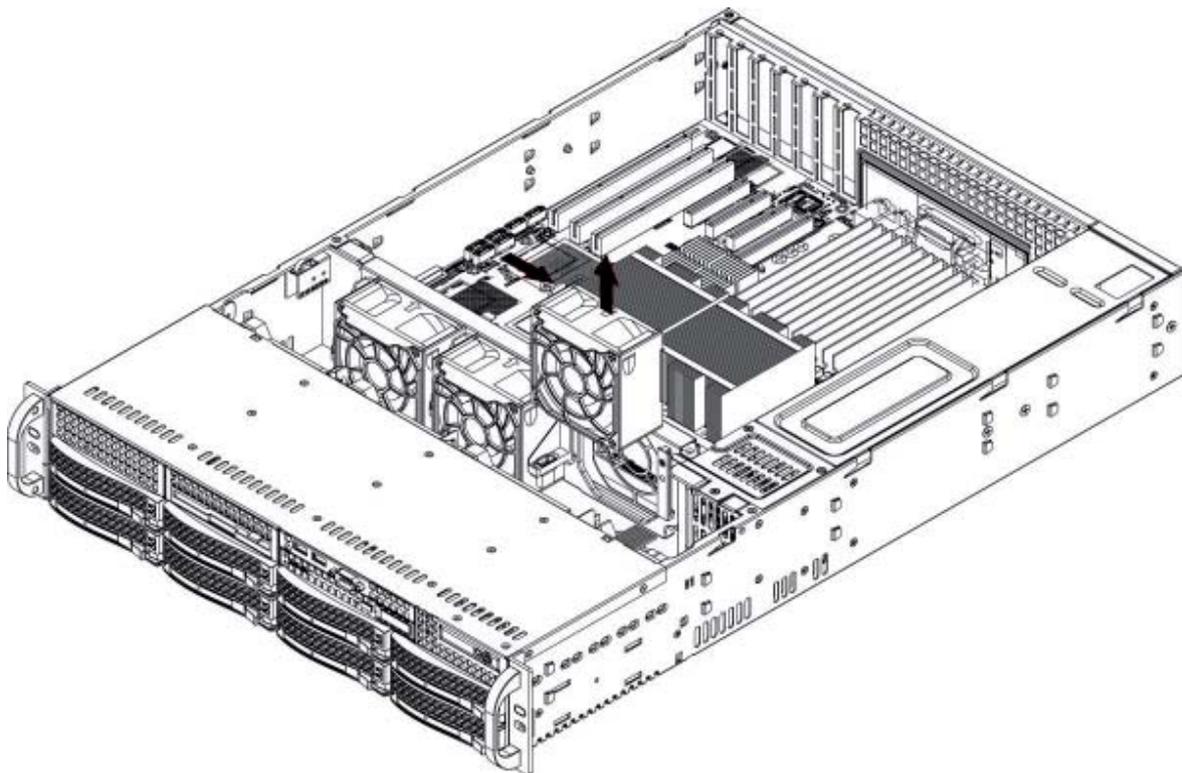
#### *Removing a fan*

1. Remove the chassis cover.
2. Press the tabs on the sides of the fan to unlock and remove the fan and its housing. The fan's power connections will automatically detach.
3. System power does not need to be shut down since the fans are hot-pluggable.

#### *Installing a new fan*

1. Replace the failed fan with an identical 8-cm, 12 volt fan (available from Bull support, p/n FAN-0094L-000).
2. Position the new fan into the space vacated by the failed fan previously removed. A "click" can be heard when the fan is fully installed in place and the power connections are made.
3. If the system power is on, the hot-plug feature will cause the fan to start immediately upon being connected to its header on the serverboard.

**Figure 6-2. Removing System Cooling Fans**



## 6-4 Drive Bay Installation/Removal

### Accessing the Drive Bays

SATA Drives: You do not need to access the inside of the chassis or remove power to replace or swap SATA drives. Proceed to the next step for instructions.

**Note:** You must use standard 1" high, SATA drives in the bullx R423-E2.

DVD-ROM/Floppy Disk Drive: For installing/removing the DVD-ROM or floppy disk drive, you will need to gain access to the inside of the server by removing the top cover of the chassis. Proceed to the "DVD-ROM and Floppy Drive Installation" section later in this chapter for instructions.

5.25" Drive Bay: For installing/removing a component in the 5.25" drive bay, proceed to the "5.25" Drive Bay Installation" section later in this chapter for instructions.

## SATA Drive Installation

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

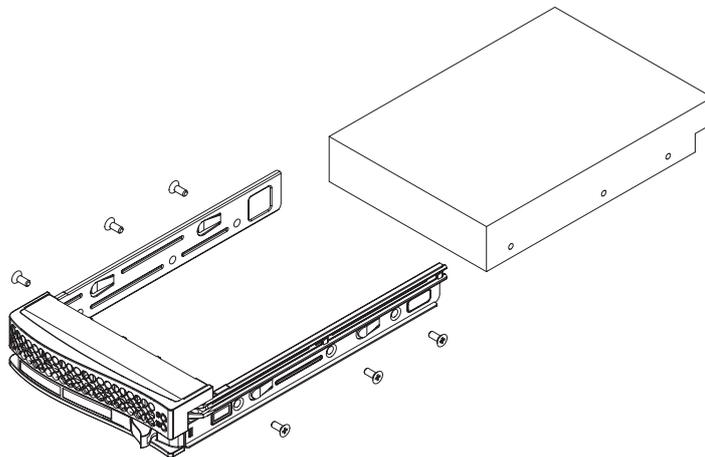
### *Mounting a SATA drive in a drive carrier*

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

### *Installing/removing hot-swap Serial ATA drives*

1. Push the release button located beside the drive's LEDs.

**Figure 6-3. Mounting a SATA Drive in a Carrier**

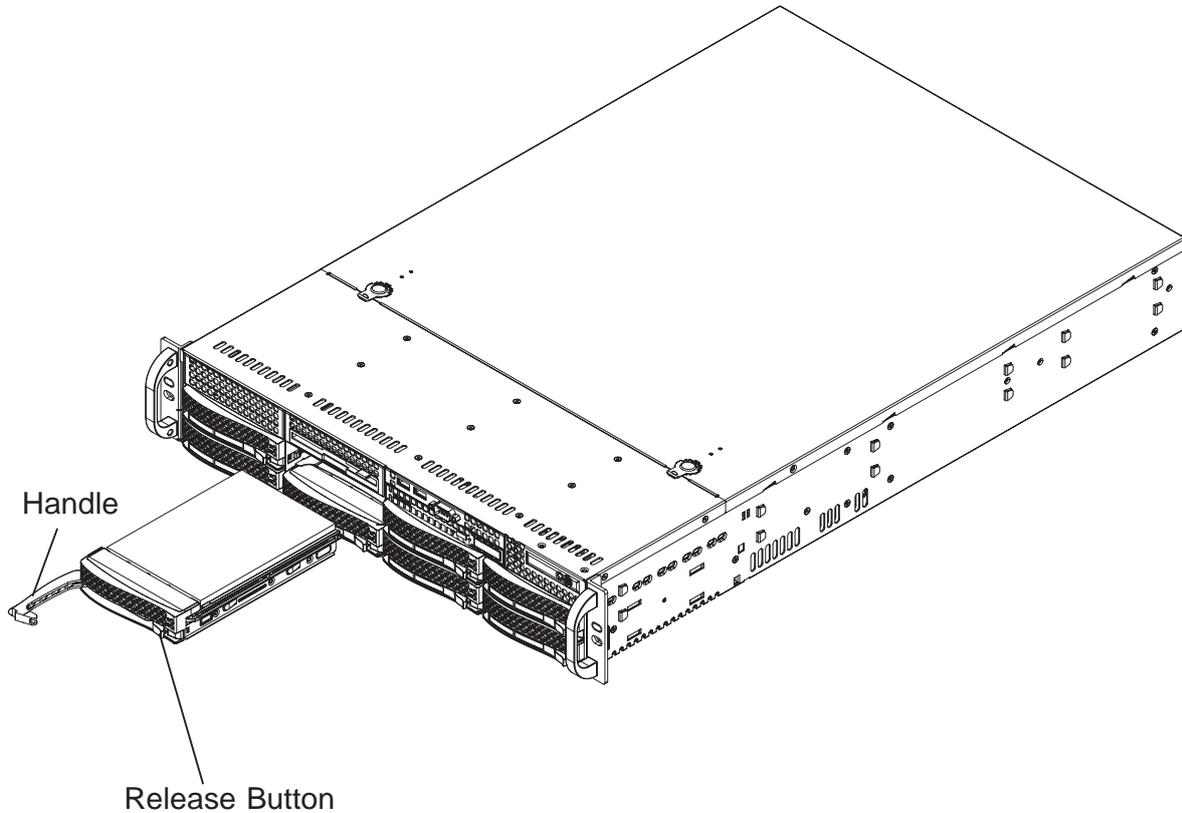


**Use caution when working around the SATA backplane. Do not touch the backplane with any metal objects and make sure no ribbon cables touch the backplane or obstruct the holes, which aid in proper airflow.**



**Important: Regardless of how many SATA hard drives are installed, all drive carriers must remain in the drive bays to maintain proper airflow.**

**Figure 6-4. Removing a Serial ATA Drive Carrier**



**Important: All of the SATA drive carriers must remain in the drive bays to maintain proper cooling airflow.**

## Hard Drive Backplane

The SATA drives plug into a backplane that provides power, drive ID and bus termination. A RAID controller can be used with the backplane to provide data security. The operating system you use must have RAID support to enable the hot-swap capability of the Serial ATA drives. The backplane is already preconfigured, so there are no jumpers or switches present on it.

## DVD-ROM and Floppy Drive Installation

The top cover of the chassis must be opened to gain full access to the DVD-ROM and floppy drive bays. The bullx R423-E2 accomodates only slim type DVD-ROM drives. Side mounting brakets are typically needed to mount a slim DVD-ROM drive in the bullx R423-E2 server.

### *Accessing the inside of the chassis*

1. Release the retention screws that secure the server unit to the rack.
2. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").
3. Next, depress the two buttons on the top of the chassis to release the top cover and at the same time, push the cover away from you until it stops. You can then lift the top cover from the chassis to gain full access to the inside of the server. **Note:** You must power down the system before installing or removing floppy or IDE components.

Drives mount on rails and should "click" into place to be correctly and fully installed in their bays.

- The floppy disk drive cable has seven twisted wires.
- A color mark on a cable typically designates the location of pin 1.
- A single floppy disk drive ribbon cable has 34 wires and 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.

## 6-5 Power Supply

The bullx R423-E2 has a 700 watt redundant power supply consisting of two power modules. Each power supply module has an auto-switching capability, which enables it to automatically sense and operate at a 100V - 240V input voltage.

### Power Supply Failure

If either of the two power supply modules fail, the other module will take the full load and allow the system to continue operation without interruption. The PWR Fail LED will illuminate and remain on until the failed unit has been replaced. Replacement units can be ordered directly from Bull support. The power supply units have a hot-swap capability, meaning you can replace the failed unit without powering down the system.

### Removing/Replacing the Power Supply

You do not need to shut down the system to replace a power supply unit. The backup power supply module will keep the system up and running while you replace the failed hot-swap unit. Replace with the same model, which can be ordered directly from Bull Support.

#### *Removing the power supply*

1. First unplug the power cord from the failed power supply module.
2. Depress the locking tab on the power supply module.
3. Use the handle to pull it straight out with the rounded handle.

#### *Installing a new power supply*

1. Replace the failed hot-swap unit with another identical power supply unit.
2. Push the new power supply unit into the power bay until you hear a click.
3. Secure the locking tab on the unit.
4. Finish by plugging the AC power cord back into the unit.

## Chapter 7. BIOS

### 7-1 Introduction

This chapter describes the AMI BIOS Setup Utility for the R423-E2. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.

#### Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

**Note:** In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. (**Note:** the AMI BIOS has default text messages built in. Supermicro retains the option to include, omit, or change any of these text messages.)

The AMI BIOS Setup Utility uses a key-based navigation system called "hot keys". Most of the AMI BIOS setup utility "hot keys" can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

**Note:** Options printed in Bold are default settings.

#### How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

## Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test.

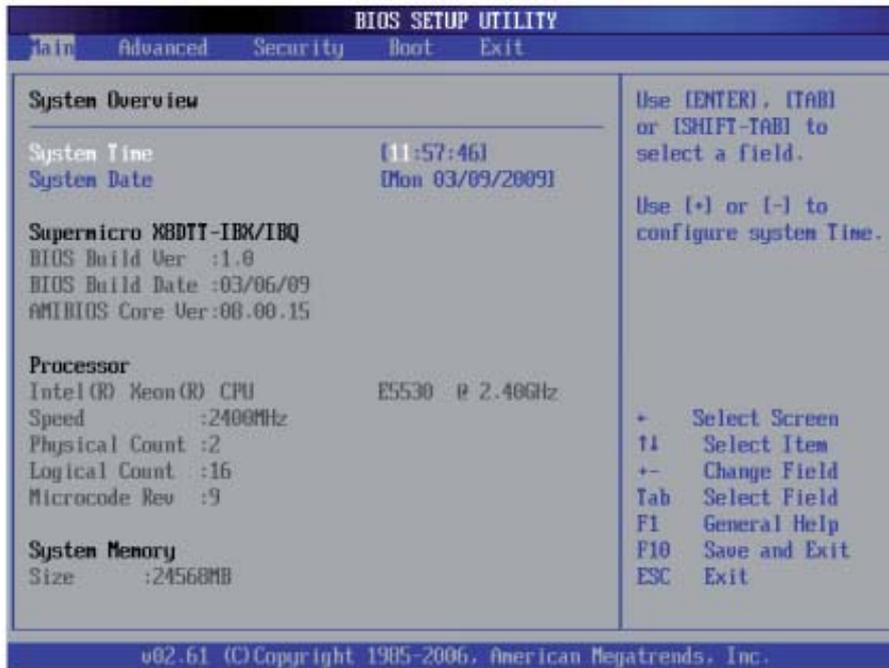
As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.



**Warning:** Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

## 7-2 Main Setup

When you first enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.



## System Overview

The following BIOS information will be displayed:

### System Time/System Date

Use this option to change the system time and date. Highlight System Time or System Date using the arrow keys. Key in new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date must be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format. (**Note:** The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.)

### Supermicro Motherboard

- BIOS Build Version: This item displays the BIOS revision used in your system.
- BIOS Build Date: This item displays the date when this BIOS was completed.
- AMI BIOS Core Version: This item displays the revision number of the AMI BIOS Core upon which your BIOS was built.

### Processor

The AMI BIOS will automatically display the status of the processor used in your system:

- CPU Type: This item displays the type of CPU used in the motherboard.
- Speed: This item displays the speed of the CPU detected by the BIOS.
- Physical Count: This item displays the number of processors installed in your system as detected by the BIOS.
- Logical Count: This item displays the number of CPU Cores installed in your system as detected by the BIOS.
- Micro\_code Revision: This item displays the revision number of the BIOS Micro\_code used in your system.

### Memory

This displays the size of memory available in the system:

- Size: This item displays the memory size detected by the BIOS.

## 7-3 Advanced Setup Configurations

Use the arrow keys to select Boot Setup and hit <Enter> to access the submenu items:



### ▶ Boot Features

Access the submenu to make changes to the following settings.

#### QuickBoot Mode

If Enabled, this option will skip certain tests during POST to reduce the time needed for system boot. The options are **Enabled** and Disabled.

#### QuietBoot Mode

This option allows the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** and Disabled.

#### AddOn ROM Display Mode

This sets the display mode for Option ROM. The options are **Force BIOS** and Keep Current.

#### Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On**.

### **Wait For 'F1' If Error**

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled**.

### **Hit 'Del' Message Display**

This feature displays "Press DEL to run Setup" during POST. The options are **Enabled** and Disabled.

### **Interrupt 19 Capture**

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are Enabled and **Disabled**.

## **Power Configuration**

### **Power Button Function**

If set to Instant\_Off, the system will power off immediately as soon as the user hits the power button. If set to 4\_Second\_Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant\_Off** and 4\_Second\_Override.

### **Restore on AC Power Loss**

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power-On, Power-Off and **Last State**.

### **Watch Dog Timer**

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled**.

## ► Processor and Clock Options

This submenu allows the user to configure the Processor and Clock settings.

### Ratio CMOS Setting

This option allows the user to set the ratio between the CPU Core Clock and the Memory Frequency. (**Note:** if an invalid ratio is entered, the AMI BIOS will restore the setting to the previous state.) The default setting depends on the type of CPU installed on the motherboard. The default setting for the CPU installed in your motherboard is **[18]**. Press "+" or "-" on your keyboard to change this value.

### C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E significantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a "Halt State." The options are Disabled and **Enabled**.

### Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware pre fetcher will pre fetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled**.

### 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**.

### Intel® Virtualization Technology (Available when supported by the CPU)

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

### Execute-Disable Bit Capability (Available when supported by the OS and the CPU)

Set to Enabled to enable the Execute Disable Bit which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled**. (Refer to Intel and Microsoft Web Sites for more information.)

### **Simultaneous Multi-Threading (Available when supported by the CPU)**

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

### **Active Processor Cores**

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 **All**, 1 and 2.

### **Intel® EIST Technology**

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's web site for detailed information.** The options are Disable (Disable GV3) and **Enable (Enable GV3)**.

### **Intel® TurboMode Technology**

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enabled** and Disabled.

### **Intel® C-STATE Tech**

If enabled, C-State is set by the system automatically to either C2, C3 or C4 state. The options are Disabled and **Enabled**.

### **C-State package limit setting**

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto**, C1, C3, C6 and C7.

### **C1 Auto Demotion**

When enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled**.

### **C3 Auto Demotion**

When enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled**.

### **Clock Spread Spectrum**

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** and Enabled.

## ► **Advanced Chipset Control**

The items included in the Advanced Settings submenu are listed below:

### ► **CPU Bridge Configuration**

#### **QPI Links Speed**

This feature selects QPI's data transfer speed. The options are Slow-mode, and **Full Speed**.

#### **QPI Frequency**

This selects the desired QPI frequency. The options are **Auto**, 4.800 GT, 5.866GT, 6.400 GT.

#### **QPI L0s and L1**

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboard. The options are **Disabled** and Enabled.

#### **Memory Frequency**

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto**, Force DDR-800, Force DDR-1066, and Force DDR-1333.

#### **Memory Mode**

The options are **Independent**, Channel Mirror, Lockstep and Sparing.

Independent - All DIMMs are available to the operating system.

Channel Mirror - The motherboard maintains two identical copies of all data in memory for redundancy.

Lockstep - The motherboard uses two areas of memory to run the same set of operations in parallel.

Sparing - A preset threshold of correctable errors is used to trigger fail-over.

The spare memory is put online and used as active memory in place of the failed memory.

## Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are Enabled and **Disabled**.

## Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are Enabled and **Disabled**.

## Throttling - Closed Loop/Throttling - Open Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are **Disabled** and Enabled. If Enabled, the following items will appear:

### Hysteresis Temperature

Temperature Hysteresis is the temperature lag (in degrees Celsius) after the set DIMM temperature threshold is reached before Closed Loop Throttling begins. The options are Disabled, **1.5° C**, 3.0° C, and 6.0° C.

### Guardband Temperature

This is the temperature which applies to the DIMM temperature threshold. Each step is in 0.5° C increment. The default is **[006]**. Press "+" or "-" on your keyboard to change this value.

### Inlet Temperature

This is the temperature detected at the chassis inlet. Each step is in 0.5° C increment. The default is **[070]**. Press "+" or "-" on your keyboard to change this value.

### Temperature Rise

This is the temperature rise to the DIMM thermal zone. Each step is in 0.50C increment. The default is **[020]**. Press "+" or "-" on your keyboard to change this value.

### Air Flow

This is the air flow speed to the DIMM modules. Each step is one mm/ sec. The default is **[1500]**. Press "+" or "-" on your keyboard to change this value.

### Altitude

This feature defines how many meters above or below sea level the system is located. The options are **Sea Level or Below**, 1~300, 301~600, 601~900, 901~1200, 1201~1500, 1501~1800, 1801~2100, 2101~2400, 2401~2700, 2701~3000.

### DIMM Pitch

This is the physical space between each DIMM module. Each step is in 1/1000 of an inch. The default is **[400]**. Press "+" or "-" on your keyboard to change this value.

## ► North Bridge Configuration

This feature allows the user to configure the settings for the Intel North Bridge chip.

### **Crystal Beach/DMA (Direct Memory Access)**

This feature works with the Intel I/O AT (Acceleration Technology) to accelerate the performance of TOE devices. (Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card.) When this feature is set to Enabled, it will enhance overall system performance by providing direct memory access for data transferring. The options are Enabled and **Disabled**.

### **Intel VT-d**

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled**.

### **IOH PCIE Port1 Bifurcation**

This feature allows the user to set IOH Bifurcation configuration for the PCI-E Port 1. The options are X4X4X4X4, X4X4X8, X8X4X4, X8X8, and **X16**.

### **IOH PCIE Max Payload Size**

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128 MB; while others, with a payload size of 256 MB which inhibits the coalesce feature. Please refer to your add-on card user guide for the desired setting. The options are 256MB and **128MB**.

## ► South Bridge Configuration

This feature allows the user to configure the settings for the Intel ICH South Bridge chipset.

### **USB Functions**

This feature allows the user to decide the number of onboard USB ports to be enabled. The Options are: Disabled, 2 USB ports, 4 USB ports, 6 USB ports, 8 Ports, 10 Ports and **12 USB ports**.

### **Legacy USB Support**

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard, and vice versa. The settings are Disabled, **Enabled** and Auto.

### **USB 2.0 Controller**

Select Enabled to activate the onboard USB 2.0 controller. The options are **Enabled** and Disabled.

### **USB 2.0 Controller Mode**

This setting allows you to select the USB 2.0 Controller mode. The options are **Hi-Speed (480 Mbps)** and Full Speed (12 Mbps).

### **BIOS EHCI Hand-Off**

Select Enabled to enable BIOS Enhanced Host Controller Interface support to provide a workaround solution for an operating system that does not have EHCI Hand-Off support. When enabled, the EHCI Interface will be changed from the BIOS-controlled to the OS-controlled. The options are Disabled and **Enabled**.

## ► IDE/SATA/Floppy Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE devices and displays the following items:

### SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, **Compatible** and Enhanced.

#### Configure SATA#1 as

This feature allows the user to select the drive type for SATA#1. The options are **IDE**, RAID and AHCI. (When the option-RAID is selected, the item-ICH RAID Code Base will appear. When the option-AHCI is selected, the item-SATA AHCI will be available.)

#### ICH RAID Code Base (This feature is available when the option-RAID is selected)

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

#### SATA AHCI (This feature is available when the option-AHCI is selected)

Select Enable to enable the function of Serial ATA Advanced Host Interface. (Take caution when using this function. This feature is for advanced programmers only.)The options are Enabled and **Disabled**. If the option-Enabled is selected, the following item will display.

#### Hot Plug (This feature is available when the option-Enabled is selected)

Select Enable to enable the hot plug function for the SATA devices. The options are **Enabled** and Disabled.

### SATA#2 Configuration

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced**.

## Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of Primary IDE Master/Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are:

### Type

Select the type of device connected to the system. The options are Not Installed, **Auto**, CD/DVD and ARMD.

### LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto**.

### Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** and Disabled.

### PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto**, 0, 1, 2, 3, and 4.

Select Auto to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE disk drive support cannot be determined.

Select 0 to allow the AMI BIOS to use PIO mode 0. It has a data transfer rate of 3.3 MBs.

Select 1 to allow the AMI BIOS to use PIO mode 1. It has a data transfer rate of 5.2 MBs.

Select 2 to allow the AMI BIOS to use PIO mode 2. It has a data transfer rate of 8.3 MBs.

Select 3 to allow the AMI BIOS to use PIO mode 3. It has a data transfer rate of 11.1 MBs.

Select 4 to allow the AMI BIOS to use PIO mode 4. It has a data transfer bandwidth of 32-Bits. Select Enabled to enable 32-Bit data transfer.

### **DMA Mode**

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE disk drive support cannot be determined.

Select SWDMA0 to allow the BIOS to use Single Word DMA mode 0. It has a data transfer rate of 2.1 MBs.

Select SWDMA1 to allow the BIOS to use Single Word DMA mode 1. It has a data transfer rate of 4.2 MBs.

Select SWDMA2 to allow the BIOS to use Single Word DMA mode 2. It has a data transfer rate of 8.3 MBs.

Select MWDMA0 to allow the BIOS to use Multi Word DMA mode 0. It has a data transfer rate of 4.2 MBs.

Select MWDMA1 to allow the BIOS to use Multi Word DMA mode 1. It has a data transfer rate of 13.3 MBs.

Select MWDMA2 to allow the BIOS to use Multi-Word DMA mode 2. It has a data transfer rate of 16.6 MBs.

Select UDMA0 to allow the BIOS to use Ultra DMA mode 0. It has a data transfer rate of 16.6 MBs. It has the same transfer rate as PIO mode 4 and Multi Word DMA mode 2.

Select UDMA1 to allow the BIOS to use Ultra DMA mode 1. It has a data transfer rate of 25 MBs.

Select UDMA2 to allow the BIOS to use Ultra DMA mode 2. It has a data transfer rate of 33.3 MBs.

Select UDMA3 to allow the BIOS to use Ultra DMA mode 3. It has a data transfer rate of 66.6 MBs.

Select UDMA4 to allow the BIOS to use Ultra DMA mode 4. It has a data transfer rate of 100 MBs.

Select UDMA5 to allow the BIOS to use Ultra DMA mode 5. It has a data transfer rate of 133 MBs.

Select UDMA6 to allow the BIOS to use Ultra DMA mode 6. It has a data transfer rate of 133 MBs. The options are **Auto**, SWDMA<sub>n</sub>, MWDMA<sub>n</sub>, and UDMA<sub>n</sub>.

### **S.M.A.R.T. For Hard disk drives**

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect hard disk drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support hard drive disk. The options are Disabled, Enabled, and **Auto**.

### **32Bit Data Transfer**

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** and Disabled.

### **IDE Detect Timeout (sec)**

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and 35.

### **► PCI/PnP Configuration**

#### **Clear NVRAM**

This feature clears the NVRAM during system boot. The options are **No** and **Yes**.

#### **Plug & Play OS**

Selecting **Yes** allows the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** to allow the AMI BIOS to configure all devices in the system.

#### **PCI Latency Timer**

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64**, 96, 128, 160, 192, 224 and 248.

#### **PCI IDE BusMaster**

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are **Disabled** and **Enabled**.

#### **Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM**

Select **Enabled** to enable the onboard LAN1 or LAN2 Option ROM. This is to boot computer using a network interface. The options are **Enabled** and **Disabled**.

### **► Super IO Device Configuration**

#### **Serial Port1 Address/ Serial Port2 Address**

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select **Disabled** to prevent the serial port from accessing any system resources. When this option is set to **Disabled**, the serial port physically becomes unavailable. Select **3F8/IRQ4** to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are **Disabled**, **3F8/IRQ4**, 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port2 are **Disabled**, **2F8/IRQ3**, 3E8/IRQ4, and 2E8/IRQ3.

## ► Remote Access Configuration

### Remote Access

This allows the user to enable the Remote Access feature. The options are Disabled and Enabled. If Remote Access is set to Enabled, the following items will display:

#### Serial Port Number

This feature allows the user decide which serial port to be used for Console Redirection. The options are COM 1 and **COM 2**.

#### Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1**; 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

#### Flow Control

This feature allows the user to set the flow control for Console Redirection. The options are **None**, Hardware, and Software.

#### Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST. (Note: This setting may not be supported by some operating systems.) Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always**.

#### Terminal Type

This feature allows the user to select the target terminal type for Console Redirection. The options are **ANSI**, VT100, and VT-UTF8.

#### VT-UTF8 Combo Key Support

A terminal keyboard definition that provides a way to send commands from a remote console. Available options are **Enabled** and Disabled.

#### Sredir Memory Display Delay

This feature defines the length of time in seconds to display memory information. The options are **No Delay**, Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

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## ► Hardware Health Monitor

This feature allows the user to monitor system health and review the status of each item as displayed.

### CPU Overheat Alarm

This option allows the user to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.



#### **Warning:**

1. Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed.
2. To avoid possible system overheating, please be sure to provide adequate airflow to your system.

The options are:

- The Early Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.
- The Default Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5° C above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

### CPU Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

#### **CPU Temperature**

The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This 'Temperature Threshold' or 'Temperature Tolerance' has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (i.e., by increasing CPU Fan speed, triggering the Overheat Alarm, etc). Since CPUs can have different 'Temperature Tolerances', the installed CPU

can now send information to the motherboard what its 'Temperature Tolerance' is, and not the other way around. This results in better CPU thermal management.

Bull has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU's temperature status, rather than by just simply seeing a temperature reading (i.e., 25° C). The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

**Low** – This level is considered as the 'normal' operating state. The CPU temperature is well below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control).

User intervention: No action required.

**Medium** – The processor is running warmer. This is a 'precautionary' level and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings.

User intervention: No action is required. However, consider checking the CPU fans and the chassis ventilation for blockage.

**High** – The processor is running hot. This is a 'caution' level since the CPU's 'Temperature Tolerance' has been reached (or has been exceeded) and may activate an overheat alarm.

User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

**Notes:**

1. The system may shut down if it continues for a long period to prevent damage to the CPU.
2. The information provided above is for your reference only. For more information on thermal management, please refer to Intel's Web site at [www.Intel.com](http://www.Intel.com).

**System Temperature:** The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

## Fan Speed Control Monitor

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. Select Server if your system is used as a Server. Select "Disabled, (Full Speed @12V)" to disable the fan speed control function and allow the onboard fans to constantly run at the full speed (12V). The Options are: 1. **Disabled (Full Speed)**, 2. Server Mode, 3. Workstation Mode.

### **Fan Speed Reading**

This feature displays the fan speed readings from fan interfaces Fan1 through Fan8.

### **Voltage Readings**

The following voltage readings will be displayed:

CPU1 Vcore, CPU2 Vcore, +5Vin, +12Vcc (V), VP1 DIMM, VP2 DIMM, 3.3Vcc (V), and Battery Voltage

### **►ACPI Configuration**

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

#### **ACPI Version Features**

The options are **ACPI v1.0**, ACPI v2.0 and ACPI v3.0. Please refer to ACPI's website for further explanation: <http://www.acpi.info/>.

#### **ACPI APIC Support**

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** and Disabled.

#### **APIC ACPI SCI IRQ**

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled**.

#### **Headless Mode**

This feature is used to enable system to function without a keyboard, monitor or mouse attached. The options are Enabled and **Disabled**.

#### **High Performance Event Timer**

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are Enabled and **Disabled**.

## ► IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel's website at [www.intel.com](http://www.intel.com).

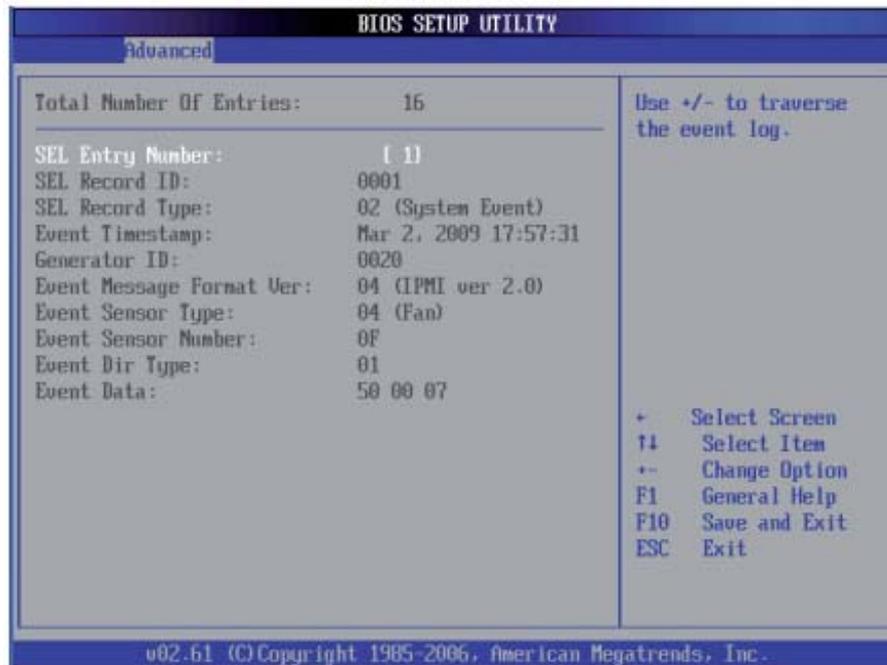


### Status of BMC

Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

## ► View BMC System Event Log

This feature displays the BMC System Event Log (SEL). It shows the total number of entries of BMC System Events. To view an event, select an Entry Number and pressing <Enter> to display the information as shown in the screen..



- Total Number of Entries
- SEL Entry Number
- SEL Record ID
- SEL Record Type
- Timestamp, Generator ID
- Event Message Format User
- Event Sensor Type
- Event Sensor Number,
- Event Dir Type
- Event Data.

### Clear BMC System Event Log

#### Clear BMC System Log

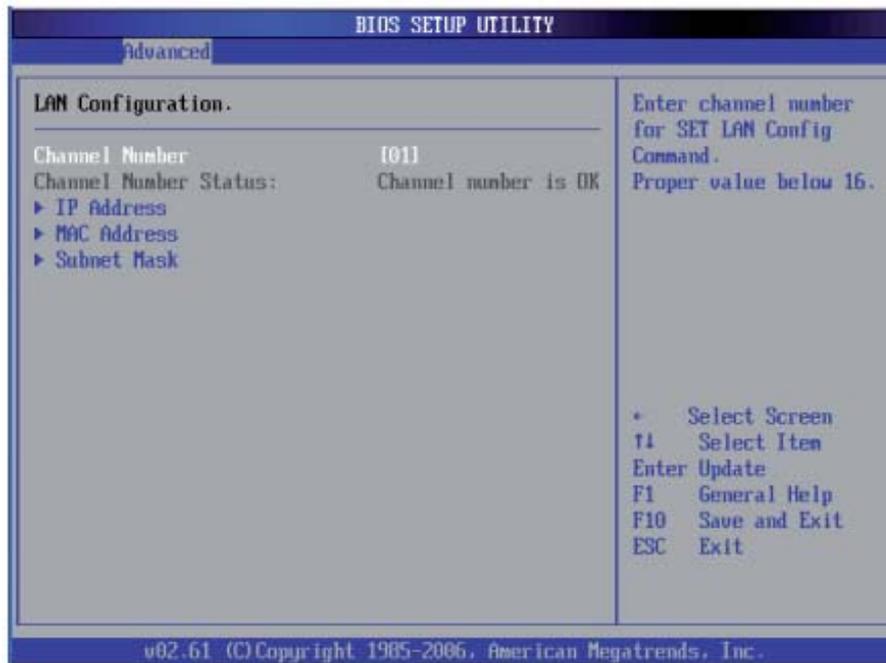
Select OK and press the <Enter> key to clear the BMC system log. Select to keep the BMC System log. The options are **OK** and Cancel..



**Caution:** Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

## ► Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address as shown in the following graphics..



**Channel Number** - Enter the channel number for the SET LAN Config command. This is initially set to **[1]**. Press "+" or "-" on your keyboard to change the Channel Number.

**Channel Number Status** - This feature returns the channel status for the Channel Number selected above: "Channel Number is OK" or "Wrong Channel Number".

## ► IP Address Configuration

Enter the IP address for this machine. This should be in decimal and in dotted quad form (i.e., 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255 as shown in the screen below..



### Parameter Selector

Use this feature to select the parameter of your IP Address configuration. IP Address

### Current IP Address in BMC

This item displays the current IP address used for your IPMI connection..

## ► MAC Address Configuration

### Parameter Selector

Use this feature to select the parameter of your Mac Address configuration.

### Mac Address

The BIOS will automatically enter the Mac address of this machine; however it may be over-ridden. Mac addresses are 6 two-digit hexadecimal numbers (Base 16, 0 ~ 9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60).

### Current Mac Address in BMC

This item displays the current Mac address used for your IPMI connection.

## ► Subnet Mask Configuration

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255..

### Parameter Selector

Use this feature to select the parameter of your Subnet Masks configuration.

### Subnet Mask

This item displays the current subnet mask setting for your IPMI connection.

## ► Set PEF Configuration



## Set PEF Configuration

Set this feature to configure the Platform Event Filter (PEF). PEF interprets BMC events and performs actions based on pre-determined settings or 'traps' under IPMI 1.5 specifications. For example, powering the system down or sending an alert when a triggering event is detected.

The following will appear if PEF Support is set to Enabled. The default is **Disabled**.

**PEF Action Global Control** - These are the different actions based on BMC events. The options are **Alert**, Power Down, Reset System, Power Cycle, OEM Action, Diagnostic Interface.

**Alert Startup Delay** - This feature inserts a delay during startup for PEF alerts. The options are Enabled and **Disabled**.

**PEF Alert Startup Delay** - This sets the pre-determined time to delay PEF alerts after system power-ups and resets. Refer to Table 24.6 of the IPMI 1.5 Specification for more information at [www.intel.com](http://www.intel.com). The options are **No Delay**, 30 sec, 60 sec, 1.5 min, 2.0 min.

**Startup Delay** - This feature enables or disables startup delay. The options are Enabled and **Disabled**.

**PEF Startup Delay** - This sets the pre-determined time to delay PEF after system power-ups and resets. Refer to Table 24.6 of the IPMI 1.5 Specification for more information at [www.intel.com](http://www.intel.com). The options are **No Delay**, 30 sec, 60 sec, 1.5 min, 2.0 min.

**Event Message for PEF Action** - This enables or disables Event Messages for PEF action. Refer to Table 24.6 of the IPMI 1.5 Specification for more information at [www.intel.com](http://www.intel.com). The options are **Disabled** and Enabled.

## ► BMC Watch Dog Timer Action

Allows the BMC to reset or power down the system if the operating system hangs or crashes. The options are **Disabled**, Reset System, Power Down, Power Cycle.

### **BMC Watch Dog TimeOut [Min:Sec]**

This option appears if BMC Watch Dog Timer Action (above) is enabled. This is a timed delay in minutes or seconds, before a system power down or reset after an operating system failure is detected. The options are **[5 Min]**, [1 Min], [30 Sec], and [10 Sec].

► **DMI Event Log**

**View Event Log**

Use this option to view the System Event Log.

**Mark all events as read**

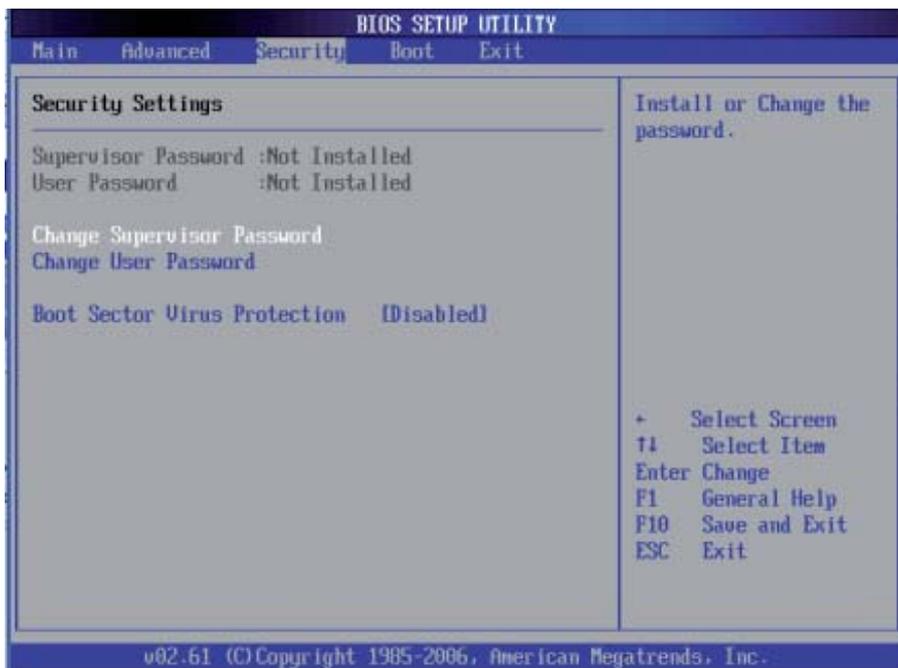
This option marks all events as read. The options are OK and **Cancel**.

**Clear event log**

This option clears the Event Log memory of all messages. The options are OK and **Cancel**.

## 7-4 Security Settings

The AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.



**Supervisor Password**

This item indicates if a Supervisor password has been entered for the system. "Not Installed" means a Supervisor password has not been used.

**User Password**

This item indicates if a user password has been entered for the system. "Not Installed" means that a user password has not been used.

**Change Supervisor Password**

Select this feature and press <Enter> to access the submenu, and then type in a new Supervisor Password.

**User Access Level (Available when Supervisor Password is set as above)**

Available options are Full Access: grants full User read and write access to the Setup Utility, View Only: allows access to the Setup Utility but the fields cannot be changed, Limited: allows only limited fields to be changed such as Date and Time, No Access: prevents User access to the Setup Utility.

**Change User Password**

Select this feature and press <Enter> to access the submenu , and then type in a new User Password.

**Clear User Password (Available only when User Password has been set)**

This item allows you to clear a user password after it has been entered.

**Password Check**

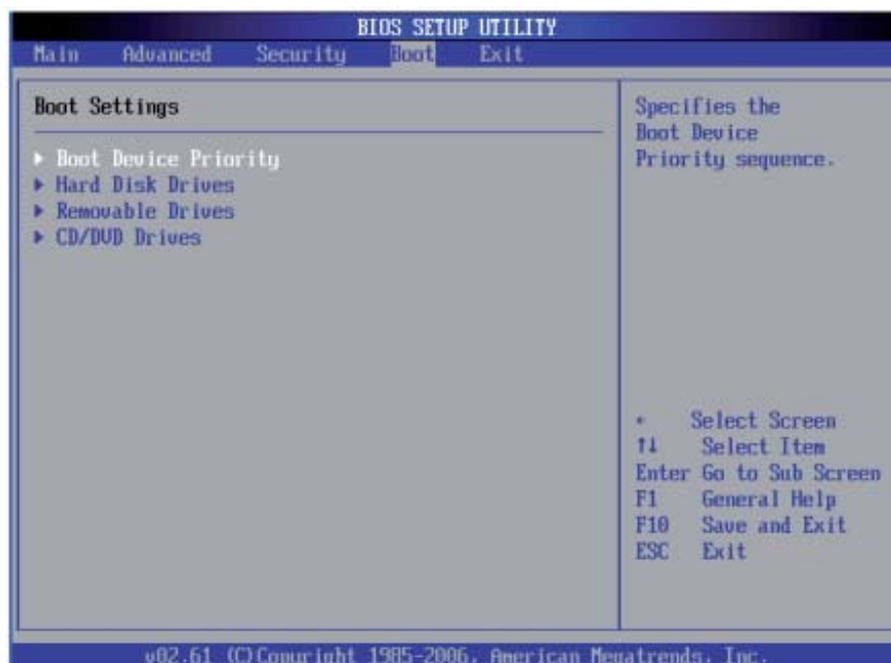
This item allows you to check a password after it has been entered. The options are **Setup** and **Always**.

**Boot Sector Virus Protection**

When Enabled, the AMI BOIS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The options are Enabled and **Disabled**.

## 7-5 Boot Configuration

Use this feature to configure boot settings..



### ► **Boot Device Priority**

This feature allows the user to specify the sequence of priority for the Boot Device.

The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device and Disabled.

- 1st Boot Device - [USB: XXXXXXXXXX]
- 2nd Boot Device - [CD/DVD: XXXXXXXXXX]

### ► **Hard Disk Drives**

This feature allows the user to specify the boot sequence from all available hard disk drives. The settings are Disabled and a list of all hard disk drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

- 1st Drive - [SATA: XXXXXXXXXX]

### ► **Removable Drives**

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

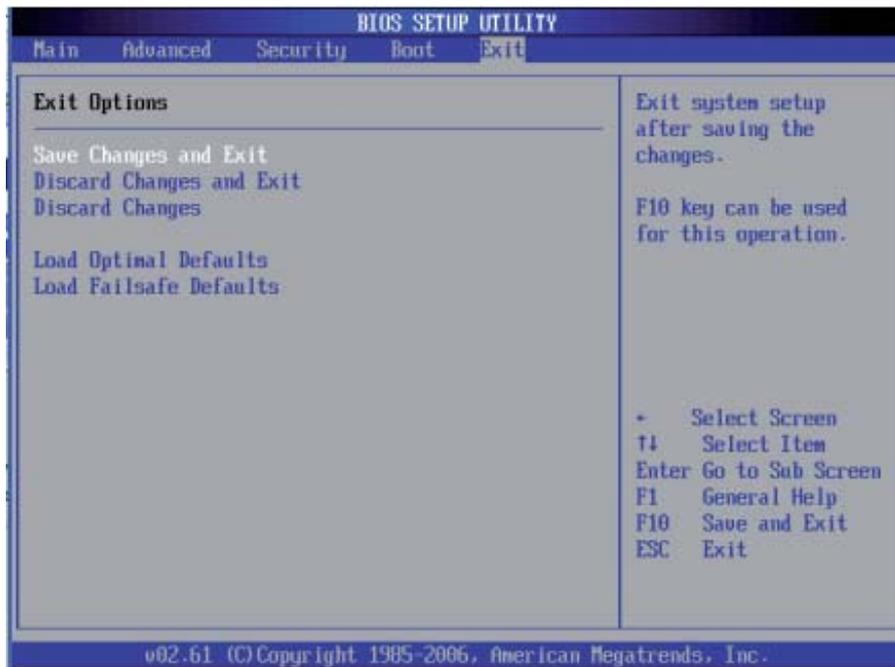
- 1st Drive - [USB: XXXXXXXXXX]
- 2nd Drive

### ► **CD/DVD Drives**

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

## 7-6 Exit Options

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.



### Save Changes and Exit

When you have completed the system configuration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

### Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

### Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

### Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

### Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

## Notes

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## Appendix A. BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

### A-1 BIOS Error Beep Codes

| BIOS Error Beep Codes                              |                                 |  |
|--|---------------------------------|--|
| Beep Code  | Error Message                   | Description                                      |
| 1 beep   | Refresh                         | Circuits have been reset.<br>(Ready to power up) |
| 5 short beeps + 1 long beep                        | Memory Error                    | No memory detected in the system                 |
| 8 beeps  | Display memory read/write error | Video adapter missing or with faulty memory      |
| 1 continuous beep (with the front panel OH LED on) | System Overheat                 | 1 continuous beep with the front panel OH LED on |

## Notes

## Appendix B. Intel HostRAID Setup Guidelines

After all the hardware has been installed, you must first configure Intel's IOH-36D SATA RAID before you install the Operating System and other software drivers.

Important Note to the User:

- This chapter describes RAID Configuration Instructions for the Intel IOH-36D RAID Controller designed for the Windows OS.

### B-1 Introduction to Serial ATA and Parallel ATA

To configure the SATA RAID functions, you must first use the Intel IOH-36D SATA RAID Utility program to configure the RAID Level that you desire before installing the Windows XP/2000/2003 operating system and other software drivers. (The necessary drivers are all included in the bullx R423-E2 Resources CD that came with your motherboard.) The current version of the IOH-36D SATA RAID Utility can only support the 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 IOH-36D Serial RAID**

Located in the South Bridge of the 5520 chipset, the I/O Controller Hub (ICH10R) 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 IOH-36D supports the following PATA and SATA device configurations: Legacy mode and Native mode.

## The Intel HostRAID Configurations

The following types of Intel's HostRAID configurations are supported:

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

RAID 1 (Data Mirroring): an identical data image from one drive is copied to another drive. The second drive must be the same size or larger than the first drive.

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

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

## The Intel Matrix Storage

The Intel Matrix Storage, supported by the IOH-36D, 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 that 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 the 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 reboot.

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.

---

## Using the Intel IOH-36D SATA RAID Utility Program

### 1. Creating, Deleting and Resetting RAID Volumes:

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

```

RAID Volumes :
None defined.

Physical Disks :
Port Drive Model      Serial #              Size   Type/Status(Vol ID)
0   WDC WD2500SD-01K   WD-HMAL72034971      232.9GB Non-RAID Disk
1   WDC WD2500SD-01K   WD-HMAL72034599      232.9GB Non-RAID Disk
2   WDC WD2500JD-00F   WD-HMAEH1376109      232.9GB Non-RAID Disk
3   WDC WD2500JD-00F   WD-HMAEH1449527      232.9GB Non-RAID Disk

Press <CTRL-I> to enter Configuration Utility...

Adaptec SCSI BIOS v4.30.0
Copyright 2003 Adaptec, Inc. All Rights Reserved.

<<< Press <Ctrl><A> for SCSISelect(TM) Utility! >>>

Slot Ch ID LUN Vendor      Product              Size Bus Status
-----
04  A  10  0

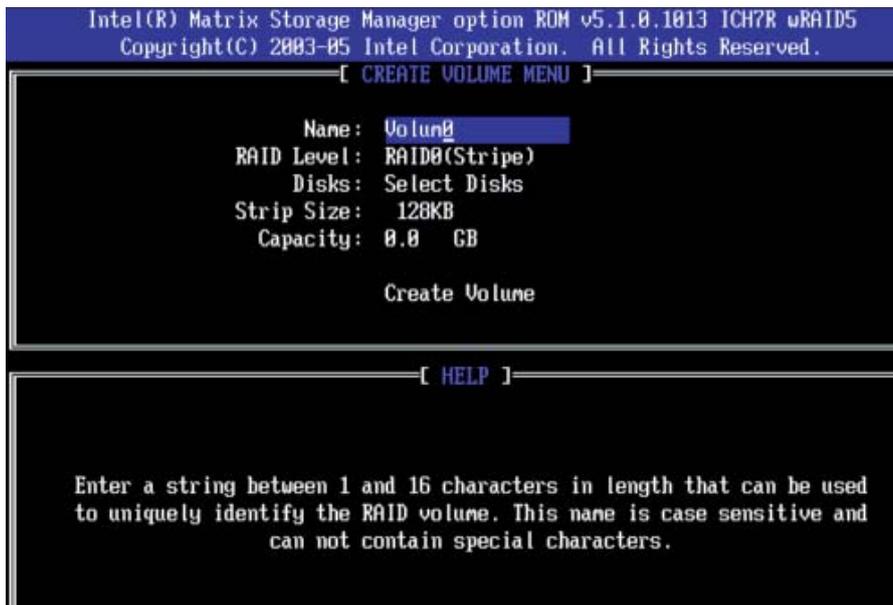
```

b. When you see the above screen, press the <Ctrl> and the <I> keys simultaneously to have the main menu of the SATA RAID Utility appear:

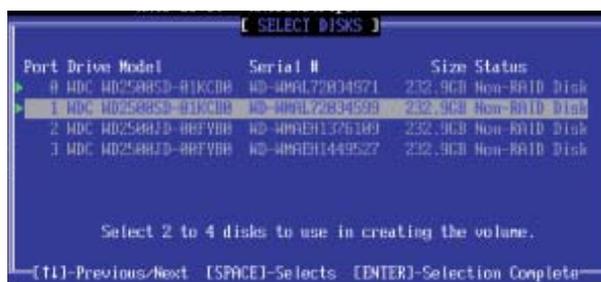
**Note:** All graphics and screen shots shown in the manual are for reference only. The screen shots shown in the manual do not imply Supernicro's endorsement or non-endorsement on any 3rd party's product. Your screens may or many not look exactly the same as the graphics shown in this manual.

**Creating a RAID 0 Volume:**

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



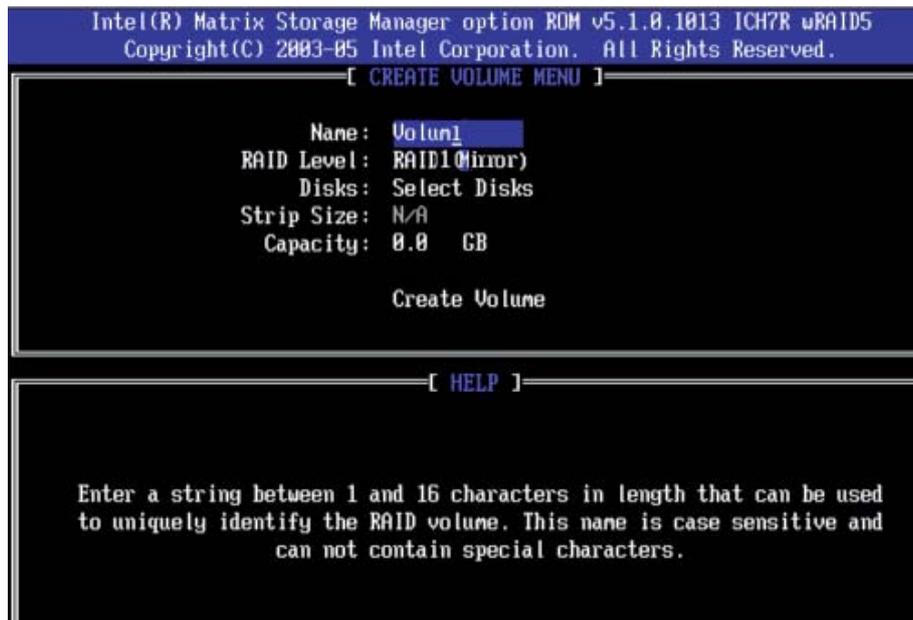
- b. Specify a name for the RAID 0 set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)
- c. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select RAID 0 (Stripe) and hit <Enter>.
- d. When the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



- e. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to confirm the selection of the drive.
- f. Use the <Up Arrow>, <Down Arrow> keys to select the stripe size, ranging from 4 KB to 128 KB for the RAID 0 array, and hit <Enter>. (**Note:** For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.)
- g. Press <Enter> when the Create Volume item is highlighted. A warning message displays.
- h. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

**Creating a RAID 1 Volume:**

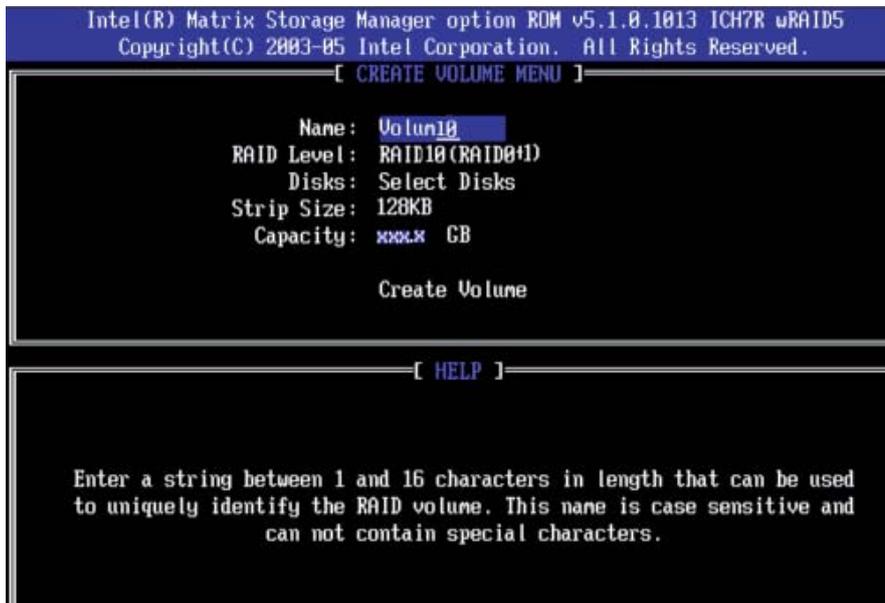
- a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:



- b. Specify a name for the RAID 1 set and press the <Tab> key or the <Enter> key to go to the next field. (You can use the <Esc> key to select the previous menu.)
- c. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select RAID 1 (Mirror) and hit <Enter>.
- d. When the Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.
- e. Press <Enter> when the Create Volume item is highlighted. A warning message displays.
- f. When asked "Are you sure you want to create this volume (Y/N)", press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

**Creating a RAID 10 (RAID 1+ RAID 0):**

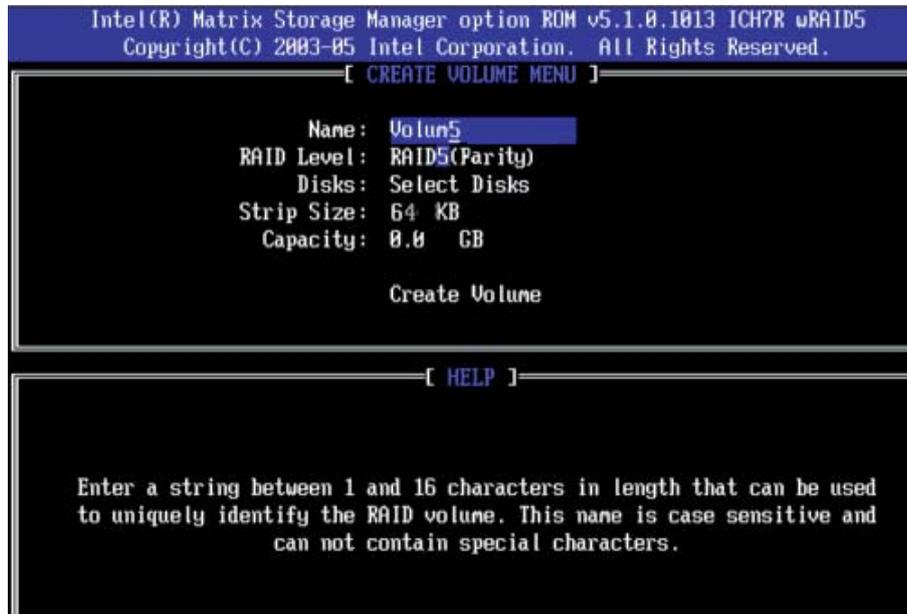
a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:



- b. Specify a name for the RAID 10 set and press <Enter>.
- c. When RAID Level item is highlighted, use the <Up Arrow>, <Down Arrow> keys to select RAID 10 (RAID1 + RAID0) and hit <Enter>.
- d. When the Stripe Size is highlighted, use the <Up Arrow>, <Down Arrow> keys to select the stripe size from 4 KB to 128 KB for your RAID 10 and hit <Enter>. The default setting is 64 KB. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size.)
- e. When the RAID Volume Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.
- f. Press <Enter> when the Create Volume item is highlighted. A warning message displays.
- g. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

**Creating a RAID 5 Set (Parity):**

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



- b. Specify a name for the RAID 5 set and press <Enter>.
- c. When the Raid Level is highlighted, use the <Up Arrow>, <Down Arrow> keys to select RAID 5 (Parity) and hit <Enter>.
- d. When the Disk item is highlighted, press <Enter> to select the HDD to configure as RAID. The following pop-up screen (\*See the Note on Page C-3) displays:



- e. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to confirm the selection of the drive.
- f. Use the <Up Arrow>, <Down Arrow> keys to select the stripe size, ranging from 4 KB to 128 KB for the RAID 5 array, and hit <Enter>. (**Note:** For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.)
- g. Enter your desired RAID volume capacity and press <Enter> when the capacity item is highlighted. The default setting is the maximum capacity allowed.
- h. Press Enter when the Create Volume item is highlighted. A warning message displays.
- i. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

**Deleting RAID Volume:**



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

- a. From the main menu, select item2-Delete RAID Volume, and press <Enter>.
- b. Use the <Up Arrow>, <Down Arrow> keys to select the RAID set you want to delete and press <Del>. A Warning message displays.
- c. When asked "Are you sure you want to delete this volume (Y/N), press "Y" to delete the RAID volume, or type "N" to go back to the Delete Volume menu.

**Resetting to Non-RAID and Resetting a RAID HDD**

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

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



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

**Exiting the Intel Matrix Storage Manager Utility:**

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



## Appendix C. Adaptec HostRAID Setup Guidelines

After all the hardware has been installed, you must first configure the Adaptec Embedded Serial ATA RAID before you install the Windows operating system. The necessary drivers are all included on the bullx R423-E2 Resources CD that came packaged with your motherboard. Note: *The following section provides information on the Adaptec SATA RAID Driver based on the Intel South Bridge (IOH-36D/ICH10R) Controller.*

### C-1 Introduction to the Adaptec SATA RAID Controller

#### Serial ATA (SATA)

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

#### ICH10R I/O Controller Hub

Located in the South Bridge of the Intel 5520 chipset, the ICH10R I/O Controller Hub provides the I/O subsystem with access to the rest of the system. It supports a 1-channel Ultra ATA/100 Bus Master IDE controller and an Adaptec SATA Host Controller, which support up to six SATA drives, up to two RAID volumes and up to four drives in RAID configurations. See the table below for details.

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

## **Configuring Adaptec SATA RAID for supported Operating Systems**

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

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

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

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

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

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

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

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

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

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

## Adaptec SATA with HostRAID 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, bullx R423-E2 serverboard offers the user the benefits of SATARAID without the high costs associated with hardware RAID applications.

## Using the Adaptec RAID Configuration Utility (ARC)

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

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

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

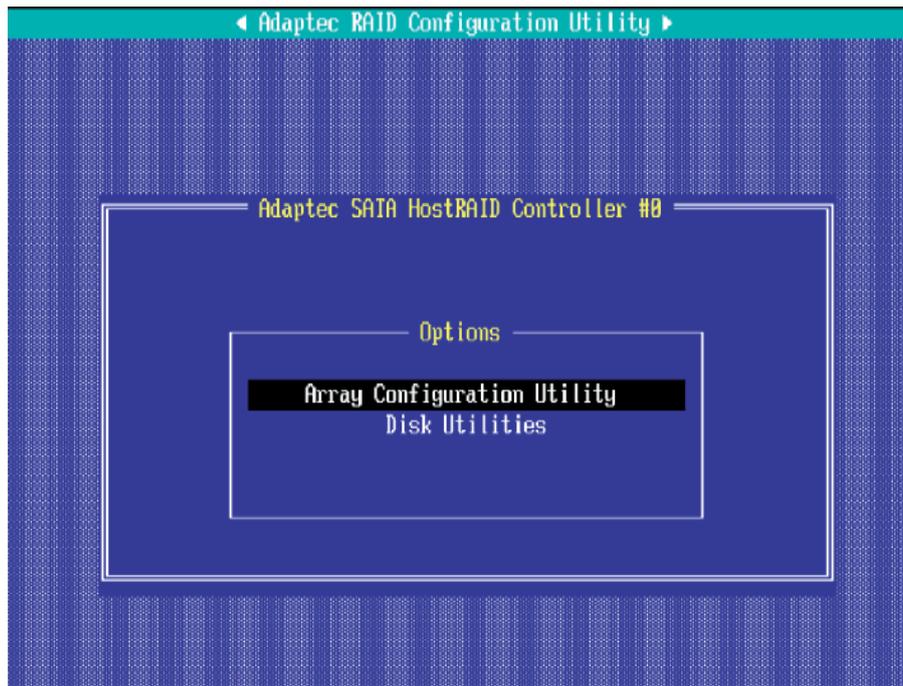
To run the Adaptec RAID Configuration Utility, you will need to do the following:

1. Enable RAID functions in the system BIOS (refer to Chapter 7 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.)

### A. Using the Array Configuration Utility (ACU)

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

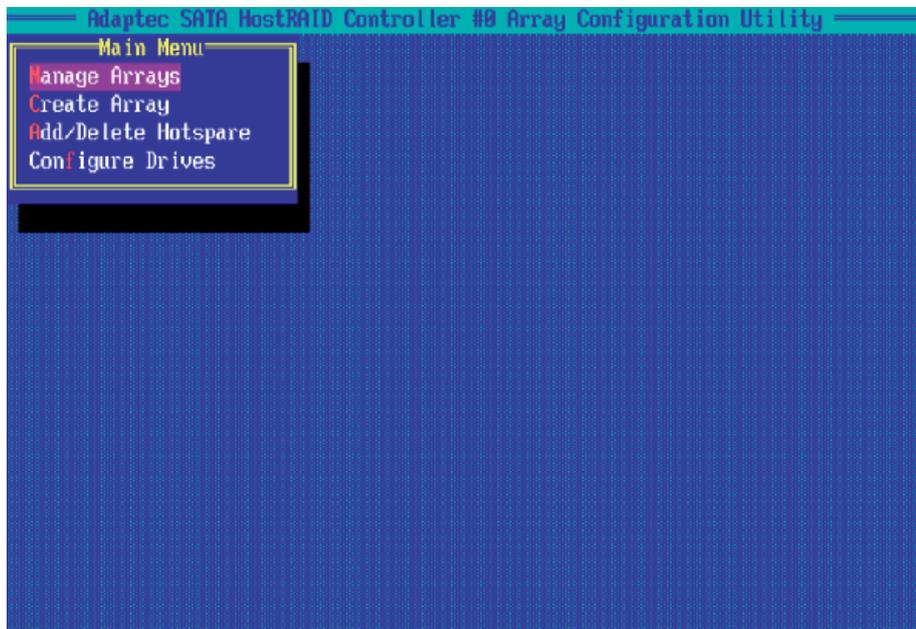
**Note:** To select an option, use the arrow keys to highlight the item and then press the <Enter> key to select it. To return to the previous menu, press the <ESC> key. Press the <Insert> key to select a drive. When a drive is highlighted (selected), press the <Delete> key to de-select it.



## Managing Arrays

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

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



## Configuring Disk Drives

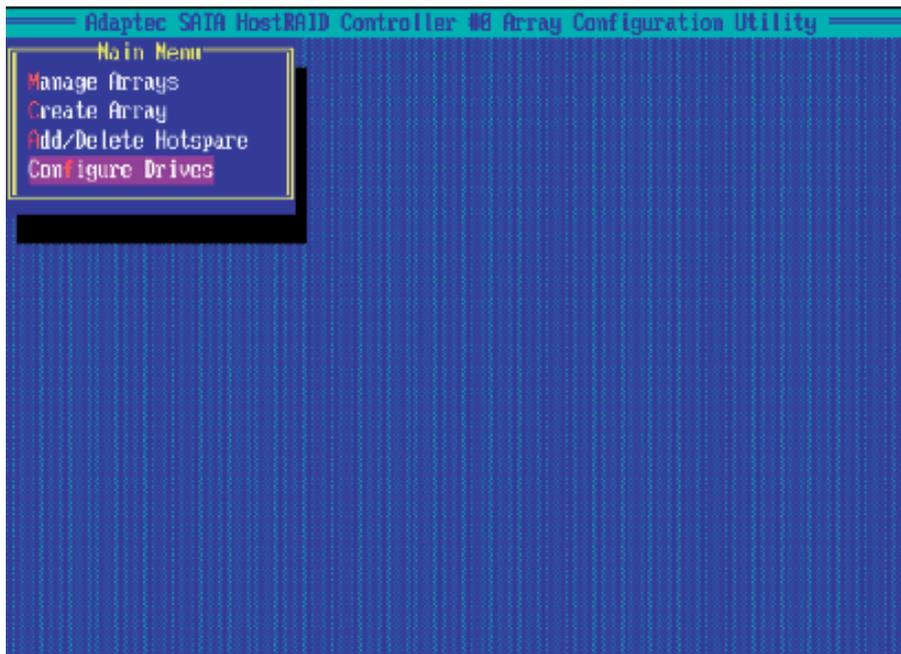
You may need to configure a disk drive before you can use it.

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

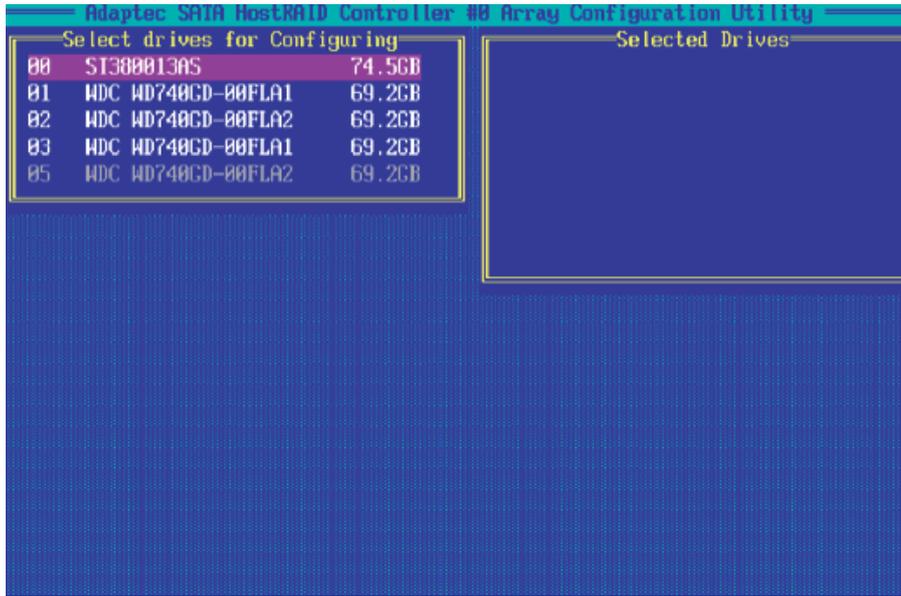
***Do not configure*** a disk that is part of a boot array. To determine which disks are associated with a particular array, please refer to [Viewing Array Properties](#).

### **To configure a disk drive:**

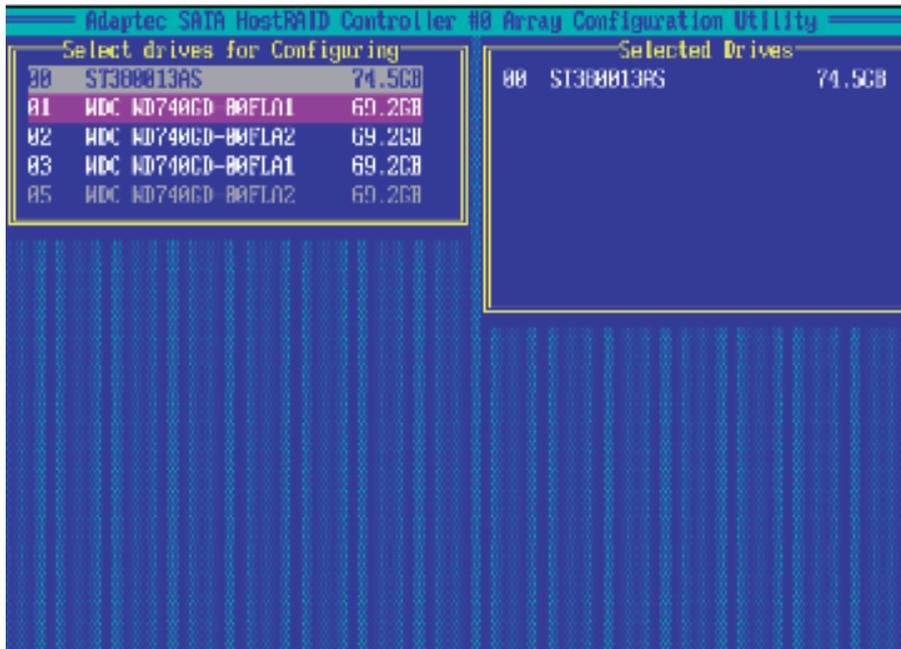
1. From the main menu (shown on Page C-4), select Configure Drives and hit <Enter> (as shown below.)



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

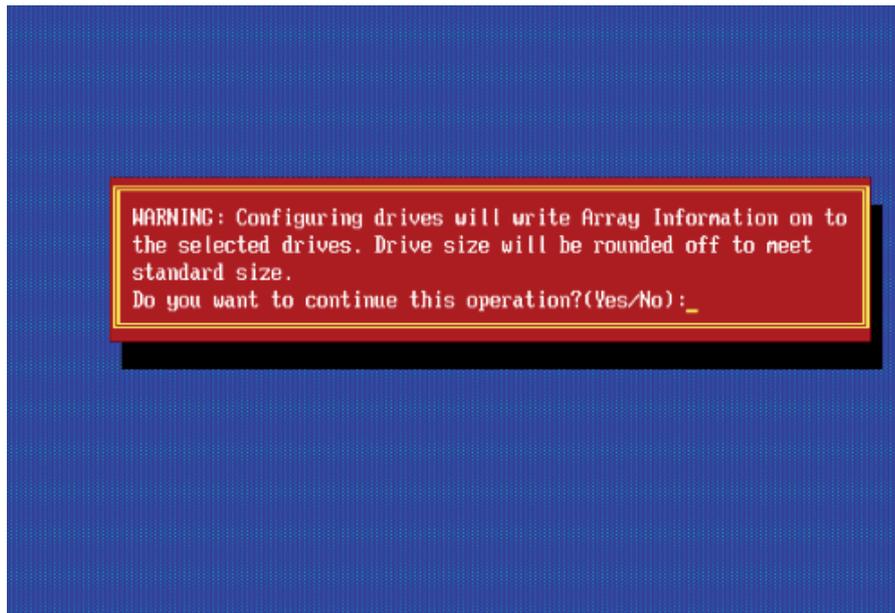


3. The drive you've selected will appear in the "Selected Drives Dialog Box" on the right (as shown below.) Repeat the same steps until all drives that you want to configure appear in the selected drives box.



4. Once both drives display in the selected drive box, press <Enter>.

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



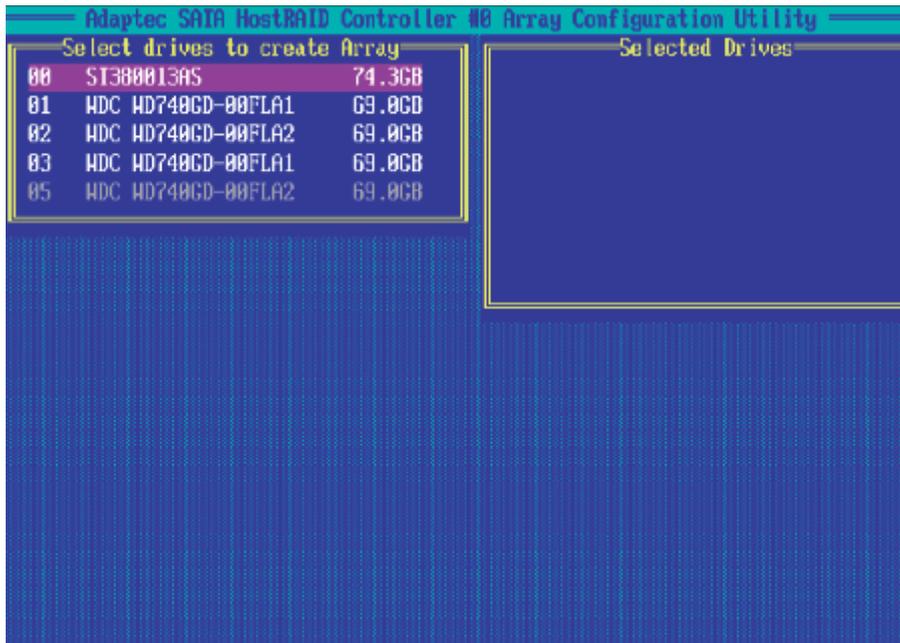
6. Make sure that you have selected the correct disk drives to configure. If correct, type Y to continue.

## 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.)

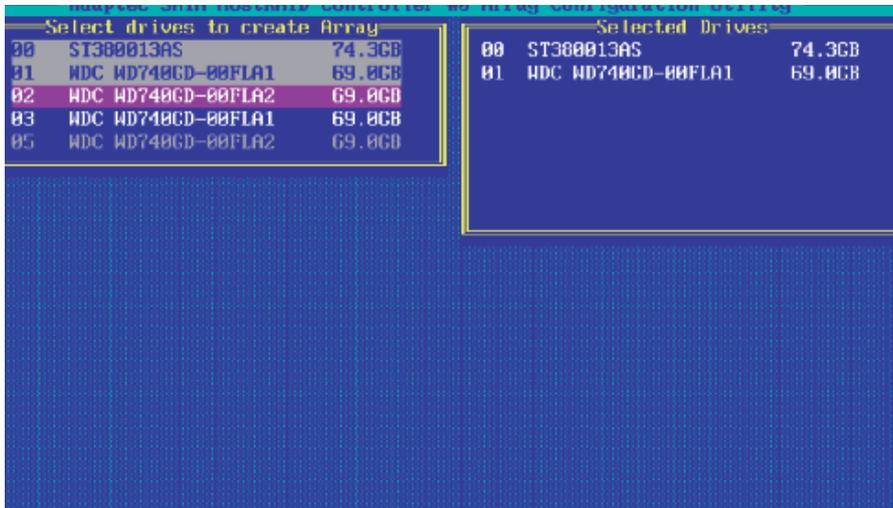
### To create an array:

1. From the main menu (shown on page C-4), select Create Array.
2. Select the disks for the new array and press Insert (as the screen shown below).  
**Note:** To de-select any disk, highlight the disk and press Delete.



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

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



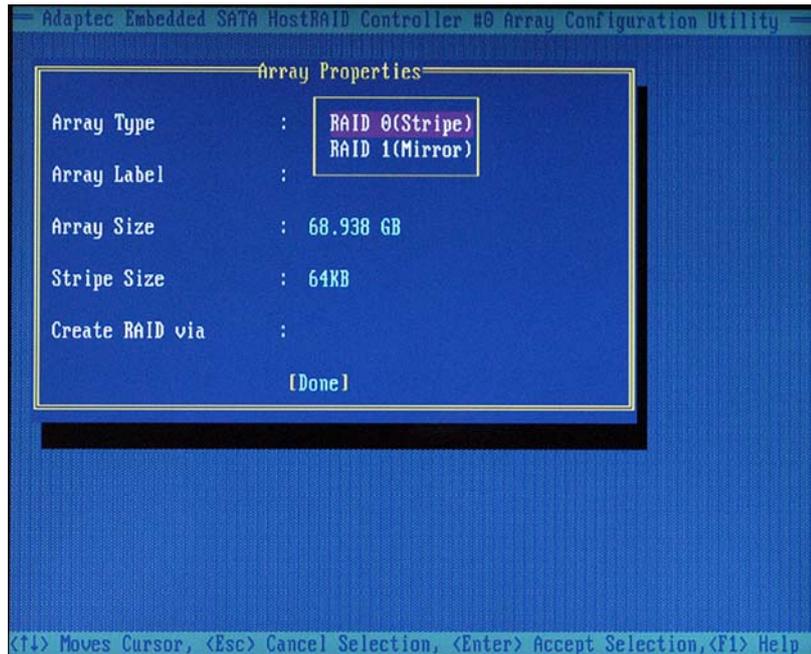
## Assigning Array Properties

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

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

To assign properties to the new array:

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



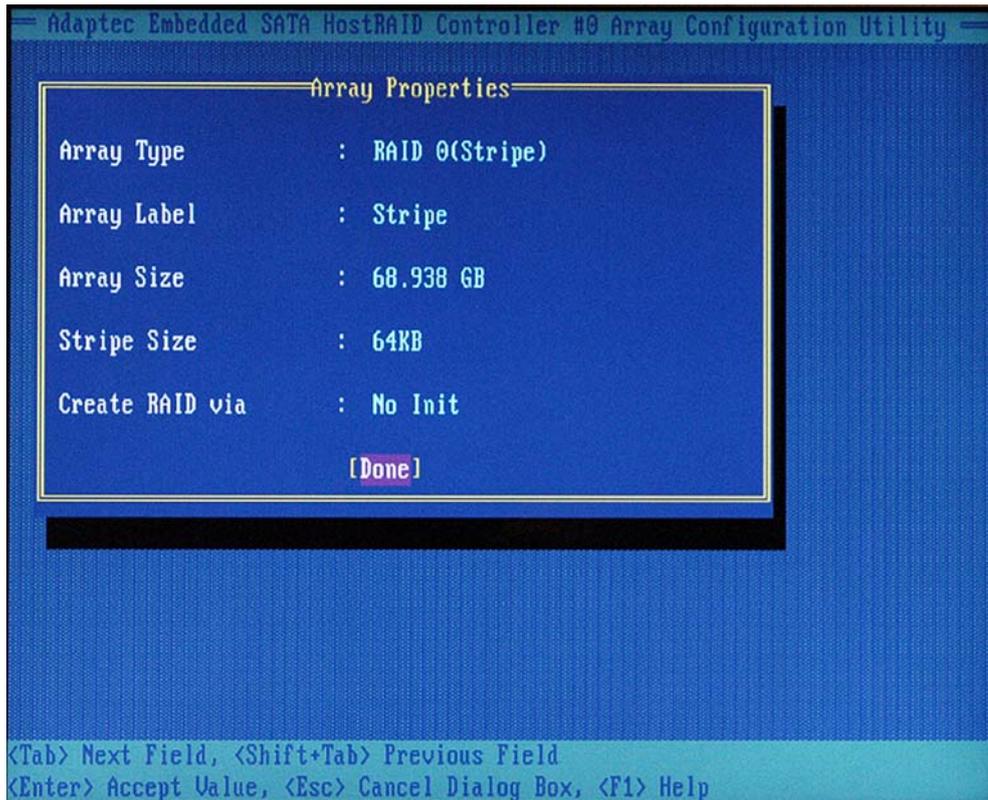
2. Under the item "Array Label", type in a label and press <Enter>. (Note: The label shall not be more than 15 characters.)
3. For RAID 0, select the desired stripe size. (**Note:** Available stripe sizes are 16, 32, and 64 KB. 64K is default. Please do not change the default setting.)
4. The item: "Create RAID via" allows you to select between the different ways of creating methods for RAID 0 and RAID 1.

The following table gives examples of when each is appropriate.

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

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

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



**Notes:**

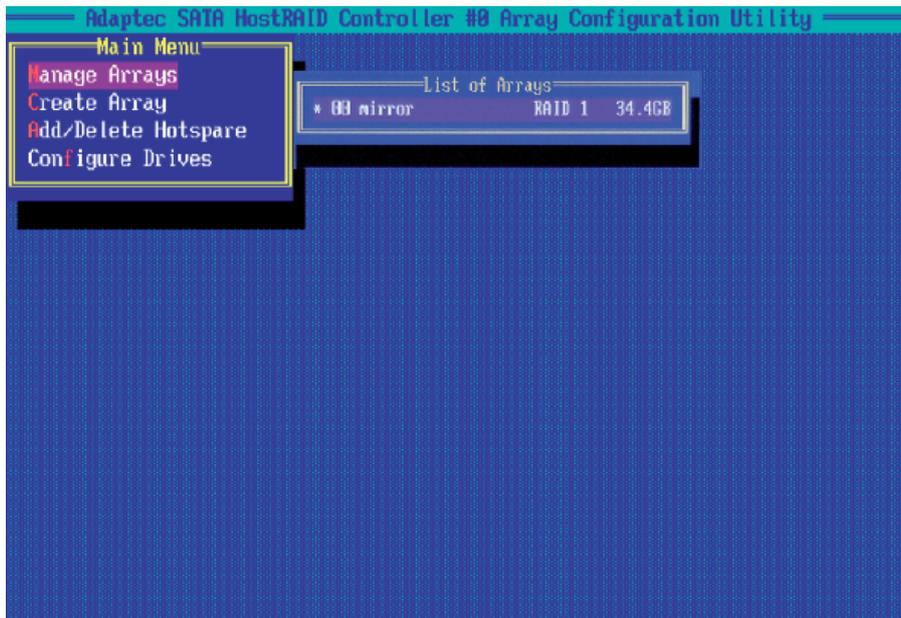
1. Before adding a new drive to an array, be sure to back up any data stored on the new drive; otherwise, all data will be lost.
2. If you stop the Build or Clear process on a RAID 1, you can restart it by pressing <Ctrl> and <R>.
3. If you've used the Quick Init option to create a RAID1, it may return some data mis-comparison when you run a consistency check at a later time. This is normal.
4. The Adaptec Host RAID allows you to use drives of different sizes in a RAID. However, you can only select a smaller drive as the source or first drive during a build operation.
5. When migrating from single volume to RAID 0, migrating from a larger drive to a smaller drive is allowed. However, the destination drive must be at least half the capacity of the source drive.
6. It is not recommended that you migrate or build an array on Windows dynamic disks (volumes) because it will result in data loss.

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

## Adding a Bootable Array

To make an array bootable:

1. From the Main menu, select Manage Arrays.
2. From the List of Arrays, select the array you want to make bootable, and press <Ctrl> and <B>.
3. Enter Y to create a bootable array when the following message is displayed: "This will make all other existing bootable array non-bootable. Do you want to make this array bootable? (Yes/No):" Then, a bootable array will be created. An asterisk (\*) will appear next to the bootable array (as shown in the picture below:)



## Deleting a Bootable Array

To delete a bootable array:

1. From the Main menu, select Manage Arrays.
2. From the List of Arrays, select the bootable array you want to delete, and press <Ctrl> and <B>. Note: a bootable array is the array marked with an asterisk (\*) (as shown in the picture above.)
3. When the following message is displayed: "The array is already marked bootable. Do you want to make this array as not bootable? (Yes/No)," Enter Y to delete a bootable array. The bootable array will be deleted and the asterisk will disappear.

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

## Adding/Deleting Hotspares

### To add a Hotspare:

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

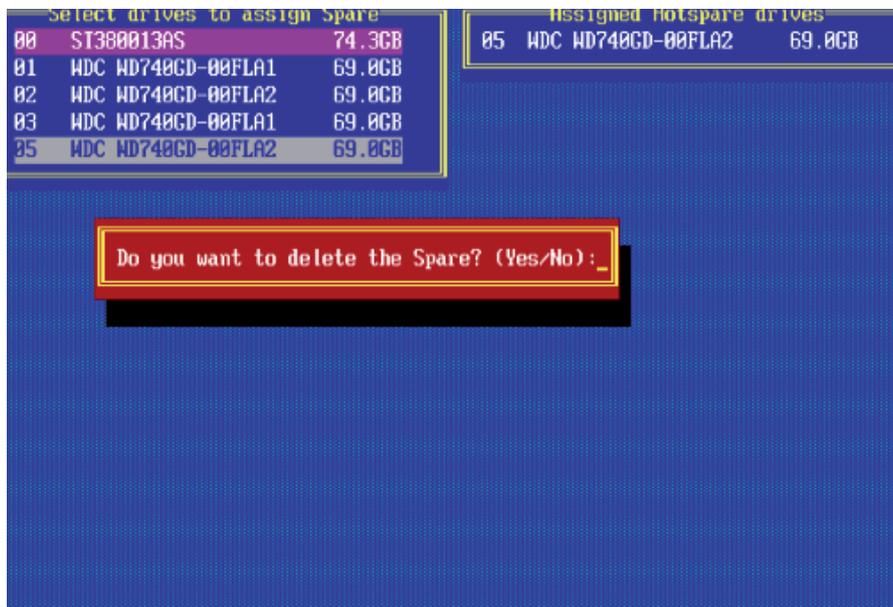
1. From the main menu (shown on Page C-4), select Add/Delete Hotspares.
2. Use the up and down arrow keys to highlight and select the disk you want to designate as a hotspare, and press <Insert>, and then, press <Enter>.
3. Press Yes when the following prompt is displayed:

"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 C-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.

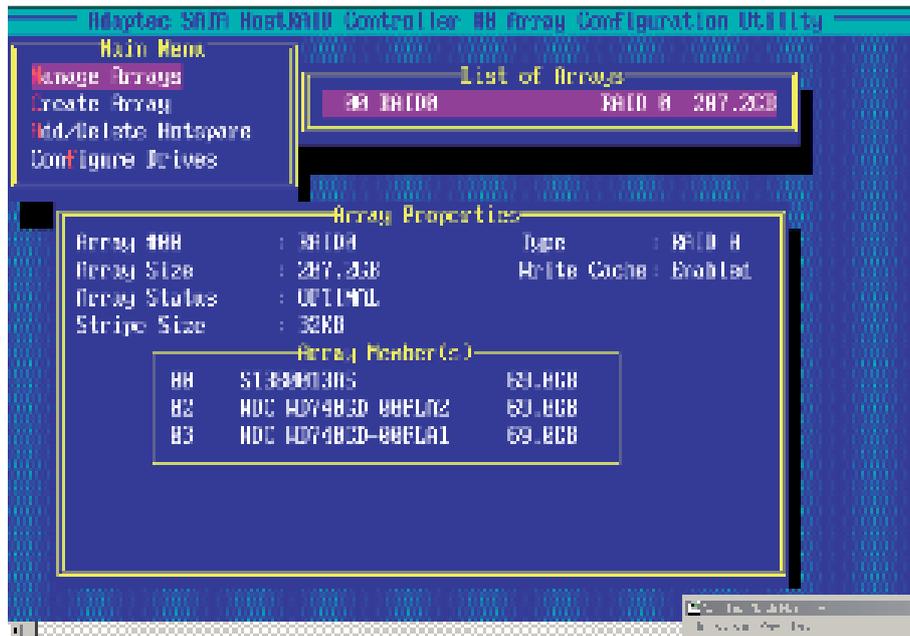


## Viewing Array Properties

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

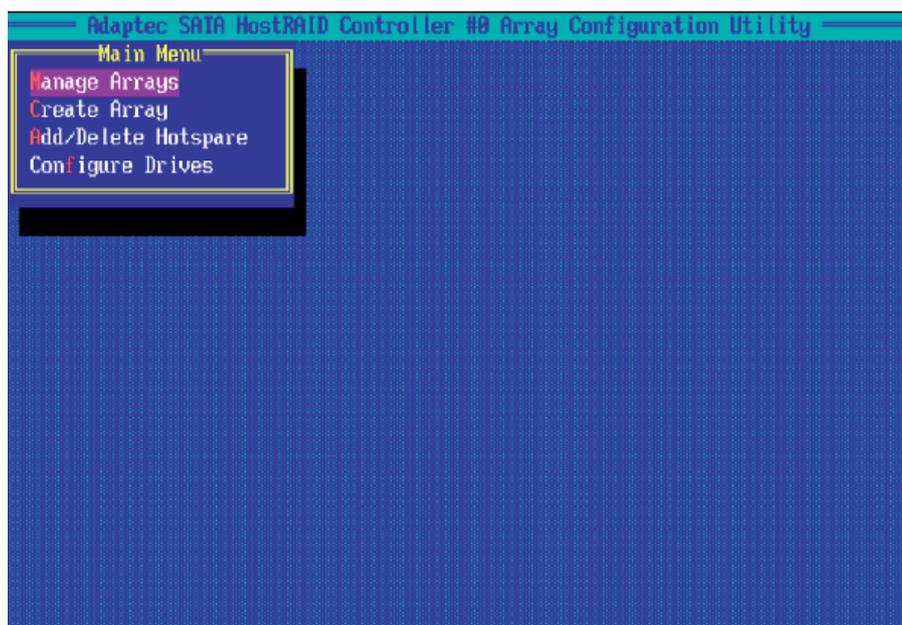
If an array Build process is interrupted or when one critical member is missing, you must perform a Rebuild to restore its functionality. For a critical array rebuild operation, the optimal drive is the source drive.

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

### To Rebuild an array:

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

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



### **Deleting Arrays**

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

To delete an existing array:

1. From the main menu (shown on Page C-4), select Manage Arrays.
2. Select the array you wish to delete and press <delete>.
3. In the Array Properties dialog box, select Delete and press <Enter>. The following prompt is displayed:

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

RAID 1 only—the following prompt is also displayed:

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

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

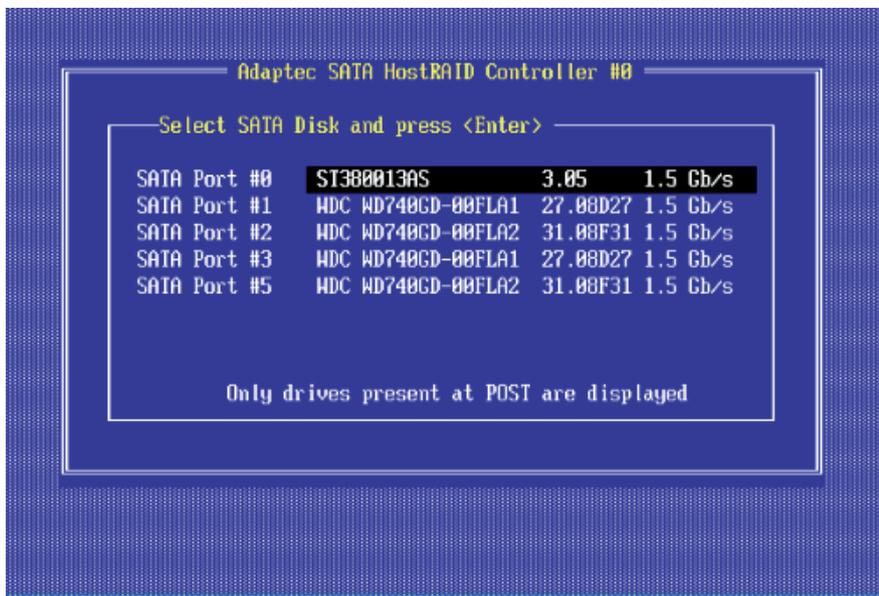
## Using the Disk Utilities

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

### To access the disk utilities:



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

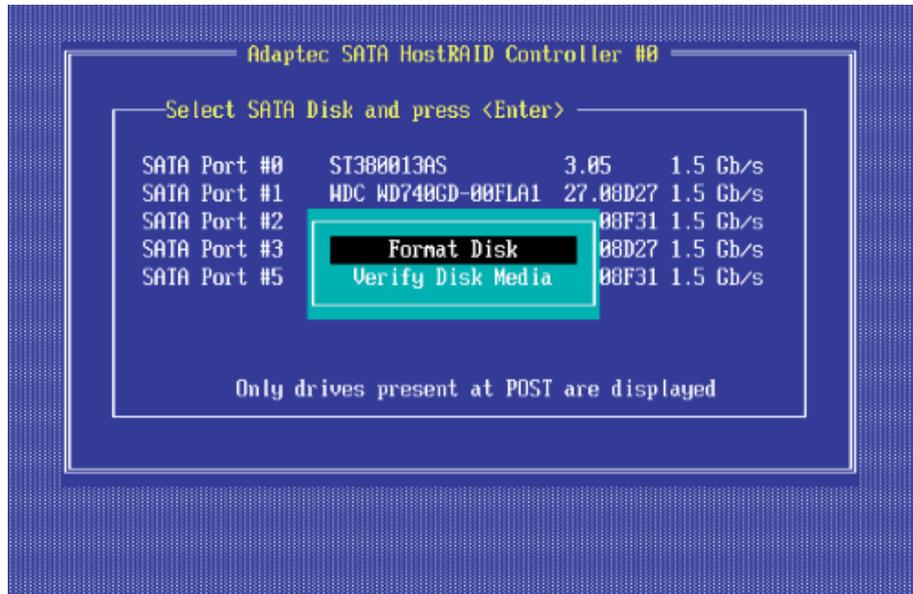


2. Select the desired disk and press <Enter>. The following screen appears:

**To format a disk:**

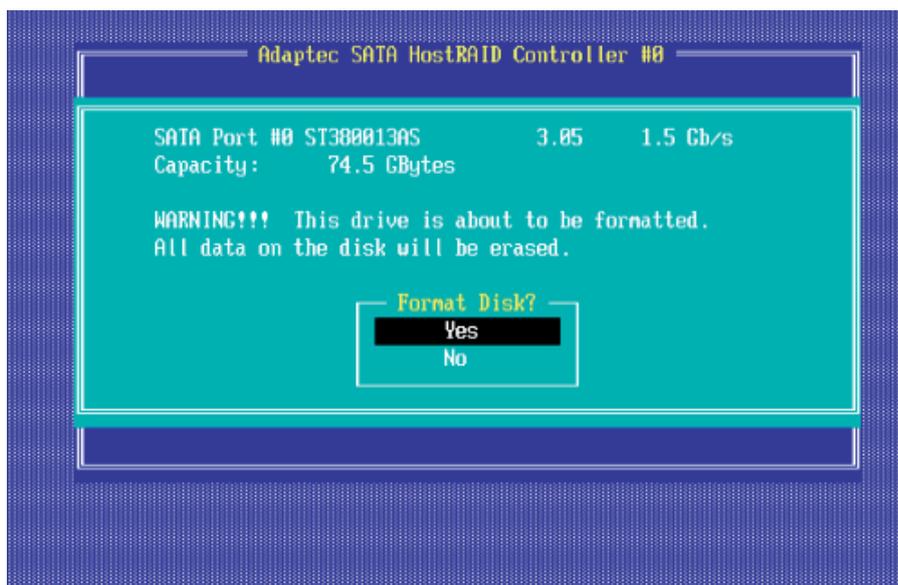
**Note:** The operation of Formatting Disk allows you to perform a low-level formatting of a hard drive by writing zeros to the entire disk. Serial ATA drives are low-level formatted at the factory and do not need to be low-level formatted again.

3. When the screen shown below displays, select Format Disk and press <Enter>. The following screen appears:

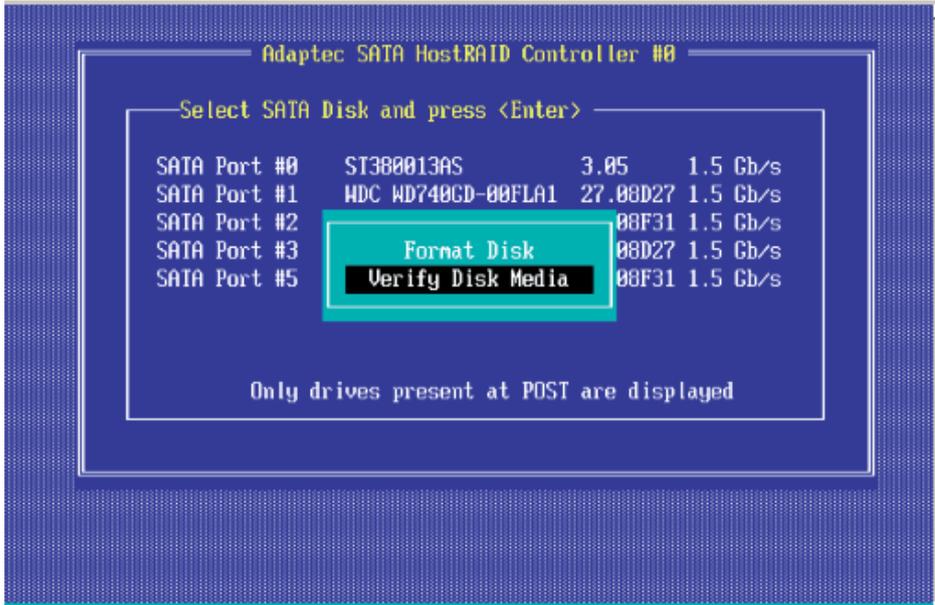


4. Read the warning message when it appears in the screen as shown below. To continue with disk formatting, select Yes and hit <Enter>. Otherwise, select No and press <Enter>.

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

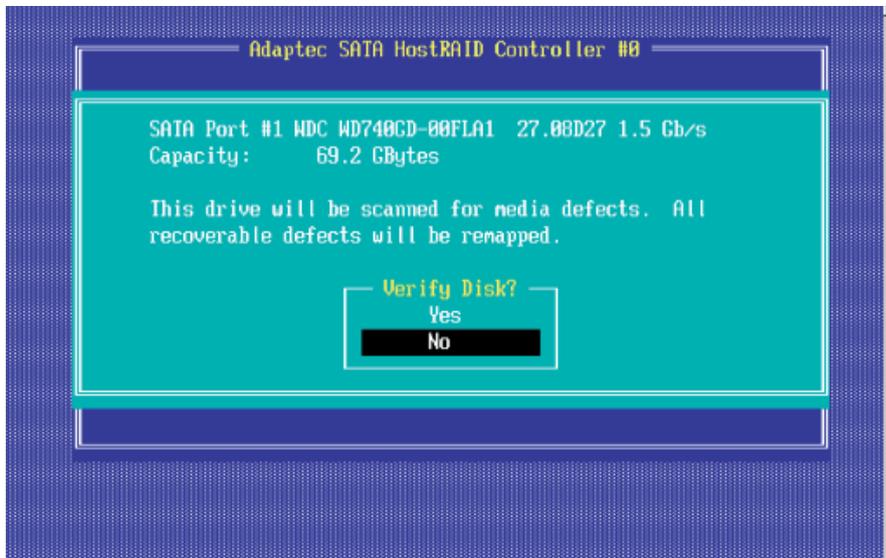


**To verify disk media:**



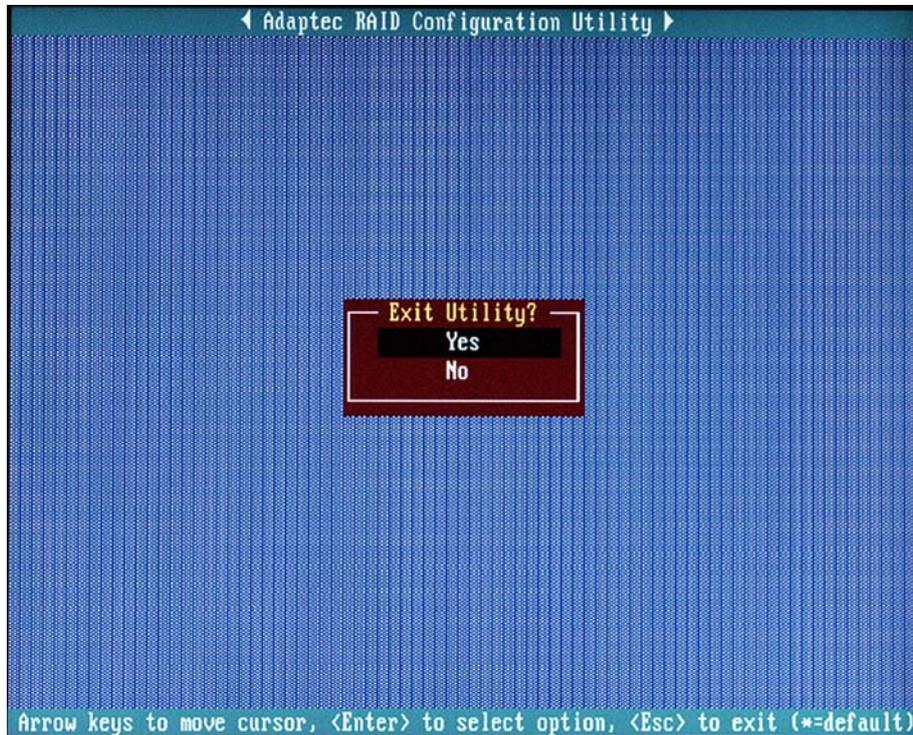
3. When the screen shown above displays, select Verify Disk Media and press <Enter>.

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



**To Exit Adaptec RAID Configuration Utility**

1. Once you have completed RAID array configurations, press ESC to exit. The following screen will appear.
2. Press Yes to exit the Utility.





## Appendix D. System Specifications

**Note:** unless noted specifications apply to a complete system (both server-boards).

### Processors

Two Intel® 5500 Series (LGA 1366) processors, each processor supporting two full-width Intel QuickPath Interconnect (QPI) @ 6.4 GT/s with a total of up to 51.2 GB/s Data Transfer Rate (6.4 GB/s per direction)

### Chipset

Intel 5520 chipset, including two 5520 I/O Hubs (North Bridge) and one ICH10R (South Bridge).

### BIOS

- 32 Mb AMI SPI Flash ROM,
- PCI 2.2, ACPI 1.02/2.0/3.0, Plug and Plat (PnP), DMI 2.3, USB Keyboard support, and SMBIOS 2.3.

### Memory

Eighteen 240-pin DIMM sockets support up to 144 GB of DDR3 Registered ECC 1333/1066/800 MHz Memory modules (with maximum of 8 GB per DIMM module).

### Serial ATA Controller

Intel ICH10R supports six 3 Gb/s Serial ATA2 ports (RAID 0, 1, 10, 5 for Windows, RAID 0, 1, 10 for Linux.)

### SATA Drive Bays

Eight hot-swap drive bays to house six standard SATA drives

### PCI Expansion

Three PCI-E 2.0 x8 slots (Slot 1/ Slot 3/Slot 7).

Two PCI-E 2.0 x16 slots (Slot 2/ Slot 6).

One PCI-E 2.0 x4 (in x8) slot (Slot 5).

One PCI-E 2.0 x8 (in x16) slot (Slot 4).

### Serverboard

R423-E2

13.68 x 13.00 in (347.5 x 330.2 mm)

bullx

Dimensions :

## Notes



BULL CEDOC  
357 AVENUE PATTON  
B.P.20845  
49008 ANGERS CEDEX 01  
FRANCE

REFERENCE  
86 A1 52FA 01