NOVASCALE

NovaScale T840 E2

User's Guide

REFERENCE
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User's Guide

Hardware

May 2009

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Text Conventions

This guide uses the following text conventions.

Warnings, cautions, and notes have the following meanings:

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

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

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

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

Safety Notices

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

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

Regulatory Information

European Notice

Products with the CE marking comply with both the Electromagnetic Compatibility Directive (2004/108/EEC) and the Low Voltage Directive (2006/95/EEC) - modified by the Directive 93/68/EEC - issued by the Commission of the European Economic Community.

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

- EN55022: Radio disturbance characteristics
- EN55024 : Immunity characteristics
- EN6100-3-2: Limitation of harmonic current emissions
- EN6100-3-3: Limitation of voltage fluctuation and flicker in low-voltage supply system
- EN60950-1: Product Safety. If your system includes a telecommunication network board, the input/output socket is classified as Telecommunication Network Voltage (TNV-3).

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

USA and Canada Notice

Products with UL marking comply with the following UL standards:

- UL 1950 (3rd edition 1998)

Products with FCC marking comply with the following FCC standards

- FCC part 15

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

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

Modifications to the Product

CE and FCC Marking

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

Connections and Remote Earths

PELV (Protected Extra Low Voltage)

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

SELV (Safety Extra Low Voltage)

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

Remote Earths

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

Building Supply

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

Power Supply and Cables

Power Supply

- The DC push-button on/off switch on the front panel does not turn off the system AC power. +5vdc is present on the system board whenever the AC power cords are connected between the system and an AC outlet. Before doing the procedures in

this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

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

Cables

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

Batteries

Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance. Also refer to *"Product Disposal" on page 13*.

Chassis Cover Removal and Replacement

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

Laser Compliance Statement

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

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

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

Warning - Hazardous Voltage!

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

Warning -Avoid Electrostatic Discharge!

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

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

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

Product Disposal

The Waste Electrical and Electronic Equipment (WEEE) Directive requires that used electrical and electronic products must be disposed of separately from normal household waste in order to promote reuse, recycling and other forms of recovery and to reduce the quantity of waste to be eliminated with a view to reducing landfill. WEEE includes accessories such as keyboard, mouse, remote control, speakers, etc. When you dispose of such products, please follow the agreement made between you and us and/or your distributor.

T840 E2 System Features

This system is a highly flexible and reliable server designed to offer the highest levels of performance for the price range.

Its main features are:

- The Intel® Tylersburg chipset.
- The Intel® Xeon® Nehalem-EP and Westmere-DP processors.
- The RAID technology, offering support for various RAID levels on Microsoft® Windows® and Linux operating systems.
- The tower chassis can easily be installed into a standard EIA 19-inch rack cabinet.

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

Related Documents

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

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

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

T840 E2 System Chassis Features

Front View

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

Figure 1: Front View (with Front Bezel)

Front Bezel Lock

Lock the front bezel to prevent unauthorized access to the inside of the chassis.

Figure 2: Front Door Lock (A)

Note: *the keys can be found behind the front bezel.*

Front view details

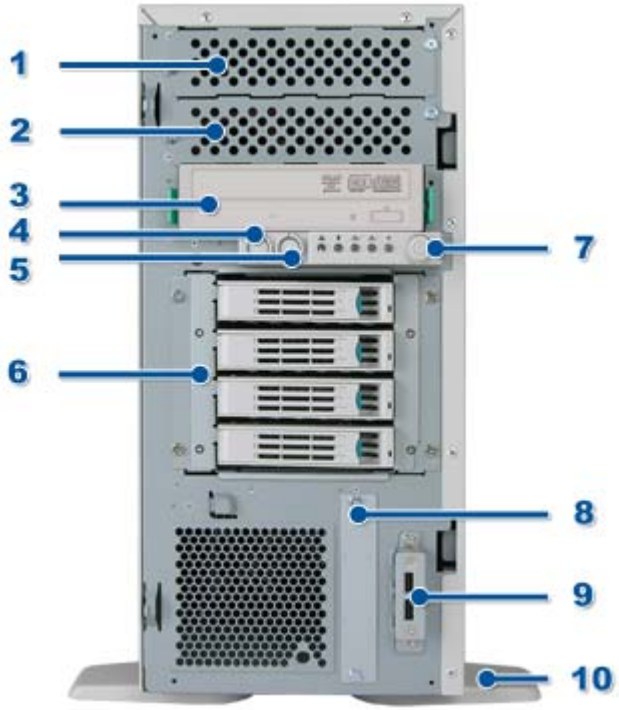


Figure 3: Front View (without Front Bezel)

1. 5.25-inch device bay.

A backup file device of 5.25-inch width such as DAT drive or MO drive may be installed in the 5.25-inch device bay.

2. 5.25-inch device bay.

Refer to (1)

3. Optical disk drive.

The optical disk drive reads or writes data from/onto the inserted CD-ROM or DVD-ROM.

The drive is equipped with the following:

- Open/Close button to eject the tray
- Access lamp that indicates the disk access status (lights while being accessed)
- Emergency hole to forcibly eject the tray

4. DUMP switch

5. RESET switch

6. Hard disk drive bay.

The bay can contain hard disk drives.

7. POWER/SLEEP switch.

The POWER/SLEEP switch is used to turn the power of the server ON/OFF. If you press this switch once, the power is turned on with the lamp going on green. If you press the switch again, the power is turned off.

Some operating systems may provide the function of switching to a power saving (sleep) mode. If you press the POWER/SLEEP switch once after the setting, the system enters the power saving mode. If you press the switch again, the system returns to the normal state.

8. 3.5-inch floppy disk drive bay.

Not used.

9. USB connectors.

The USB connectors allow the server to connect with USB 2.0 devices.

10. Stabilizers.

Use the stabilizers to prevent the server from falling down. Close the stabilizers when laying the server down.

Front Lamps Indication

This section explains the indication and meanings of the system lamps located on the front panel of your system.

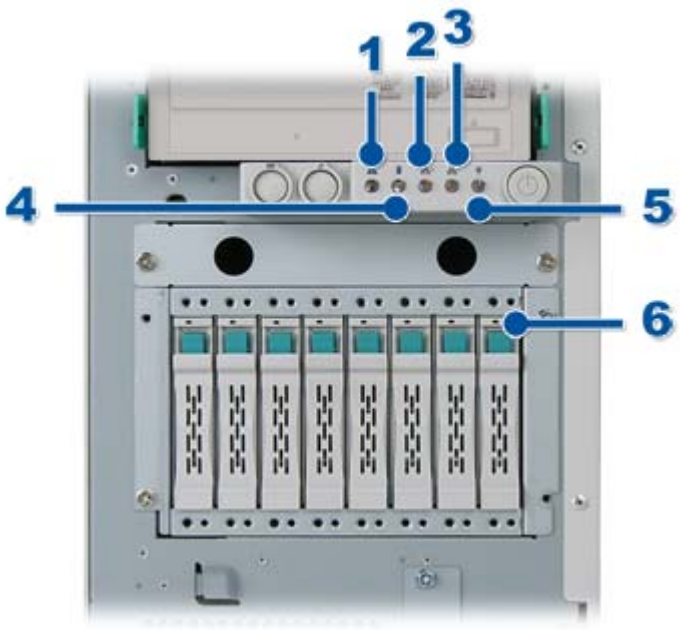


Figure 4: Front panel lamps

1. STATUS lamp

Lights green: the server is operating normally.

blinks amber: the server is in abnormal state.

Off: the server is in abnormal state.

Refer to *"Diagnostic LEDs" on page 170* to check the meaning and the procedure for the STATUS lamp indication.

2. LAN access lamp (2)

Lights green: data is being transmitted or received.

3. LAN access lamp (1)

Lights green: data is being transmitted or received.

4. DISK ACCESS lamp

   Lights green: the hard disk drives is being accessed.

5. POWER/SLEEP lamp

   Lights green: the server is powered.

   Off: the server is off-powered.

   If the OS supports a power-saving mode, the green lamp flashes while the server is in this power-saving mode. Pressing the POWER switch places the server back in the normal mode.

6. DISK lamps

   Each hard disk drive has a DISK lamp on its front panel. (1) in below figure

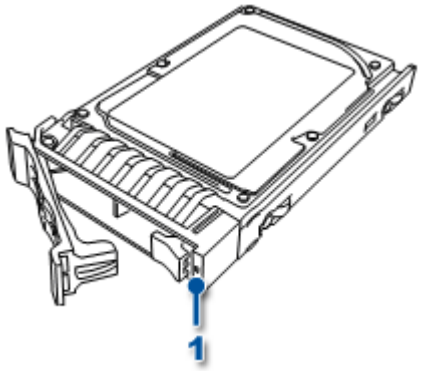


Figure 5: Disk lamp

Lights green: power is supplied to the hard disk drive.

Blinks green: the hard disk drive is being accessed.

Lights amber: the hard disk drive is defective in the RAID System configuration.

Note: *While hard disk drives are in a RAID System configuration (RAID1/ RAID5, RAID6, RAID10, or RAID50), a single failed hard disk drive does not affect the operation of the server.*

However, we recommend you replace the failed hard disk drive and auto-rebuild (reconfigure) the hard disk drives as soon as possible. (You can hot-swap such a failed hard disk drive.)

Blinks amber: during the data rebuild operation; when the defective hard disk drive is replaced with a new one in the RAID System configuration.

Blinks green/amber: the hard disk drive is being rebuilt (this status is not a failure).

Off: when the rebuild is terminated normally. The LED goes on amber if the rebuild fails.

Caution: *To abort a rebuild, power off the server. In such a case, restart the server, hot-swap the failed hard disk drive, and restart rebuilding. Observe the following notes to use the auto-rebuild feature.*

- *Do not power off the server. If the server is powered off before rebuilding hard disk drives, the auto-rebuild feature will not start.*

- *Wait at least 90 seconds between the removal of a failed hard disk drive and the installation of a new hard disk drive.*
- *Do not replace another hard disk drive while a rebuilding is already in progress.*

T840 E2 Rear View

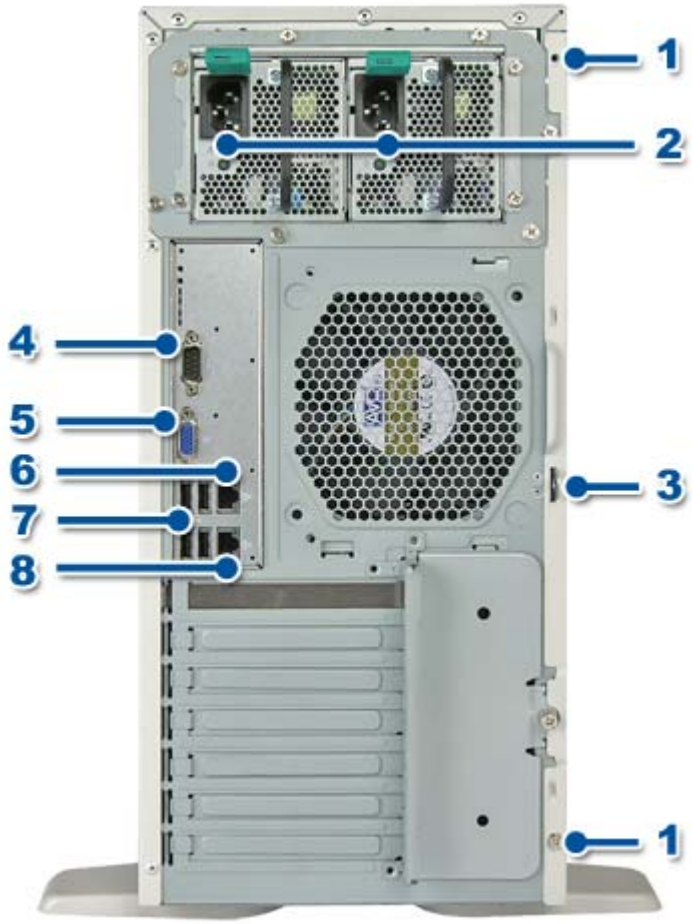


Figure 6: Rear View

1. Fixing screws.

   Secures the left side cover.

2. AC inlet.

   The AC inlet is connected with the power cord.

3. Cover lock plate.

   Installing a theft prevention device protects the internal components of the server from being stolen.

4. Serial port connector.

   The serial port connector is used to connect the server to a device with a serial interface. The server cannot be directly connected to a leased line through the connector.

5. VGA Monitor connector.

   Used to connect with the display unit.

6. LAN connector.

   The LAN connector is connected with a network system on a LAN (1000BASE-T/100BASE-TX/10BASE-T). The last digit indicates the port number.

7. USB connectors.

   The USB connectors are connected with devices accepting the USB 2.0 interface.

8. Management LAN port.

   The LAN connector is connected with management LAN (100BASE-TX/ 10BASE-T).

Rear Lamps Indication

Network ports

Figure 7: Rear panel lamps

1. LINK/ACT lamp

   This lamp indicates the state of each network port normally equipped with the server.

   Lights green: the server and the hub are correctly connected with each other (LINK state).

   Blinks green: information is transmitted through a network port (ACT state).

Note:

- *If the lamp does not light in the LINK state, check the network cable and the cable connection.*
- *If the lamp still does not light, the network (LAN) controller may be defective. Contact your service representative.*

2. 1000/100/10 lamp

   This lamp indicates whether each of the standard network ports is operated through the 1000BASE-T, 100BASE-TX or 10BASE-T network interface.

   Lights amber: the network port is operated through 1000BASE-T.

   Lights green: the network port is operated through 100BASE-TX.

   Off: the network port is operated through 10BASE-T.

Diagnostic LEDs

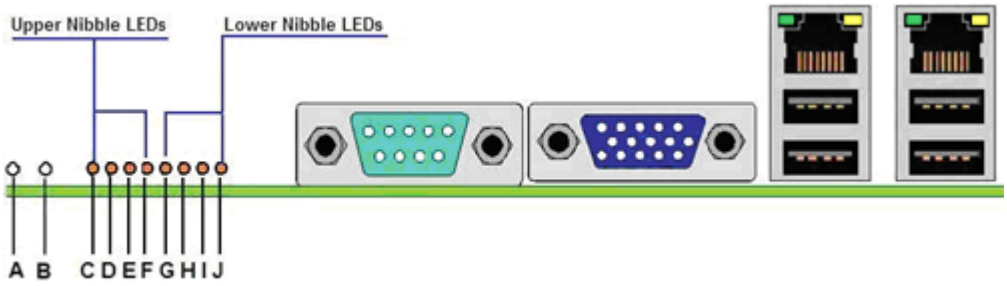


Figure 8: Diagnostic LED Placement Diagram

A. ID LED	F. Diagnostic LED #4
B. Status LED	G. Diagnostic LED #3
C. Diagnostic LED #7 (MSB LED)	H. Diagnostic LED #2
D. Diagnostic LED #6	I. Diagnostic LED #1
E. Diagnostic LED #5	J. Diagnostic LED #0 (LSB LED)

Refer to *"Diagnostic LEDs" on page 164* to check the meaning of LEDs status.

T840 E2 Internal View

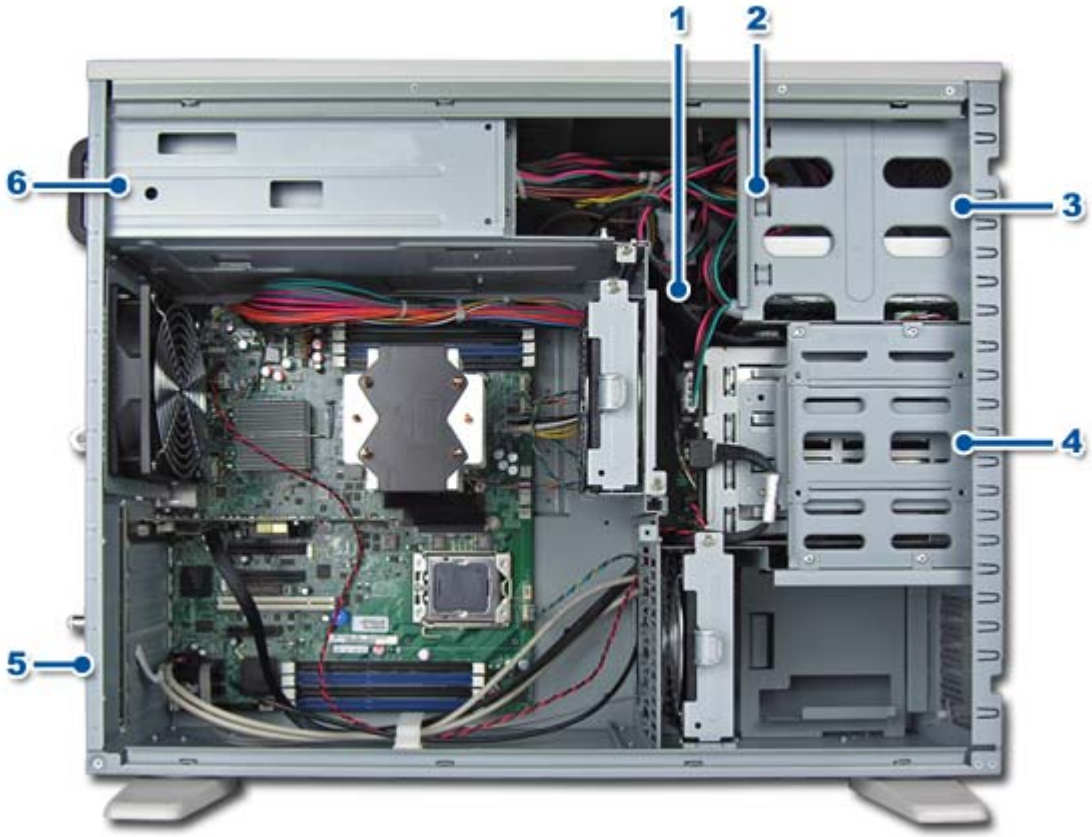


Figure 9: Internal View

1. Air duct
2. Tool-less device bay locks
3. 5.5 inch device bay
4. Hard disk drive bay
5. Rear tool-less PCI retention mechanism
6. Power supply

Motherboard

Motherboard Layout

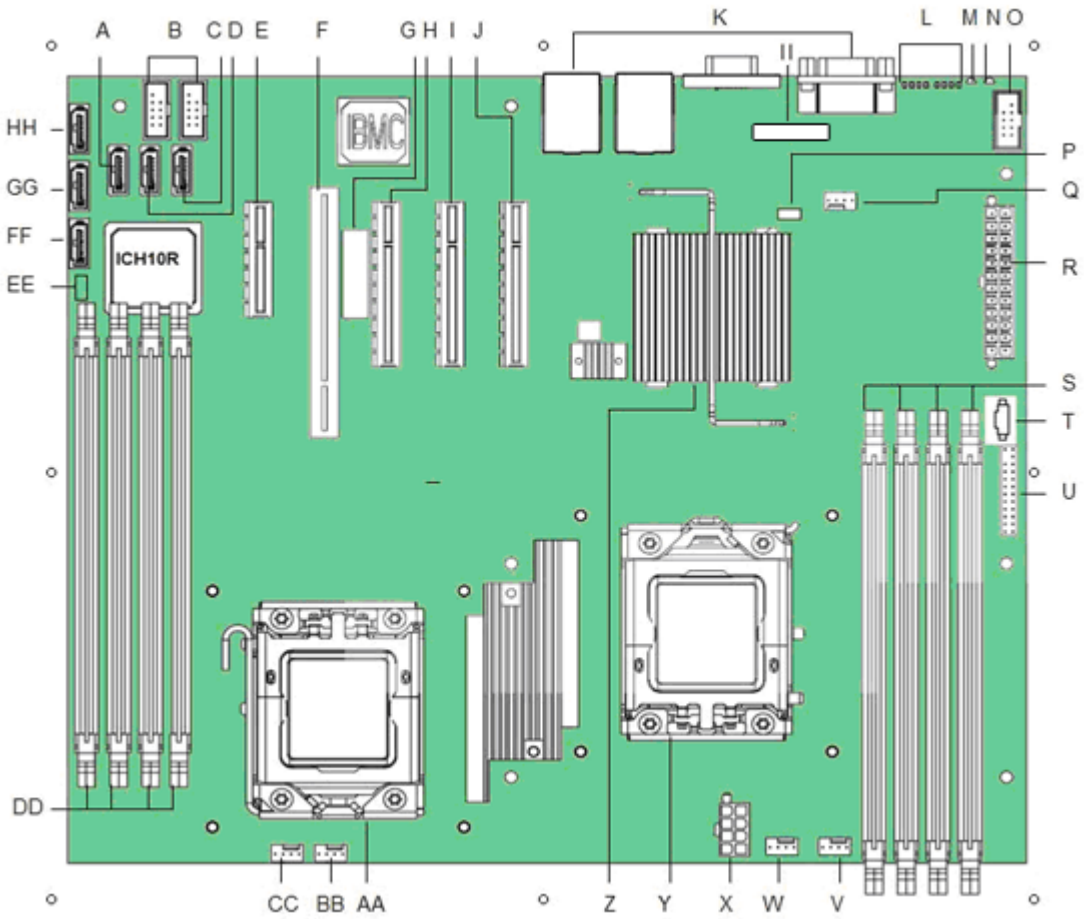


Figure 10: Motherboard Layout

A	SATA 3	J	Slot 7, PCI Express* x8	S	DIMM sockets off Processor 1 socket (Channel A, B)	BB	CPU 2 Fan header
B	Internal dual port USB2.0 header	K	Back panel I/O ports	T	Power Supply Auxiliary Connector	CC	System Fan 1 header
C	SATA 5	L	Diagnostic LEDs	U	SSI 24-pin Front Panel connector	DD	DIMM sockets off Processor 2 socket (Channel D, E)
D	SATA 4	M	Status LED	V	System fan 2 header	EE	SATA SGPIO
E	Slot 3, PCI Express* x4	N	ID LED	W	CPU 1 fan header	FF	SATA 0
F	Slot 4, 32-bit/33 MHz PCI	O	External Serial B header	X	CPU Power Connector	GG	SATA 1
G	Intel® RMM3 slot	P	SATA Key	Y	CPU Socket 1	HH	SATA 2
H	Slot 5, PCI Express* x8	Q	System fan 3 header	Z	Intel® IOH 5500 chipset	II	Battery
I	Slot 6, PCI Express* x8 (Riser card)	R	Main power connector	AA	CPU Socket 2		

Motherboard Jumpers

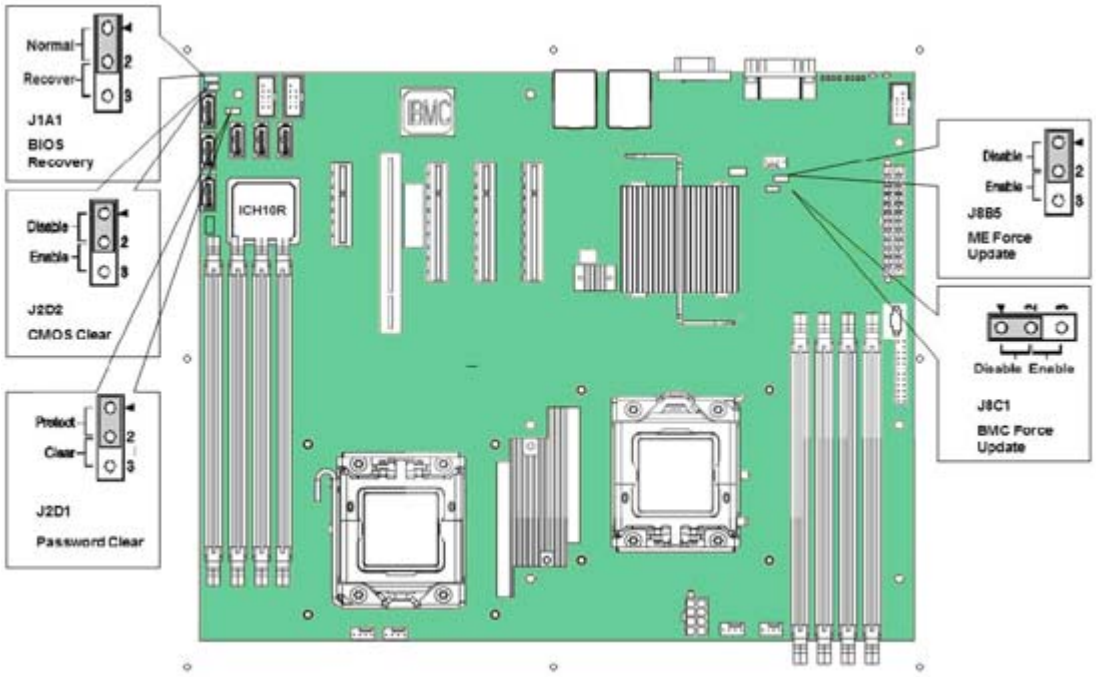


Figure 11: Motherboard Jumpers

Table 1: Motherboard Jumpers Description

Jumper Name	Pins	Jumper Purpose
J8C1: BMC Force Update	1-2	BMC Firmware Force Update Mode - Disabled (Default)
	2-3	BMC Firmware Force Update Mode - Enabled
J2D1: Password Clear	1-2	These pins should have a jumper in place for normal system operation. (Default)
	2-3	If these pins are jumpered, the administrator and user passwords are cleared on the next reset. NOTE: These pins should not be jumpered for normal operation.
J2D2: CMOS Clear	1-2	These pins should have a jumper in place for normal system operation. (Default)
	2-3	If these pins are jumpered, the CMOS settings are cleared on the next reset. NOTE: These pins should not be jumpered for normal operation.
J1A1: BIOS Recovery	1-2	These pins should have a jumper in place for normal system operation.(Default)
	2-3	The main system BIOS will not boot with these pins jumpered. NOTE: The system will boot from EFIbootable recovery media with a recovery BIOS image.
J8B5: ME Force Update	1-2	These pins should have a jumper in place for normal system operation. (Default)
	2-3	ME force update model.

Clearing the CMOS

If you are not able to access the BIOS setup screens, the CMOS Clear jumper will need to be used to reset the configuration RAM. The CMOS Clear jumper is located on jumper block J2D2 on the server board.

Refer to *"Motherboard Jumpers" on page 26* to locate the jumper.

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

Recovering the BIOS

The following steps boot the recovery BIOS and flashes the normal BIOS:

1. Power down and unplug the system from the AC power source.
2. Move the recovery jumper at JIA1 from the spare location at pins 1 and 2 to cover pins 2 and 3.

   Refer to *"Motherboard Jumpers" on page 26* to locate the jumper.
3. Insert the bootable BIOS Recovery media containing the new BIOS image files.

   You can accomplish a BIOS recovery from the SATA CD and USB Mass Storage device.

Note: *Recovery from a USB floppy is not supported on this platform.*

The recovery media must contain the following files under the root directory:

- FVMAIN.FV
- UEFI iFlash32
- *Rec.CAP
- Startup.nsh (update accordingly to use proper *Rec.CAP file)

4. Plug the system into the AC power source and power it on.
5. The BIOS POST screen appears.
6. When complete, remove the recovery media.
7. Power down and unplug the system from the AC power source.
8. Move the BIOS recovery jumper at J1A1 back to the original position, covering storage pins 1 and 2.
9. Plug the system into the AC power source and power it up to confirm the recovery is successful.

Note: Do NOT interrupt the BIOS POST during the first boot.

Note: *for more information on the BIOS Update process, please refer to "Updating the BIOS" on page 197.*

Rear Panel Connectors

Refer to *"T840 E2 Rear View" on page 21* for details.

Processor

The system board can accommodate the following:

- The Intel® Xeon® Nehalem-EP processors.

RAID Support

The Intel® Server Board provides six SATA ports (3 Gbps) via ICH10R with Intel® Embedded Server RAID Technology, with SW RAID levels 0/1/10. Optional support for SW RAID 5 with activation key.

The BIOS Setup utility provides multiple drive configuration options on the Advanced Mass Storage Controller Configuration setup page, some of which affect the ability to configure RAID. By default, the "Onboard SATA Controller" option is enabled. When this option is enabled, you can set the "SATA Mode" option to the following modes, which also lists how the mode affects configuration:

- ENHANCED Mode: Supports up to six SATA ports with IDE Native Mode.
- COMPATIBILITY Mode: Supports up to four SATA ports[0/1/2/3] with IDE Legacy mode and two SATA ports[4/5] with IDE Native Mode.
- AHCI Mode: Supports all SATA ports using the Advanced Host Controller Interface (AHCI) when the option is enabled.

Note: *For AHCI capability in EFI, you must set the AHCI legacy Option ROM to "disabled".*

- SW RAID Mode: Supports configuration of SATA ports for RAID using RAID configuration software.

Refer to the *"Advanced Menu" on page 174* for more information on how to select the controller that will be active in your system.

Set-up with the Intel Matrix Storage Manager configuration utility. Refer to *"RAID Configuration using Matrix Storage Manager" on page 78*.

Refer to *"LSI 8708EM2 SAS/SATA RAID Controller" on page 46* for more information.

Memory Configuration

The Intel® Server Board S5500BC supports a DDR3-based memory subsystem. The server board supports two DIMMs per channel. The silkscreen on the board for the DIMMs displays:

- DIMM_A1
- DIMM_A2
- DIMM_B1
- DIMM_B2
- DIMM_D1
- DIMM_D2
- DIMM_E1
- DIMM_E2

The minimal population possible is DIMM_A1.

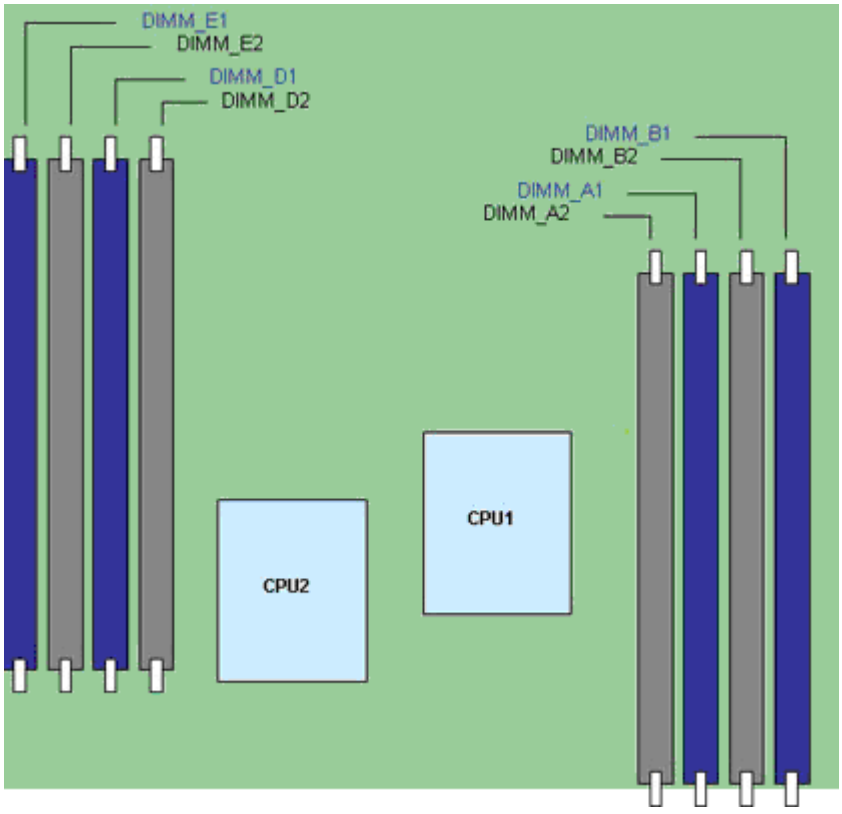


Figure 12: DIMM Configuration Diagram

For two slots per channel configuration, the server board requires DDR3 DIMMs within a channel to be populated starting with the DIMM farthest from the processor. See below figure *"Channel Slots Configuration" on page 30*.

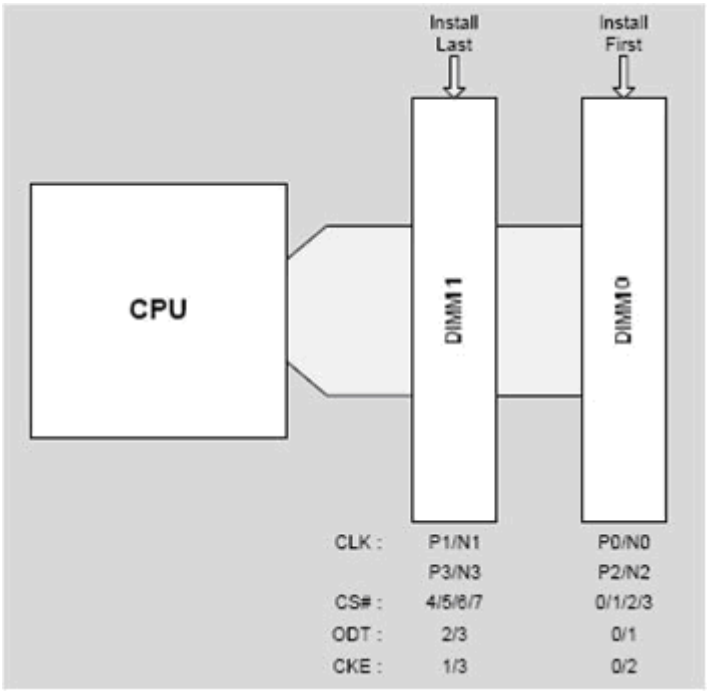


Figure 13: Channel Slots Configuration

The Independent Channel Mode is the default Maximum Performance Mode preferred for Intel® Xeon® 5500 processor series based platforms. You can populate all two channels in any order and have no matching requirements. All channels must run at the same interface frequency, but individual channels may run at different DIMM timings (RAS latency, CAS latency, and so forth).

Memory Sparing and Mirroring

The spare mode is not supported by the Intel® Server Board S5500BC. With memory mirroring, the system maintains two copies of all data in the memory subsystem. If a DIMM fails, the data is not lost because the second copy of the data is available from the mirrored DIMM in the opposite channel. The system will not fail due to memory error unless both the primary and the mirrored copy of the data become corrupt at the same time.

In a mirrored system, the maximum usable memory is one-half of the installed memory with a minimum of two DIMMs installed. Since the data is duplicated across DIMMs, it means that up to one-half of the installed DIMMs are actively in use at any one time. The remaining DIMMs are used for mirroring.

BMC Controller

The Integrated Baseboard Management Controller (Integrated BMC) is a highly integrated single-chip solution, incorporating several devices typically found on servers. The Integrated BMC on the Intel® Server Board S5500BC contains the following integrated functionality subsystem:

Server Class Super I/O functionality includes:

- Keyboard Style/BT interface for BMC support
- One Fully Functional Serial Ports, compatible with the 16C550
- Serial IRQ Support
- SMI/SCI/PME Support
- ACPI Compliant
- Up to 16 Shared GPIO ports
- Programmable Wake-up Event Support
- Plug and Play Register Set
- Power Supply Control
- Watchdog timer compliant with Microsoft SHDG
- LPC to SPI bridge for system BIOS support
- Real Time Clock module with the external RTC interface

Baseboard Management Controller

- IPMI 2.0 Compliant
- Integrated 250Mhz 32-bit ARM9 processor
- Six I2C SMBus Modules with Master-Slave support
- Two independent 10/100 Ethernet Controllers with RMII support

SPI Flash interface

- Three UART for ICMB support
- DDR-II 16bit up to 667 MHz memory interface
- Sixteen Mailbox Registers for communication between the host and the BMC
- Watchdog timer
- Three General Purpose Timers
- Dedicated Real Time Clock for BMC
- Up to 16 direct and 64 Serial GPIO ports
- Ability to maintain text and graphics controller history
- 12 10-bit Analog to Digital Converters
- Three Diode Inputs for Temperature measurements
- Eight Fan Tach Inputs
- Four Pulse Width Modulators (PWM)
- Chassis Intrusion Logic with battery backed general purpose register

- LED support with programmable blink rate control
- Programmable IO Port snooping, can be used to snoop on Port 80h
- Unique Chip ID for each part, burned at the time production testing
- Hardware 32-bit Random Number generator
- JTAG Master interface
- On-Chip Test Infrastructure for testing BMC firmware

Remote KVMS Features

- USB 2.0 interface for Keyboard, Mouse and Remote storage such as CD/DVD ROM and floppy
- USB 1.1 interface for PS2 to USB bridging, remote Keyboard and Mouse
- Hardware Based Video Compression and Redirection Logic
- Supports both text and Graphics redirection
- Hardware assisted Video redirection using the Frame Processing Engine
- Direct interface to the Integrated Graphics Controller registers and Frame buffer
- Hardware based encryption engine

Graphics Controller Subsystem

- Integrated Matrix Graphics Core
- 2D Hardware Graphics Acceleration
- DDR-II memory interface supports up to 128Mbytes of memory
- Supports all display resolutions up to 1600 x 1200 16bpp @ 75Hz
- High speed Integrated 24-bit RAMDAC
- Single lane PCI-Express host interface

Video

The Intel® server board S5500BC includes a video controller in the on-board ServerEngines* LLC Pilot II BMC, as well as 64 MB of video DDR2 SDRAM.

The SVGA sub-system supports a variety of modes, up to 1600 x 1200 resolution in 8/16/32 bpp, under 2D.

It also supports both CRT and LCD monitors up to a 100-Hz vertical refresh rate. Video is accessed using a standard 15-pin VGA connector on the back edge of the server board.

Network Controller

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

The Intel® 82574L GbE PCI-E Network Controller is a single, compact component with integrated Gigabit Ethernet Media Access Controller (MAC) and Physical Layer (PHY) function.

This device is connected to the Intel® ICH10R. The Intel® Server Board S5500BC uses this device along with the integrated Intel® ICH10R MAC and external Intel® 82567 Gigabit Network connector to provide two Gigabit Ethernet Ports designed for 10/100/1000 Mbps operation.

The Intel® 82574L GbE PCI-E Network Controller is correlated to NIC2 connector on the back edge of the board, the external Intel® 82567 Gigabit Network is correlated to NIC1 connector on the back edge of the board.

Refer to *"Diagnostic LEDs" on page 23* to see network controllers LEDs meaning.

ACPI

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

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

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

Keyboard and Mouse

The keyboard/mouse controller is USB-compatible.

Optional Features

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

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

DVD Writer Combination Drive

- Form Factor: 5.25" half height with Serial ATA interface
- The drive is capable to write 12xPCAV speed DVD-RAM (Ver. 2)writing
  - Random and Sequential.

    20xCAV speed DVD+R writing and 12xZCLV speed DVD+R DL writing and 8xZCLV speed DVD+RW writing
  - Random, Sequential and Multi-Session.

    20xCAV speed DVD-R writing and 12xZCLV speed DVD-R DL writing and 6xCLV speed DVD-RW writing and 2xCLV speed DVD-RW DL writing
  - Disc at Once, Incremental, and Multi-Border. Restricted overwrite (DVD-RW only)

    48xCAV speed CD-R writing and 32xZCLV speed CD-RW writing- Supports various DVD and CD formats.
- Power tray disc loading mechanism.
- The drive can be mounted and used in both horizontal and vertical orientation.
- Disc Diameter 120mm or 80mm
- Busy LED.
- Data buffer: 2MB

Caution: *After burning a DVD, we recommend you wait 10 minutes before burning another one.*

DAT72 Tape Backup Unit (USB)

Please refer to the documentation on the *Tape Online CD* for more information.

DAT160 Tape Backup Unit (USB)

Please refer to the documentation on the *Tape Online CD* for more information.

LTO-3 HH Tape Drive (SCSI)

Please refer to the documentation on the *Tape Online CD* for more information.

LTO-4 HH Tape Drive (SAS)

Please refer to the documentation on the *Tape Online CD* for more information.

Intel Pro/1000 PT Single Port LAN Board

One gigabit copper server connection in a PCI Express slot.

Interface

- PCI Express.

Connectors

- One RJ-45.

IEEE standards / network topology:

- 10BASE-T, 100BASE-TX, 1000BASE-T.

Features

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

Intel Pro/1000 PT Dual Port LAN Board

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

Interface

- PCI Express.

Connectors

- Two RJ-45.

IEEE standards / network topology:

- 10BASE-T, 100BASE-TX, 1000BASE-T.

Features

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

Network Management

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

Advanced Software Features

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

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

S-ATA Hard Disk Drive

- SATA II specification.
- Capacity: 160GB minimum on 2.5”; 250GB minimum on3.5”
- 7200 RPM
- RAID support

SAS Hard Disk Drive

- Capacity: 73GB minimum on 2.5”; 300GB minimum on 3.5”
- 10000 or 15000 RPM
- RAID support

LSI 8708EM2 SAS/SATA RAID Controller

Features

- 8 SAS/SATA compatible ports
- Optional battery backup module
- Optional RAID5/6 key activation
- Connect up to 16 intermixed SAS and SATA devices within the same array
- Auto-resume on array rebuild
- Auto resume array reconstruction
- Online Capacity Expansion
- Comprehensive management tools
- Audible alarm circuit

Specifications

- Hardware Specifications:
  - LSI SAS 1078 RAID Chip
  - PCI Express compliant.
    - 3 Gb/s per lane.
    - x8 lane width.
  - Cache memory of 128MB or 256MB DDRII 667MHz SDRAM (depending on your configuration).
- RAID Support:
  - RAID Levels 0, 1, 10.
  - RAID Levels 0, 1, 10, 5, and 6 with the optional activation key.

Note: *For more information, refer to the documentation included on the ExpressBuilder DVD-ROM.*

Adaptec SCSI Card 29320LPE

This card is a PCIe x1 Ultra320 SCSI controller that is ideal as a SCSI tape drive connection solution thanks to its unparalleled PCIe connectivity, and the reliability and stability of a single-channel I/O interface.

Features

- Interface: PCIe x1
- Data transfer rate: up to 320Mbyte/sec.
- Connectors:
  - Internal: One 68-pin VHDCI
  - External: One 68-pin Ultra320
- Physical Specifications
  - Size: 16,8cm x 6,5cm

Note: *no internal SCSI tape drive is qualified for your system.This card is used only to connect to external storage devices.*

Note: *refer to the Card User Guide for more information.*

LSI SAS 3442E-R

The LSI SAS3442E-R four-port internal/four-port external SAS/SATA PCI Express storage adapter provides 300 MB/s bandwidth (600 MB/s, full duplex) on each port for combined throughput of up to 2.4 GB/s.

The storage adapter supports multi-volume OS independent Integrated RAID 0, 1, 1E and 10E without the need for special drivers. The SAS3442E-R features PCI Express connectivity, removing the host bus bottleneck from the parallel PCI busses.

Features

- 3Gb/s per port
- x4 internal SFF-8484 / x4 external SFF-8470 connectors
- Integrated RAID 0, 1, 1E and 10E
- 8-lane 2.5 Gb/s PCI Express
- MD-2 small form-factor design
- Connects to both SAS and SATA HDDs and tape drives
- Allows more than 122 total end-point devices
- Fusion-MPT architecture provides more than 140,000 I/Os per second

Note: *refer to the Card User Guide for more information.*

Setting Up Your System

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

Unpacking the System

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

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

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

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

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

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

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

T840 E2 Rack Conversion Kit Assembly

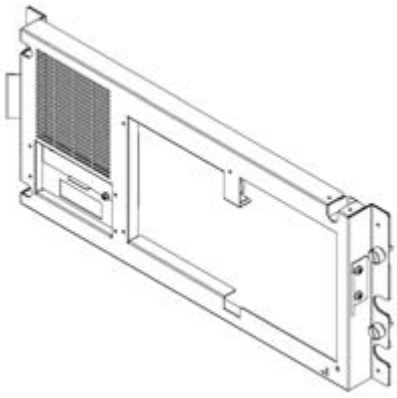
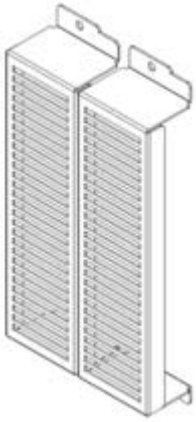
This section provides the assembly instructions for mounting the server into a standard 19-inch rack cabinet.

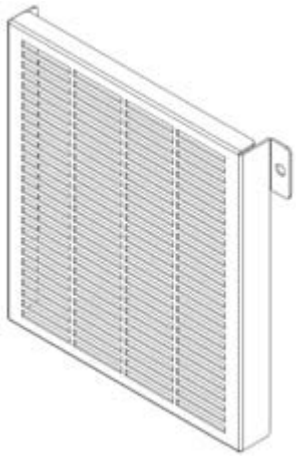
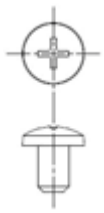
Unpacking the Rack Conversion Kit

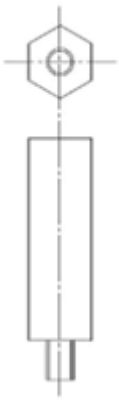
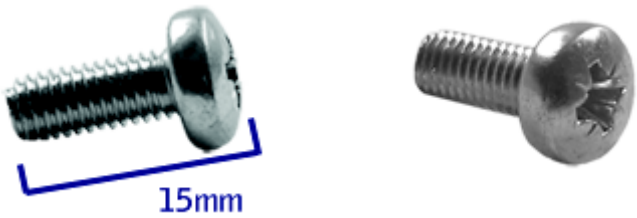
Although the rack installation kit is inspected and carefully packaged at the factory, damage may occur during shipping. Follow these steps for unpacking.

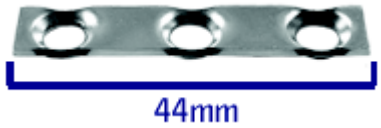
1. Visually inspect the shipping containers; notify your carrier immediately of any damage.
2. Carefully remove the rack mounting hardware and verify the parts.

Note: *The quantities noted below are subject to change without notice.*

Front cover 1 unit	
Device cover 2 units	

3.5 inch HDD cover 1 unit	
2.5 inch blank cover 1 unit	
Filler 1 unit	
Metric **Screw (M5)** 10 units	
Inch screw (#6-32UNC) 5 units	

Metric **screw (M4)** 14 units	
Stud 1 unit	
2 sets of **support rail assemblies** (1 front and 1 rear part for each)	
6 (minimum) **self-tapping screws** (TCB M5) for support rails front and rear parts assembling	
6 (minimum) **washers**, to be used with the 6 self-tapping screws	

8 **flange head screws** (M5x12) used to fix the support rail assemblies to the rack	
4 **washer plates**, to be used with the flange head screws to fix the support rail assemblies to the rack	
2 **Screws M5x16**, to be used with the washers to fix the filler to the mounting rails	
2 **Washers** for the M5x16 screws	
6 **Caged nuts** 2 units, to be used with the screws and washers to fix the filler to the mounting rails. 4 units, to fix the front bezel.	

If some of the parts listed above are missing or if the hardware is damaged, notify your server representative.

Additional Parts for Future Use

8 (minimum) **screws TCB M5** 8 (minimum) **washers**	  

Before You Begin

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

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

- Avoid excessive vibration and shock. Dropping an electronic component can cause serious damage.
- Do not disconnect or remove parts other than those specified in the procedure.
- Do not touch I/O connector pins.
- All screws are Phillips-head, unless otherwise specified.
- On completion of any assembly or reassembly, perform a power-on test. If a fault occurs, verify that the assembly or reassembly was performed correctly. If the problem persists, refer to *"Solving Problems" on page 148*.

Static Precautions

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

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

Assembly

The following subsection describes how to assemble your rack-mount server into a standard 19-inch rack cabinet.

Before you begin select an appropriate location in your rack cabinet for the rack-mount server. To improve rack stability, mount heavier items towards the bottom of the rack cabinet. If the rack is a stand-alone unit and the rack is more than 75% filled with components, consider installing an optional stabilizer kit.

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

- ***Anchor the equipment rack:*** *The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs). You must also consider the weight of any other device installed in the rack.*
- ***Main AC power disconnect:*** *You are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labelled as controlling power to the entire unit, not just to the server(s).*
- ***Grounding the rack installation:*** *To avoid the potential for an electrical shock hazard, you must include a third wire safety grounding conductor with the rack installation. If a server power cord is plugged into an AC outlet that is part of the rack, then you must provide proper grounding for the rack itself. If server power cords are plugged into wall AC outlets, the safety grounding conductor in each power cord provides proper grounding only for the server. You must provide additional, proper grounding for the rack and other devices installed in it.*
- ***Temperature****: The operating temperature of the server, when installed in an equipment rack, must not go below 5 °C or rise above 35 °C. Extreme fluctuations in temperature can cause a variety of problems in your server.*
- ***Ventilation****: The equipment rack must provide sufficient airflow to the front of the server to maintain proper cooling. It must also include ventilation sufficient to exhaust a maximum of 4,100 Btu's per hour for the server. The rack selected and the ventilation provided must be suitable to the environment in which the server will be used.*

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

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

Modifying the server from tower to rack-mount type

1. Remove the front bezel.
2. Remove the four stabilizers from the bottom of the server (4 screws).

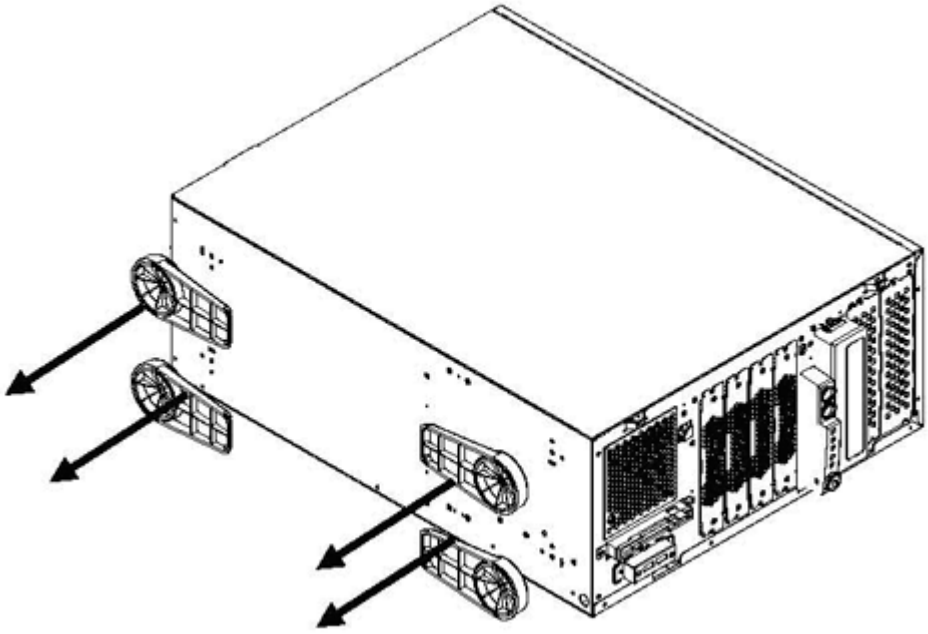


Figure 14: Removing the stabilizers

3. Mount the stud to the front face of the server.
4. Using the screws securing the dummy cover mounted on the vacant slot of 5.25-inch device, put the device cover over the dummy cover, and secure it together with the dummy cover.

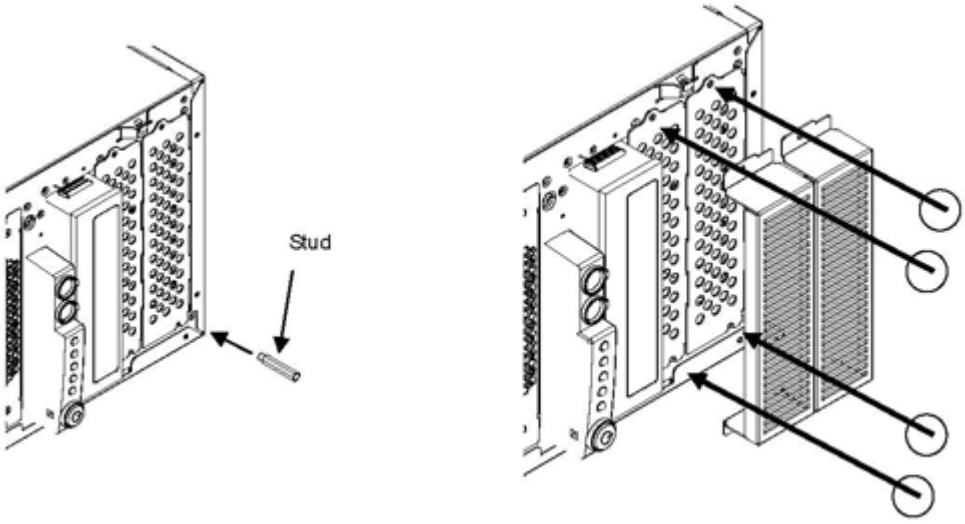


Figure 15: Mounting the dummy cover

5. According to your system configuration, secure the 3.5-inch HDD cover to the front cover with metric screw (M4).
   - 3.5-inch fixed disk model

- 3.5 HDD cover
- 3 metric screws (M4)

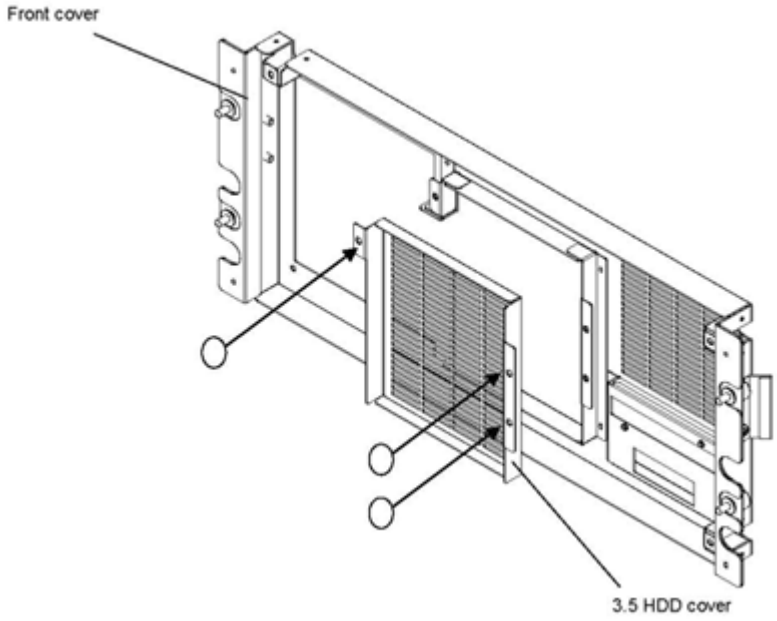


Figure 16: Securing the HDD cover

- 2.5-inch disk model
- 2.5 blank cover

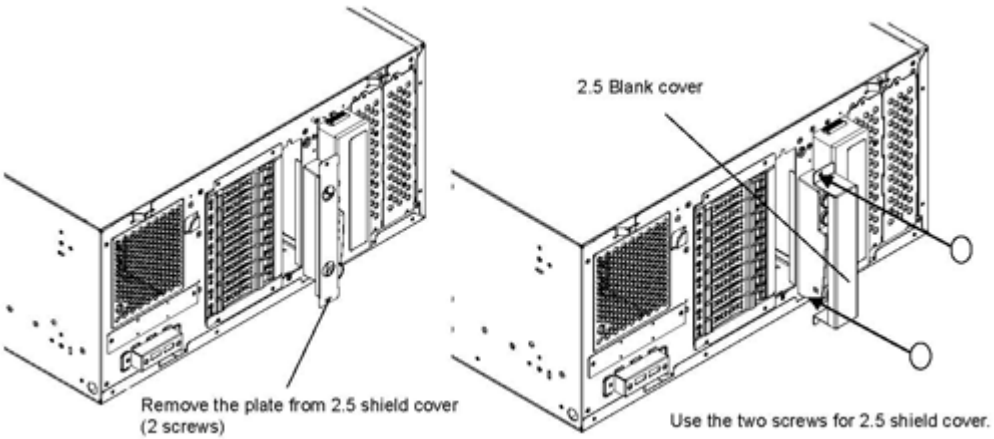


Figure 17: Securing the 2.5 inch cover

- Built-in FDD model

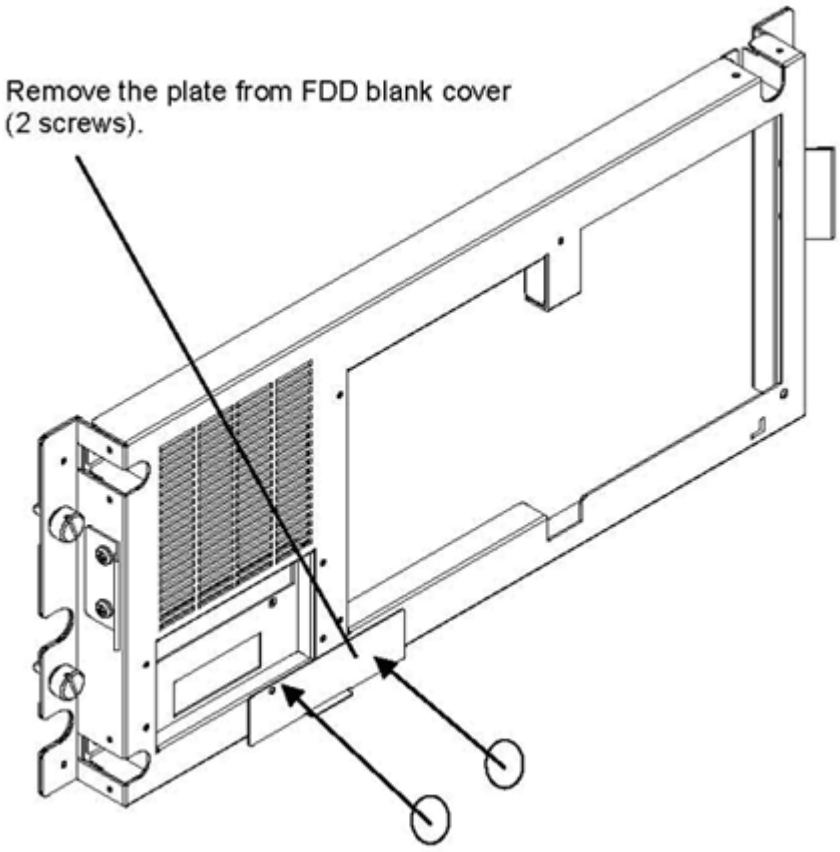


Figure 18: Removing the plate

6. Fix the front cover with four inch screws (#6-32UNC).

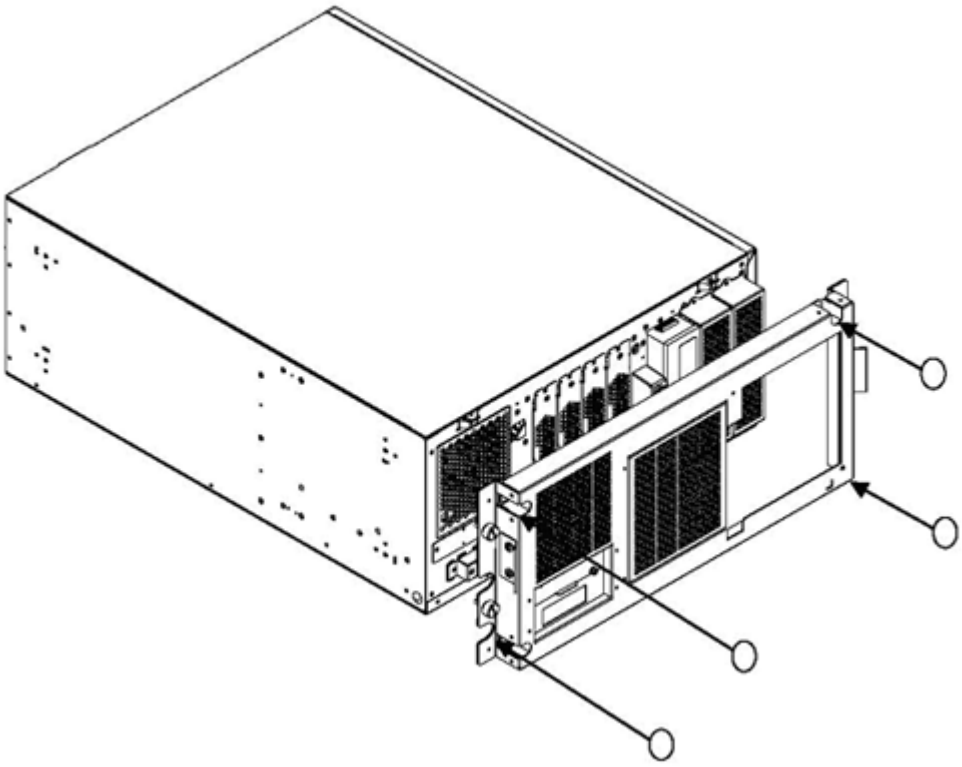


Figure 19: Fixing the front cover

Assembling the Front and Rear Parts of Support Rails

The support rails are made of a front and a rear part. Those two parts may be adjusted to fit the distance between the front and rear vertical rails of the rack.

1. Assemble the front and rear parts of the right support rail with 3 self tapping screws and 3 flat washers.

Figure 20: Right support rail, front and rear parts

Note: *When using self-tapping screws, we recommend you tighten the screw for 3 quarters of a turn, and loosen for 1 quarter. Repeat this cycle until the screw is completely tightened.*

2. Adjust the total length to fit the distance between the front and rear vertical rails of the rack before securing the screws.
3. Assemble the left support rail the same way.

Installing the server in the rack

1. Install the right support rail in the rack.
2. Secure the rail to the front and rear vertical mounting rails with 3 flange head screws M5 and the washer plate.

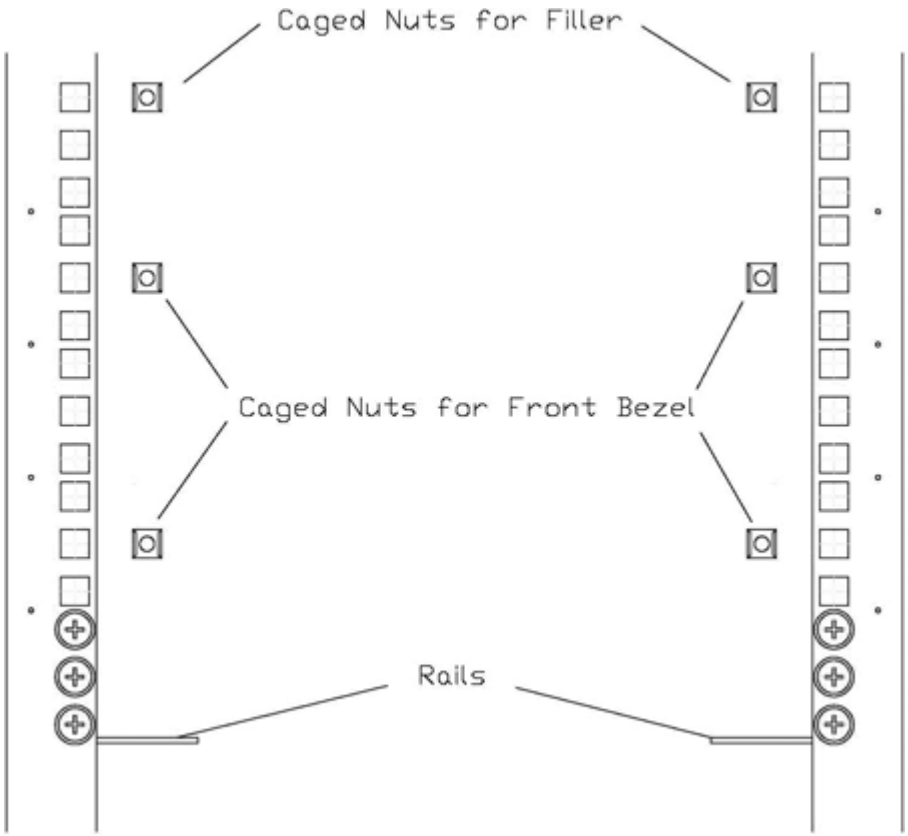


Figure 21: Installing the right support rail

- Position the caged nut on the inside of the front vertical mounting rail.
- Hook the side lip of a caged nut into the square hole in the rail.
- Push the other side lip of the caged nut into the square hole in the rail until it is secured.

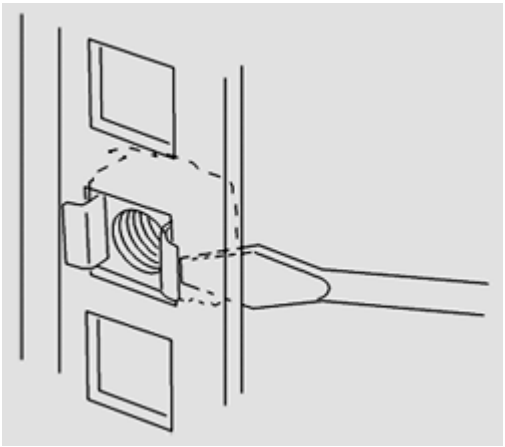


Figure 22: Inserting a caged nut

3. Repeat steps 1 to 2 for the left support rail.
4. Take the server and fix it into the bay.

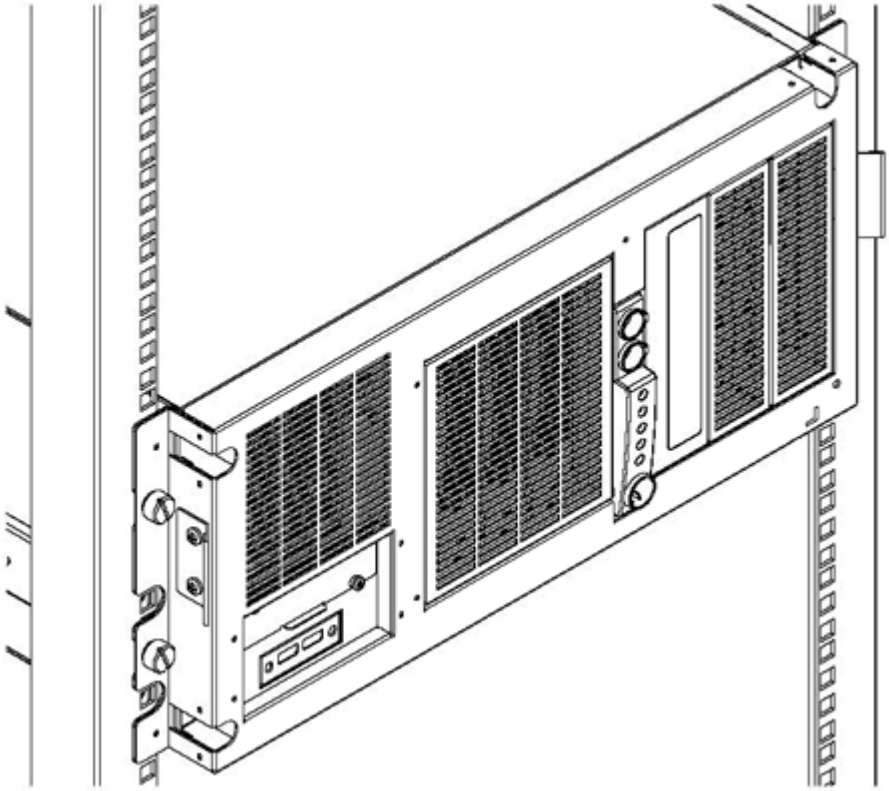


Figure 23: fixing the server in the bay

5. Fix the filler with M5 screws, above the server.

Making Connections

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

Caution: *Damage to the system may result if the keyboard/ mouse cable (other than USB) is inserted or removed when power is applied to the system.*

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

T840 E2 Power Supply

Depending on your configuration, your system features one of the power supplies described below:

- A hot-swappable power supply fitted with one or two power supply modules (implying redundancy features).
- A fixed power supply.

Connecting the Power Cord(s)

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

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

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

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

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

Warning: ***Do not attempt to modify or use the supplied AC power cord if it is not the exact type required.***

Hot-Swappable Power Supply Features

This hot-swappable power supply consists of two independent modules.

It can function properly with only one module.

However, if two modules are fitted, if one of the power modules should fail, the other one will supply power to the system until you can change the failed module. The failed module can be hot-swapped.

Note: *Connect both power modules to power outlets to ensure continuous operation.*

Power Supply LEDs

There are two LEDs on the back of the power supply. Refer to the table below for more information.

Table 2: Power Supply LEDs

Power Supply Condition	Status LED (AC OK / Power Supply Fail)	Power LED (Power Good)	Remarks
AC Power Off	OFF	OFF	
AC Power On in Standby	Green	OFF	
AC ON and all outputs in Normal	Green	Green	
Any DC outputs in short circuit	Green	OFF	Power distribution module board only. Module OK.
DC Fan not spinning	Amber	OFF	Module protection only
Over-Temperature Protection (OTP)	Amber	Green	Send out alert signal

The PSU is protected against over-temperature conditions that may be caused by a reduction of the fan cooling or an excessive ambient temperature. In OTP mode, the power supply unit will eventually shut down.

Hot-Swapping a Power Module

Warning: ***Hazardous voltage, current, and energy levels are present inside the power supply. There are no user-serviceable parts inside it; servicing of the power supply should be done only by technically qualified personnel.***

1. Observe the safety and ESD precautions listed in *"General Safety Information" on page 96*.
2. Remove the power cable from the defective power supply.

Warning: ***Put on protective gloves before you follow the instructions below. The power modules are very hot and there is a risk of severe burns.***

3. Press up on the green latch (A) while pulling on the handle (B) to remove the hot-swap power supply from the chassis.

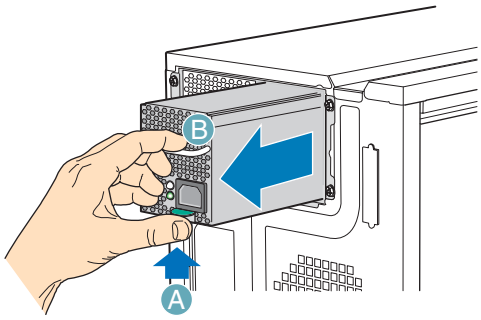


Figure 24: Removing the Hot Swap Power Supply Module from the Chassis

4. Insert the new hot swap power supply module.

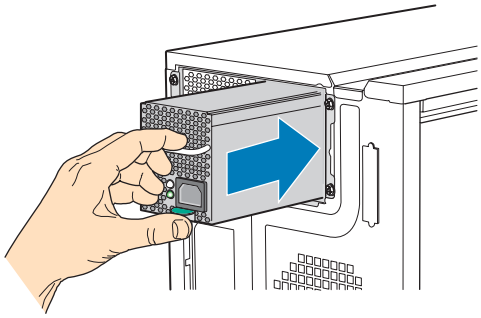


Figure 25: Inserting Hot Swap Power Supply Module in Chassis

5. Connect the power cable to the replaced hot swap power supply.

Using the System

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

When using the system the following precautions should be observed:

- Make sure you power off the system before connecting or disconnecting cables between the system and peripheral devices. Connecting or disconnecting the cables while the system is powered on may cause malfunction or failures within the system. Note that this warning does not apply to hot-plug devices.
- Check that the removable media drive access lamp is unlit before turning off the system or ejecting the media. Doing so avoids damaging the data stored on the media.
- When you turn off the system, wait at least 10 seconds before turning it on again. Cycling the power immediately may cause malfunctions or failures in the system.
- Power off the system and unplug the power cord before relocating the system. Moving the system while it is powered on may cause malfunctions or failures in the system.
- Clean the system regularly. Regular cleaning prevents failures of the system and of its components.
- Lightning may cause a momentary voltage drop. To prevent this problem, we recommend you install an uninterruptible power supply unit.
- Only use options qualified for the system. An option we did not qualify may be installed in or connected to the system, but it may fail to operate normally or even cause failures that will not covered by the warranty.

Powering On your System

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

Power on your system as follows.

1. Connect the power cord of your system. You may need to wait 30 seconds before pressing the power button as mentionned in step 5.
2. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and that their power cords are connected.
3. Power on the video display and any other external devices.

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

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

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

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

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

Note: *For error messages that appear on the display unit, refer to* *"Error Messages" on page 163.*

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

If you have problems powering on your system, refer to *"Solving Problems" on page 148*.

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

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

Powering Off your System

To turn the system power off:

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

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

2. Power off the peripheral devices.

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

Forcing a Power Shutdown

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

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

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

Resetting the System

There are two ways to reset the system.

Caution: *Resetting the system clears the DIMM memory and the data in process. To reset the system when it is not frozen, make sure that no processing is in progress.*

- Soft reset

If the system halts before starting the OS, press and hold **Ctrl** and **Alt** and press **Delete**. This restarts the system.

- Hard reset (depending on your configuration)

Press the reset button at the front of the system. Refer to *"Powering On your System" on page 68*.

Configuring Your System

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

- RAID Configuration Utilities

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

- BIOS Setup Utility

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

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

  For more information about the BIOS Setup Utility, see *"BIOS Setup Utility" on page 171*.

Configuring RAID

RAID Configuration Utility

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

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

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

RAID Levels

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

RAID 0 and RAID 1

- RAID0 (striping)

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

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

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

Warning:

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

- RAID1 (mirroring)

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

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

  Due to the data redundancy of mirroring, the capacity of the logical drive is only the size of the smallest disk drive. For example, two 100GB disk drives which have a combined capacity of 200GB instead would have 100GB of usable storage when set up in a mirrored logical drive. Similar to RAID 0 striping, if disk drives of different capacities are used, there will also be unused capacity on the larger drive.

Warning:

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

Raid 10 & RAID 5

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

■ RAID 10

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

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

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

■ RAID 5

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

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

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

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

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

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

Description

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

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

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

Enabling RAID in the BIOS

RAID should first be enabled in the BIOS before you can configure it. For more information, refer to *"BIOS Setup Utility" on page 171*.

Entering the Intel Embedded Server RAID BIOS Configuration Utility

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

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

Setting Up the RAID Feature

Please refer to the *Intel® Embedded Server RAID BIOS Configuration Utility Software Guide* included on the ExpressBuilder disc for more information.

RAID Configuration using the LSI Logic Software RAID Configuration Utility

Use this utility to set up the RAID configuration of your hard disk drives.

Note: *This utility cannot be run via the remote console feature of DianaScope.*

Running the Setup Utility

1. Press **Esc** when the full screen logo appears after you have powered on the server.

   The POST screen appears.
2. Check the description shown on the POST screen, and then press **Ctrl + M**.

   The LSI Logic Software RAID Setup Utility starts.

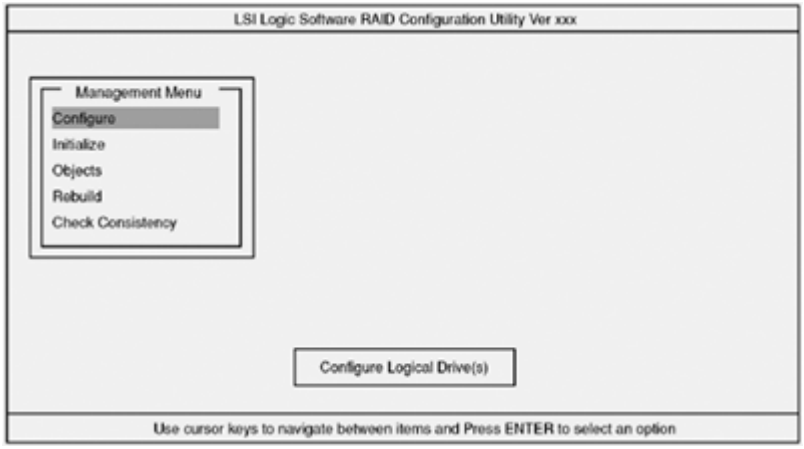


Figure 26: LSI Logic Software RAID Configuration Utility TOP Menu (Management Menu)

Note: *To exit the utility, press **Esc** in the TOP menu of LSI Logic Software RAID Setup Utility. Select **Yes**, and then press **Ctrl + Alt + Delete** to reboot the server when prompted to do so.*

Tree Menu

+: Selection/execution parameter

←: Setting parameter.

•: Information display

>: Can be set (modified) after creation of logical drive

Table 3: Tree Menu

Menu	Description
+Configure	Performs Configuration settings
+Easy Configuration	Set configuration (Using fixed value)

Table 3: Tree Menu (Continued)

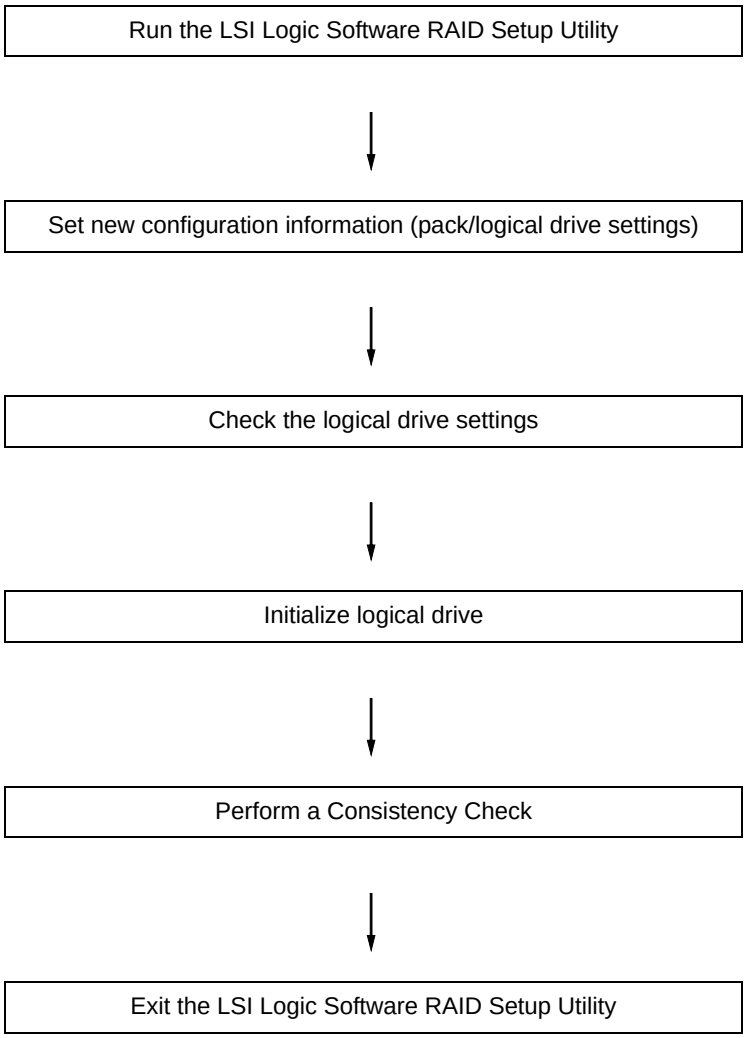
Menu	Description
+New Configuration	Set new configuration
+View/Add Configuration	Additional setting / viewing configuration
+Clear Configuration	Clear configuration
+Select Boot Drive	Chose Bootable Logical Drive
+Initialize	Initialize logical drive
+Objects	Various settings
+Adapter	Set disk array controller
+Sel. Adapter	Clear configuration
←Rebuild Rate	30
←Chk Const Rate	30
←FGI Rate	30
←BGI Rate	30
←Disk WC	Off
←Read Ahead	On
←Bios State	Enable
←Stop on Error	No
←Fast Init	Enable
←Auto Rebuild	On
←Auto Resume	Enable
←Disk Coercion	1GB
←Factoty Default	
+Logical Drive	Logical drive operation
+Logical Drives	Select logical drive (when multiple logical drives exist)
+Initialize	Initialize logical drive
+Check Consistency	Check logical drive redundancy
+View/Update Parameters	Display logical drive information
• RAID	Display RAID level
• SIZE	Display logical drive capacity
• Stripe SIZE	Display stripe size
• #Stripes	Display the number of hard disk drives in logical drive
• State	Display logical drive status
• Spans	
• Disk WC	Off: Write through On: Write back
• Read Ahead	
+Physical Drive	Physical drive operation
+Physical Drive Selection Menu	Select physical drive
+Make HotSpare	Set as hot-spare disk for auto rebuilding

Table 3: Tree Menu (Continued)

Menu		Description
	+Force Online	Make a disk online
	+Force Offline	Make a disk offline
	+Drive Properties	Display hard disk drive information
	• Device Type	Hard disk drive type
	• Capacity	Hard disk drive capacity
	• Product ID	Hard disk drive model
	• Revision No.	Hard disk drive revision
+Rebuild		Perform rebuilding
+Check Consistency		Perform logical drive redundancy check

Operating Procedures for the Setup Utility

Creating/Adding a Configuration



1. Run the LSI Logic Software RAID Setup Utility.

Select **Configure** → **New Configuration** from the TOP menu (Management Menu).

Select **View/add Configuration** to add a configuration.

Caution:

- *Creating a configuration using the New Configuration menu clears any existing configuration information. To add configuration information to an existing configuration, select **View/add Configuration**.*
- *You cannot create a Spanning of RAID1 or set the logical drive capacity on the Easy Configuration menu.*
  *Use the **New Configuration** or **View/Add Configuration** instead.*

2. When prompted to proceed, select **Yes**.

   The *Scan Device* starts (the scanning information is displayed at the bottom of the screen). Once the *Scan Device* is completed, the *New Configuration - Array Selection Menu* screen appears.

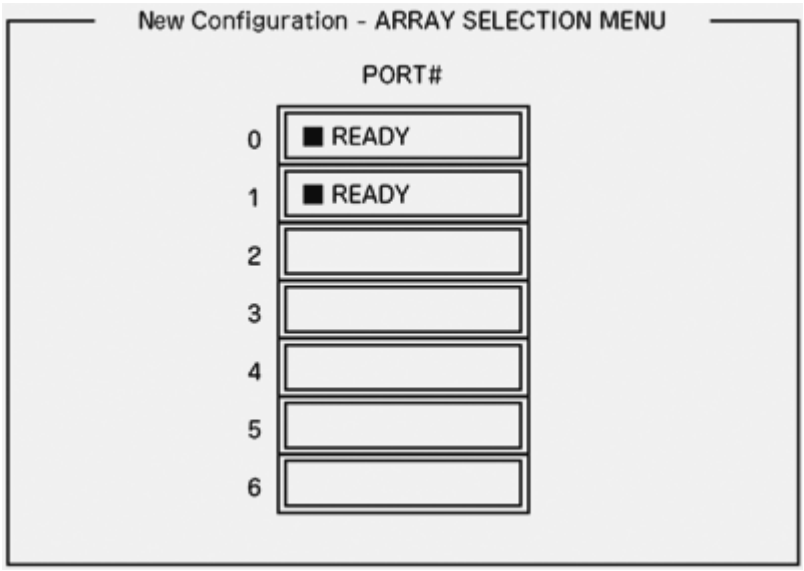


Figure 27: New Configuration - Array Selection Menu screen

3. Move the cursor onto the hard disk drive to be packed by using the cursor key and then press **Space** to select it.

   The display for the selected hard disk drive changes from *Ready* to *Online*.

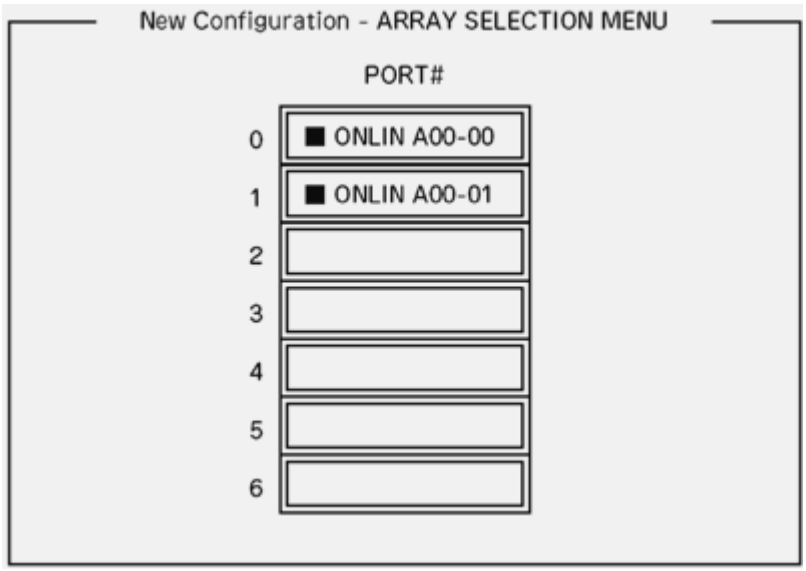


Figure 28: New Configuration - Array Selection Menu screen

4. Press **F10** to set *Select Configurable Array(s).*

5. Press **Space**.
   SPAN-1 is set.

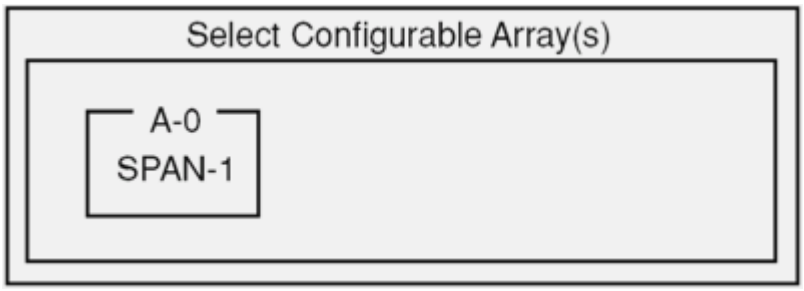


Figure 29: Select Configurable Arrays screen

6. Press **F10** to create a logical drive.
   The *Logical Drives Configure* screen appears. (The figure below shows an example of a RAID1 configured with two hard disk drives.)

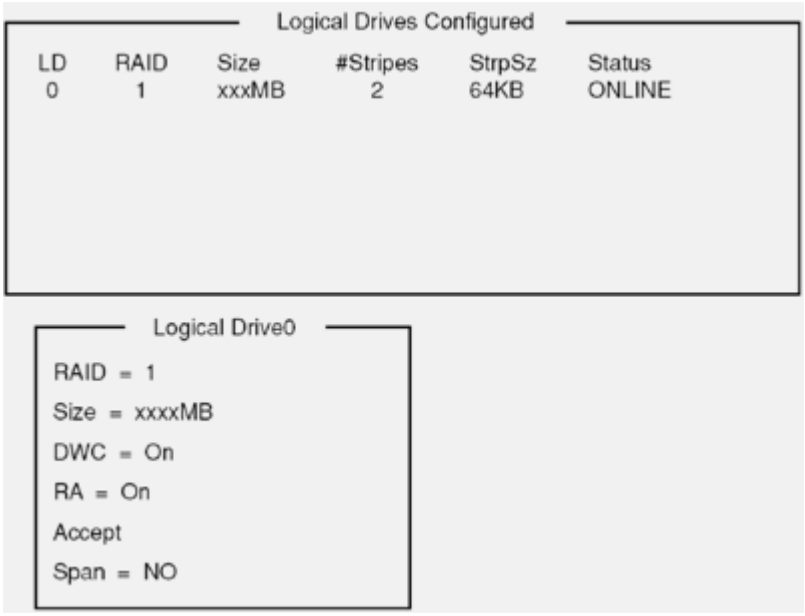


Figure 30: Logical Drives Configure screen

7. Select *RAID*, *Size*, *DWC*, *RA*, or *Span* by using cursor keys. Then press **Enter** to fix the selection and set each value.
   (1) RAID: Sets the RAID level.

Parameter	Remarks
0	RAID0
1	RAID1
10	Spanning of RAID1

   The selectable RAID level varies depending on the number of hard disk drives that configure a pack.
   (2) Size: Sets the logical drive size.
   Up to 40 logical drives can be created per disk array controller.

(3) DWC: Sets the parameter for the Disk Write Cache.

Parameter	Remarks
Off	Write through
On	Write back

(4) RA: Sets the parameter for the Read Ahead.

Parameter	Remarks
Off	Does not perform read ahead
On	Performs read ahead

(5) Span: Sets the Span.

Parameter	Remarks
SPAN=NO	Does not set span
SPAN=YES	Sets span

When performing a Span, create two or more sets of the same pack at the pack creation, as shown in the figure below.

Figure 31: Spanning of RAID1

8. When all the settings are completed, select *Accept* and then press **Enter** to create the logical drive.

The created logical drive is displayed in the *Logical Drive Configured* screen.

9. After creating a logical drive, press **Esc** to close the screen.

Go back to the *Save Configuration?* screen and then select *Yes* to save the configuration.

10. Once it is confirmed that the configuration has been saved, press **Esc** to return to the *Top* menu screen.
11. On the *Top* menu screen, select *Objects* → *Logical Drive* → *View/Update Parameters* to check the logical drive information.
12. Select *Initialize* in the *Top* menu screen.
13. When the *Logical Drives* screen appears, move the cursor to the logical drive to be initialized, and press **Space**.

    The logical drive is selected.
14. Press **F10** to start the initialization, and press **Yes** when prompted to do so.

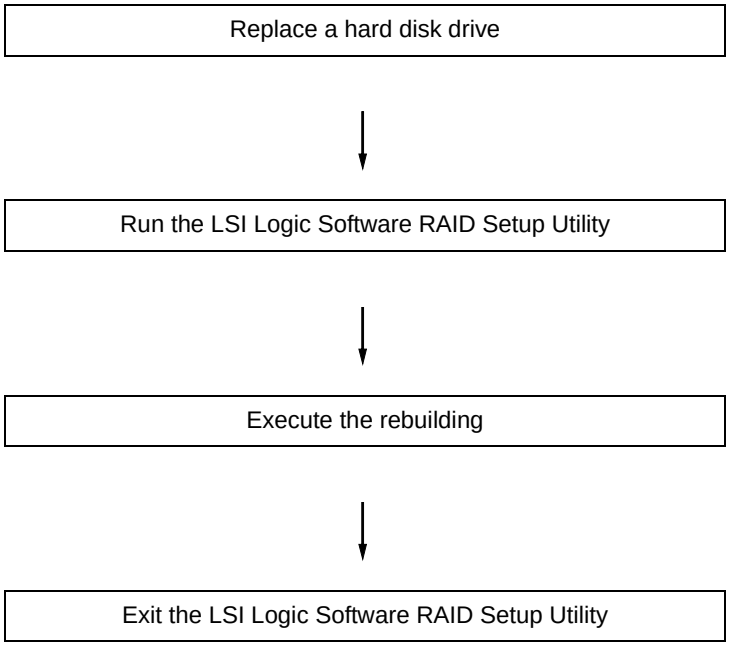
    When the progress bar in the *Initialize Logical Drive Progress* screen reaches 100%, initialization is completed.
15. Execute a Check Consistency on the logical drive that has been initialized.

    Refer to *"Check Consistency" on page 87* for more information.
16. Press **Esc** to return to the *Top* menu and exit the LSI Logic Software RAID Setup Utility.

Caution:

- *Be sure to execute a Check Consistency after creating a configuration.*
- *Check Consistency has two modes: "check and recover" and "check only".*

Manual Rebuild



1. Replace a hard disk drive and power on the server.
2. Run the LSI Logic Software RAID Setup Utility.

3. Select *Rebuild* from the *Top* menu.

   The *Rebuild – Physical Drives Selection Menu* screen appears.

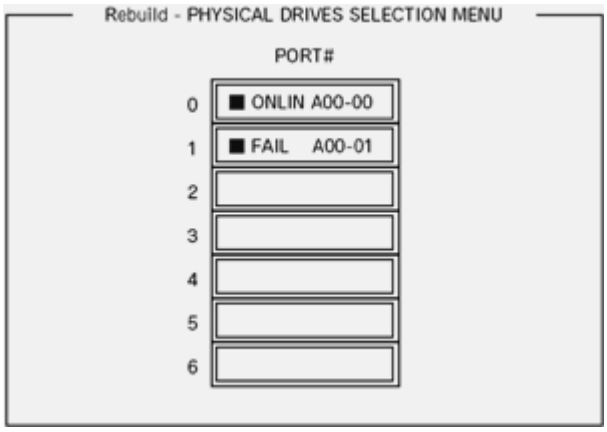


Figure 32: Rebuild – Physical Drives Selection Menu

4. Move the cursor onto the hard disk drive displaying "FAIL" and then press **Space** to select it.

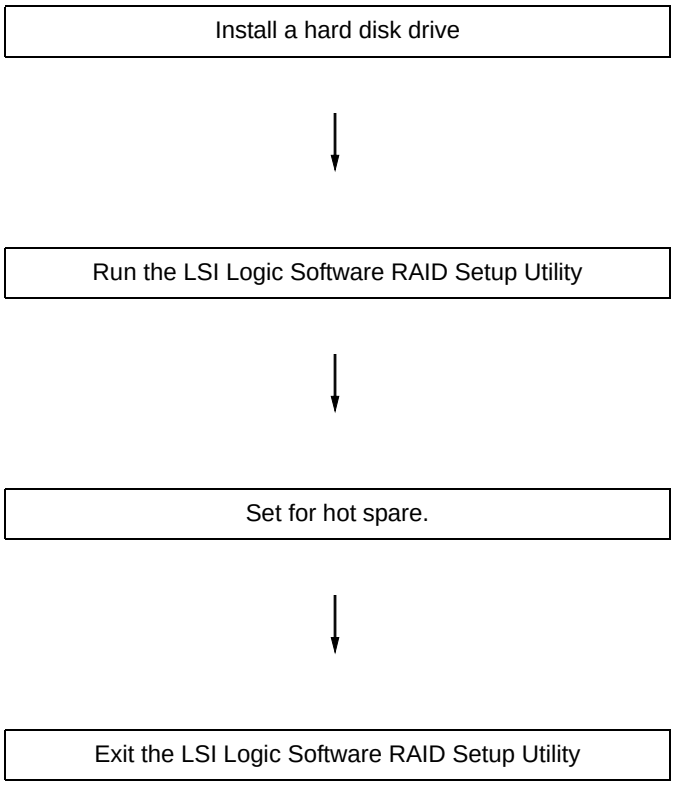
   Several hard disk drives can be selected (simultaneous rebuilding.)

5. The *Fail* indication for the selected hard disk drive starts blinking.
6. Once the hard disk drive is selected, press **F10** to start rebuilding.
7. Press *Yes* when prompted to do so. The rebuild process starts.

   When the progress bar in the *Rebuild Physical Drives in Progress* screen reaches 100%, the rebuilding is completed.

8. Press **Esc** to return to the *Top* menu and exit the LSI Logic Software RAID Setup Utility.

Setting a Hot Spare



1. Install a hard disk drive to be used as hot spare, and then power on the server.
2. Run the LSI Logic Software RAID Setup Utility.
3. Select *Objects* → *Physical Drive* from the TOP menu.
   The *Objects - Physical Drive Selection Menu* screen appears.

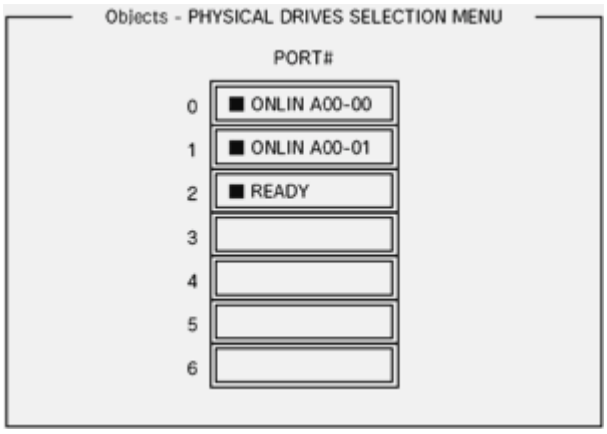


Figure 33: Objects - Physical Drive Selection Menu screen

4. Move the cursor onto the hard disk drive to be used as hot spare and press **Enter**.
5. The "Port #X" screen appears. Select *Make HotSpare*.
6. Select *Yes* when prompted to do so.
   The hard disk drive indication changes to "HOTSP."

7. Press **Esc** to return to the *Top* menu and exit the LSI Logic Software RAID Setup Utility.

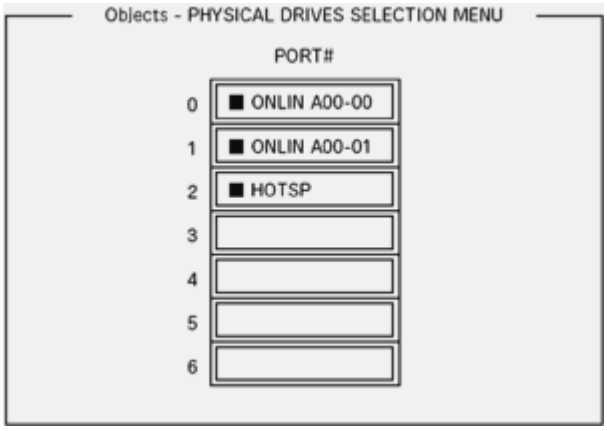
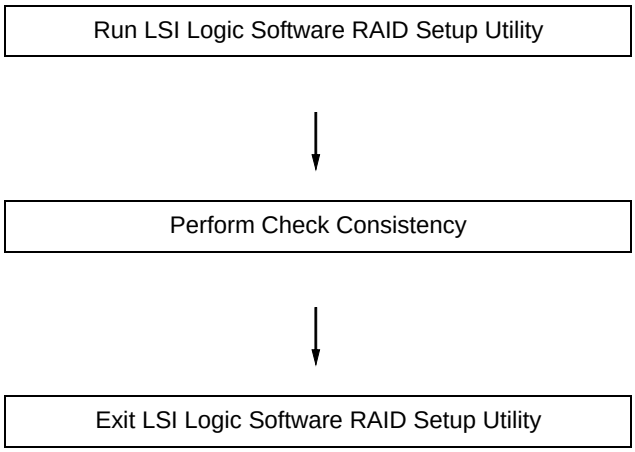


Figure 34: Objects - Physical Drive Selection Menu screen

Caution:

- *Select "Objects" → "Physical Drive" → "Port #X" → "Force Offline" to cancel the hot spare setting.*
- *When two or more hard disk drives (of the same capacity) are assigned as hot spare, rebuilding starts with the one with the smaller CH number/ ID number.*

Check Consistency



1. Run the LSI Logic Software RAID Setup Utility.
2. Select *Check Consistency* from the *Top* menu.

   The *Logical Drives* screen appears.
3. Move the cursor onto the logical drive to be checked, and press **Space** to select it.
4. Once the logical drive is selected, press **F10** to start the consistency check.
5. When prompted to do so, press "Yes".

   The consistency check starts.

   When the progress bar in the *Check Consistency Progress* screen reaches 100%, the consistency check is completed.

6. Press **Esc** to return to the *Top* menu and exit the LSI Logic Software RAID Setup Utility.

Caution:

- *Be sure to execute a Check Consistency after creating a configuration.*
- *Check Consistency has two modes: "check and recover" and "check only".*

Others Operations

Clear Configuration

Clears the configuration information. Select *Configure* → *Clear Configuration* from the *Top* menu. Executing *Clear Configuration* clears all the configuration information on the disk array controller and hard disk drives. The configuration information on all the channels of the disk array controller is also cleared.

Note:

- *When the configuration information on the disk array controller and that on the hard disk drive do not match (excluding at the replacement of a faulty disk array controller), configuration may fail if you select the configuration information on the disk array controller. In this case, execute "Clear Configuration" to create the configuration again.*
- *Use the MegaRAID Storage Manager to delete a specific logical drive.*

Force Online

Puts online a hard disk drive being in the FAIL status.

Select *Objects* → *Physical Drive* → (select hard disk drive) → *Force Online* from the *Top* menu.

Rebuild Rate

Sets the Rebuild Rate.

Select *Objects* → *Adapter* → *Sel. Adapter* → *Rebuild Rate* from the TOP menu.

The value range is 0% to 100%. The Default value (recommended) is 30%.

Hard disk drive information

Checks the hard disk drive information.

Select *Objects* → *Physical Drive* → (select hard disk drive) → *Drive Properties* from the *Top* menu.

RAID Configuration using the Universal RAID Utility

Use this utility to set up the RAID configuration of your hard disk drives.

Note: *For more information, refer to the specific documentation included on the ExpressBuilder DVD-ROM.*

Configuring the BMC

Overview

The servers' Integrated Baseboard Management Controller (iBMC) provides the ability for IPMI-based management systems to monitor and retrieve information from the server 'Out-Of-Band', independent of whether any operating system is running.

To permit management systems to do this it is necessary to configure the BMC with an IP address and user credentials. This is done using the *SYSCFG* (System Configuration) utility.

An additional Windows application, *SELVIEW* (System Event Log Viewer) is provided to view the contents of the BMC's System Event Log.

Installation

Linux

Refer to the release notes in the `\BMC\Linux\<version>\SysCfg` directory for instructions on installing the Linux version of the *SYSCFG* utility.

Windows

Windows-based *SYSCFG* and *SELVIEW* utilities are provided on the ExpressBuilder DVD. These can be found in the `\BMC\Windows\<arch>` directory.

These utilities can be run directly from the ExpressBuilder DVD.

IMB Driver Installation

To use the Windows BMC utilities it is necessary to first install the *Intelligent Management Bus* device driver. This driver provides the Operating System with access to the BMC.

To install the IMB device driver from the DVD drive, run the following from the *Command Prompt*:

<cd-drive>:

cd \BMC\Windows\<arch>\IMBDRIVER

install.cmd

Once installed, the device can be seen in the *Device Manager* under the *System Devices* section.

SELVIEW

SELVIEW (System Event Log Viewer) is provided to view the contents of the BMC's System Event Log and save the log to a file. This file can then be sent to a support team for analysis.

This utility is only available for the Windows Operating System.

Refer to the release notes for further information on using *SELVIEW.*

SYSCFG

The *SYSCFG* command-line utility is used to configure the IP address and user credentials of the BMC. Although Windows and Linux versions of this utility are provided, their command syntax is the same.

Refer to the *System Configuration Utility User Guide* found on the ExpressBuilder DVD for further details of each command.

Execute the following commands (in bold) to change the required parameters.

Note:

- *These commands must be run from the directory containing the SYSCFG.EXE program.*
- *Entering some commands may produce an error, caused by the BMC being too busy at that time to respond. Re-enter the command a few seconds later.*

Reset BMC

Restore the factory default BMC settings:

Command:**`syscfg /rfs`**

Reset the BMC:

Command:**`syscfg /rbmc`**

Note: Wait 10 seconds before entering further configuration commands.

IP address Configuration

Note: *The IP address of the BMC operates independently of any operating system IP address and must be unique to avoid conflicts.*

To display the default LAN configuration details, use the following command:

```
D:\BMC\SysCfg>syscfg /d lan 1
LAN Configuration Settings:
---------------------------
LAN Channel Selected: 1
LAN Alert Destination Index Selected: None. LAN Alert
Configuration will not be displayed.

IP Address Source: Static
BMC Host IP Address: 0.0.0.0
Subnet Mask: 0.0.0.0
Gateway IP Address: 0.0.0.0
Gateway MAC Address: 00-00-00-00-00-00
Backup Gateway IP Address: 0.0.0.0
Backup Gateway MAC Address: 00-00-00-00-00-00
Community String: AMI
Gratuitous ARP Enable: Disabled
Gratuitous ARP Interval (milliseconds): 0
BMC ARP Response Enable: Enabled
```

IP address

syscfg /le 1 static <IP-address> <subnet mask>

Exemple : ***syscfg /le 1 static 192.168.1.10 255.255.255.0***

Default Gateway

Syntax:syscfg /lc 1 12 <gateway-IP-address>

Example: ***syscfg /lc 1 12 192.168.1.254***

Note: *The BMC may not work correctly if it does not have a default gateway configured. Please ensure that it is configured.*

To confirm the LAN configuration details, use the following command:

```
C:\BMC\SysCfg>syscfg /d lan 1
LAN Configuration Settings:
---------------------------
LAN Channel Selected: 1
LAN Alert Destination Index Selected: None. LAN
Alert Configuration will not be displayed.

IP Address Source: Static
BMC Host IP Address: 192.168.1.10
Subnet Mask: 255.255.255.0
Gateway IP Address: 192.168.1.254
Gateway MAC Address: 00-00-00-00-00-00
Backup Gateway IP Address: 0.0.0.0
Backup Gateway MAC Address: 00-00-00-00-00-00
Community String: AMI
Gratuitous ARP Enable: Disabled
Gratuitous ARP Interval (milliseconds): 0
BMC ARP Response Enable: Enabled
```

User Details

Five users can be defined within the BMC. By default, these users are configured as follows:

User #	User Name	Status
1	Anonymous User	Disabled
2	root	Enabled
3	test1	Disabled
4	test2	Disabled
5	test3	Disabled

To view the configuration of a particular user, use the following command:

Syntax:`syscfg /d user <user#> 1`

Examples:

```
C:\BMC\SysCfg>syscfg /d user 2 1
User Configuration Settings:
----------------------------
User ID Selected: 2
Channel Selected: 1

User Name: root
User Status: Enabled
Privilege Level Limit: Admin
SOL Enable: Enabled

C:\BMC\SysCfg>syscfg /d user 5 1
User Configuration Settings:
----------------------------
User ID Selected: 5
Channel Selected: 1

User Name: test3
User Status: Disabled
Privilege Level Limit: Admin
SOL Enable: Enabled
```

It is not possible to delete a user – only change its' name and password. Additionally, it is not possible to change the name of the user #2, the *root* account.

In this example, we will change the name and password of user#5 and enable it.

User Name and password

To change the name and password of a user, run the following command:

Syntax:`syscfg /user <user#> <new-name> <new password>`

Example: ***`syscfg /user 5 bmcuser bmcpassword`***

Enable User

Ensure that the user is enabled:

Syntax:`syscfg /ue <user#> <enable/disable> <channel#>`

Example: ***`syscfg /ue 1 enable 1`***

Now view the new configuration:

```
D:\BMC\SysCfg>syscfg /d user 5 1
User Configuration Settings:
----------------------------
User ID Selected: 5
Channel Selected: 1

User Name: bmcuser
User Status: Enabled
Privilege Level Limit: Admin
SOL Enable: Enabled
```

With the IP address and User IDs configured and enabled, an IPMI-based management system can now communicate directly with the BMC.

Upgrading Your System

General Safety Information

Warning:

- ***The DC push-button on/off switch on the front panel does not turn off completely the system AC power. +5vdc is present on the system board whenever the AC power cord connects the system to an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cord from the back of the chassis.***
- ***Failure to disconnect the power cord before opening your system can result in personal injury and equipment damage.***
- ***Operating your system with the covers removed can damage your system components.***
- ***For proper cooling and airflow, always replace the covers before powering on your system.***
- ***Avoid burns: If the system has been running, any installed processor and heat sink on the processor board(s) will be hot.***
- ***To avoid the possibility of a burn, be careful when removing or installing components that are located near processors.***

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

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can ensure some ESD protection by wearing an anti-static wrist strap attached to chassis ground when handling system components. Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Equipment Log

Use the equipment log form located at the end of this manual to record the model and serial number of your system, all the installed options, and any other pertinent information specific to your system. You will need this information when configuring your system. Refer to *"T840 E2 Equipment Log" on page 202*.

Tools Recommended for Upgrading Your System

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

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

Preparing Your System for Upgrade

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

1. Observe the safety and ESD precautions listed under *"General Safety Information" on page 96* and *"Static Precautions" on page 96* at the beginning of this chapter.
2. Shutdown the operating system (OS).
3. If necessary, press the power on/off switch on the front panel of the system. The power-on LED goes out. Refer to *"Powering On your System" on page 68*
4. Power off the peripheral devices.
5. Unplug the system power cord(s) from the AC wall outlet(s).

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

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

Removing the Left Side Door

The right side door provides access to the disk drive bays, to the motherboard and to the 5.25 inch bay.

1. Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see *"General Safety Information" on page 96*).
2. Disconnect the monitor and peripheral devices (printers, for instance) from the system.
3. Unlock the left side cover if required.

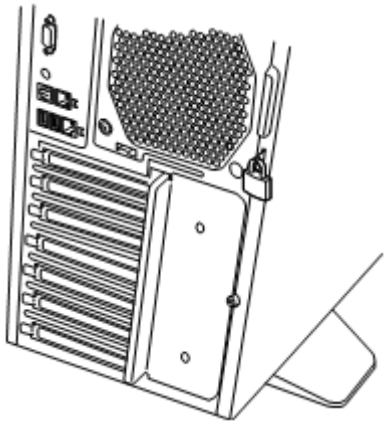


Figure 35: Key lock

4. Fold the four stabilizers at the bottom of the server toward inside.

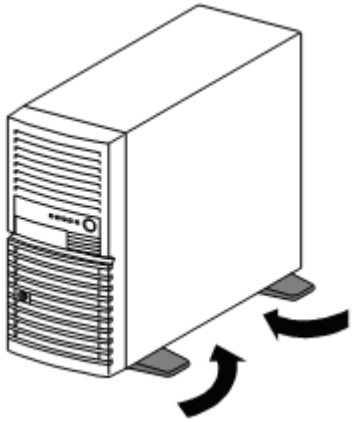


Figure 36: Fold the stabilizers

5. Lay the server slowly and gently so that its right cover faces the floor.

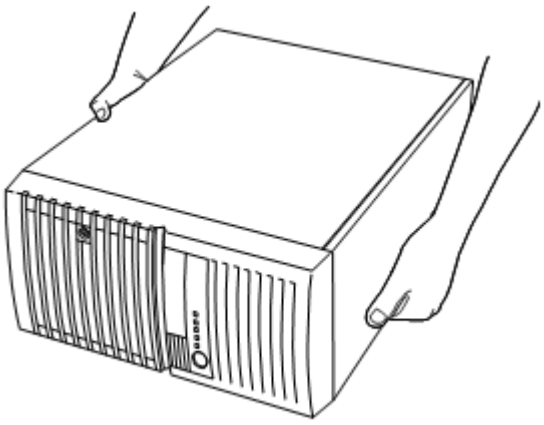


Figure 37: Lay the server

6. Remove the two screws from the rear of the server.

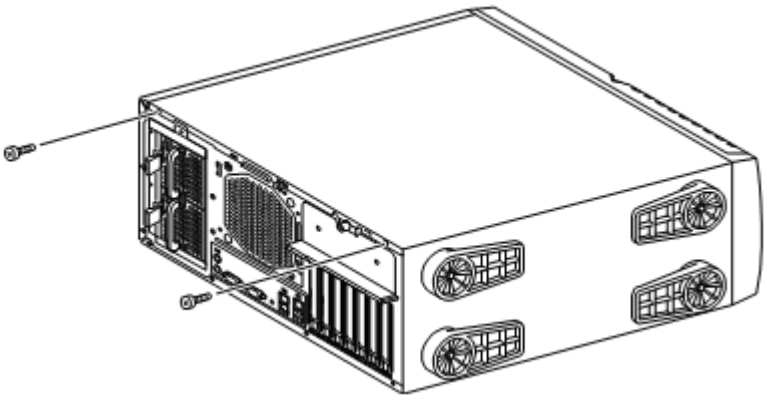


Figure 38: Remove the two screws

7. Hold the left side cover securely to remove it

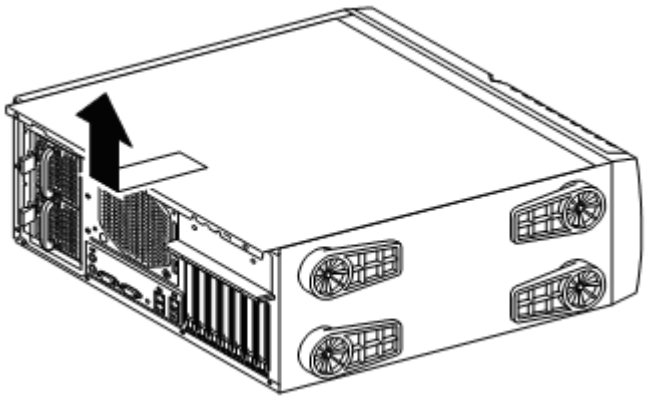


Figure 39: Remove the cover

Removing the Front Panel

The front mask must be removed to install or remove the hard disk drive and 5.25-inch device

Follow the procedure below to remove the front mask:

1. Open the front panel

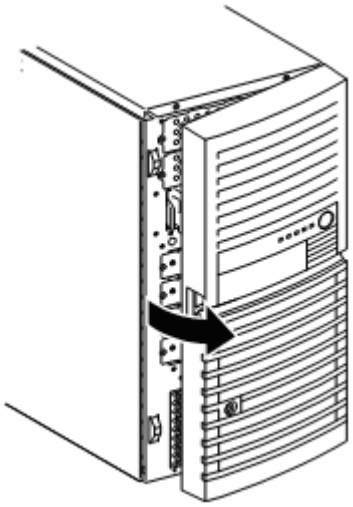


Figure 40: Open the front panel

2. Slide the front mask upward to remove it.

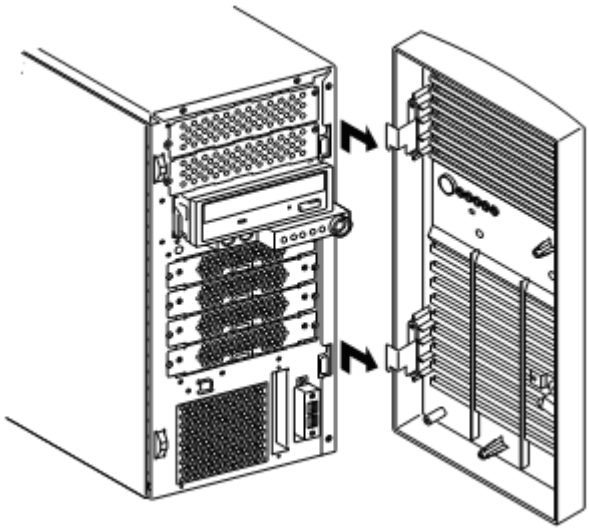


Figure 41: remove the front panel

Installing or Removing a 5.25-inch Device

This section of the chapter describes how to add and remove 5.25-inch devices. You can install a CD-ROM, DVD-ROM, COMBO DVD-ROM CD-RW or DVD+R9 Drive, tape backup unit, or other 5-25 inch devices in the additional 5.25-inch bay. See the installation instructions included with those items for specific installation information.

Adding a 5.25-inch Device

1. Remove the left side door. Refer to *"Removing the Left Side Door" on page 98*
2. Remove the front panel. Refer to *"Removing the Front Panel" on page 100*
3. From the inside of the chassis, push on the desired slot cache with your left hand and hold it with your right hand outside the chassis.
4. Pivot the cache until it gets released from the frame.

Note: *The two tabs that hold the cache actually break: this is normal.*

5. Removed the two slide rails already screwed in the bay.
6. Attach the slide rails to the upper holes on both side of the 5.25-inch device.

Figure 42: Attaching the Slide Rails

7. Slide in the 5.25-inch device until it clicks into place.
8. Connect the cable(s) to the drive. Refer to *"Cabling SATA Devices" on page 119*
9. Replace the front panel. Refer to *"Removing the Front Panel" on page 100*
10. Replace the left side door. Refer to *"Removing the Left Side Door" on page 98*

Note: *Modify the BIOS Setup program to recognise the additional device. For additional information, refer to "BIOS Setup Utility" on page 171.*

Removing a 5.25-inch device

1. Remove the left side door. Refer to *"Removing the Left Side Door" on page 98*

2. Remove the front panel. refer to *"Removing the Front Panel" on page 100*
3. Unconnect the cable(s) from the 5.25-inch device.
4. Press both slide rails ends (A) to release the 5.25-inch device
5. Pull the 5.25-inch device out of the frame.
6. Replace the front panel.
7. Replace the right side door.

Installing or Removing Hard Disk Drives

3.5-inch Hard Disk Drive (3.5-inch Disk Model)

The hard disk drive bay may contain up to four hard disk drives.

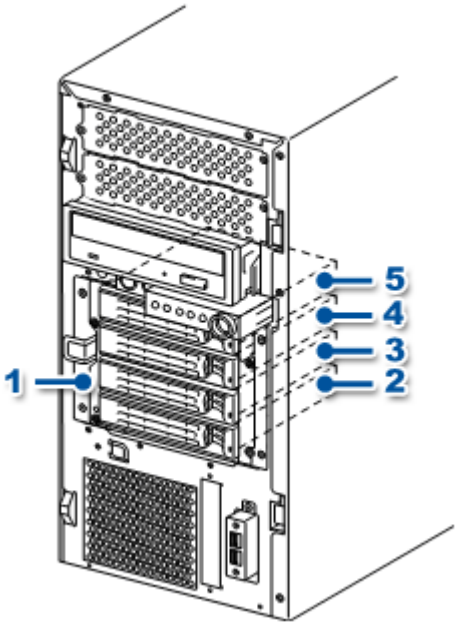


Figure 43: 3.5 inch disks bay location

1. HDD cage
2. Hard disk drive (First)
3. Hard disk drive (Second)
4. Hard disk drive (Third)
5. Hard disk drive (Fourth)

Caution: *Do not use any hard disk drive that is not authorized by Bull. Installing a third-party's hard drive may cause a failure in the server as well as the hard disk drive.*

Installation

Follow the procedure as described below to install 3.5-inch hard disk drives:

1. Open the front mask.

2. Remove the dummy tray.

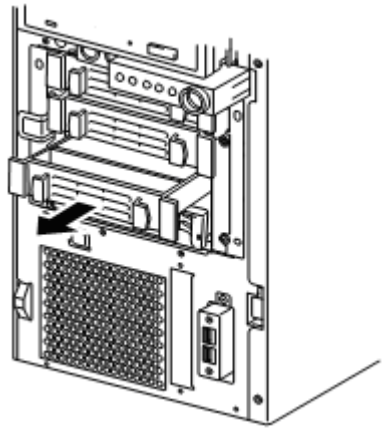


Figure 44: Removing the dummy tray

3. Install the hard disk drive in the HDD cage.
4. Fully open the lever of the hard disk drive and insert the drive into the HDD cage until it hits the depth of HDD cage.
5. After the hard disk drive is fully inserted into the cage, close the lever to fix the drive. (A click occurs when it is locked.)

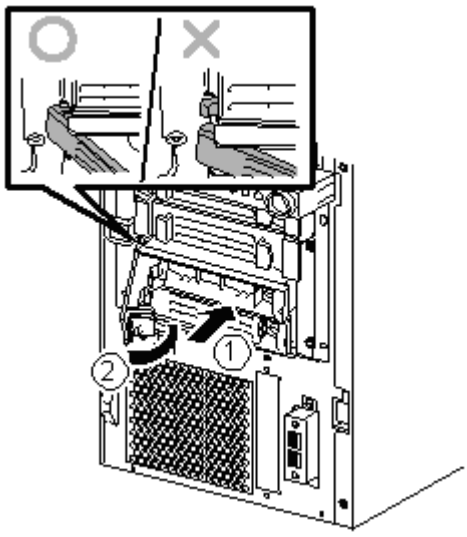


Figure 45: Closing the lever

Note: *Make sure of the orientation of the hard disk drive tray before inserting it into the cage according to the figure shown above. Also make sure that the hooks of the hard disk drive are engaged with the frame of the HDD cage.*

6. Close the front panel.

Removal

Caution: *About data on the hard disk drive*

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

- *Data seems to be erased when you empty "Recycle Bin" of Windows or execute the "format" command of the operating system. However, the actual data remains written on the hard disk drive. Data not erased completely may be restored by special software and used for unexpected purposes.*
- *It is strongly recommended that the software or service (both available at stores) for data erasure should be used in order to avoid the trouble explained above. For details on data erasure, ask your sales representative.*

Caution: *Removing more than one hard disk drive while the server is powered on destroys the logical disk. Remove or replace the hard disk drive one by one.*

1. Open the front panel
2. Pull on the green tab to open the lever
3. Pull the hard disk drive
4. Close the front panel

2.5-inch Hard Disk Drive (2.5-inch Disk Model)

The hard disk drive bay may contain up to eight hard disk drives.

Caution: *Do not use any hard disk drive that is not authorized by Bull. Installing a third-party's hard drive may cause a failure in the server as well as the hard disk drive.*

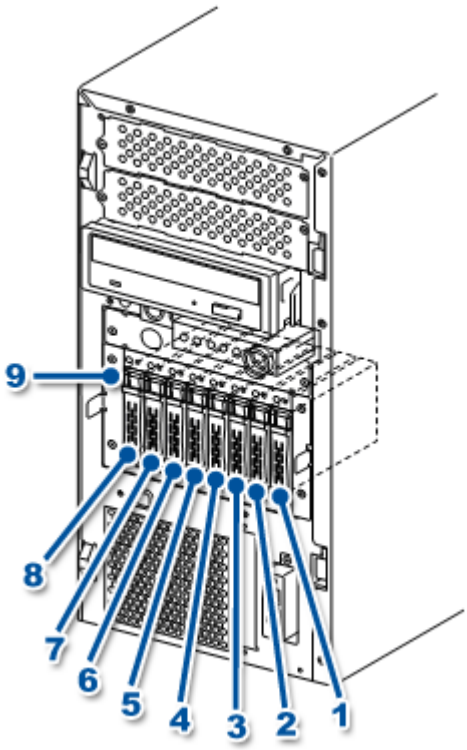


Figure 46: Hard disk drive bay

1. Hard disk drive (First)
2. Hard disk drive (Second)
3. Hard disk drive (Third)
4. Hard disk drive (Fourth)
5. Hard disk drive (Fifth)
6. Hard disk drive (Sixth)
7. Hard disk drive (Seventh)
8. Hard disk drive (Eighth)
9. HDD cage

Note: *Fill the slots with hard disk drives sequentially starting from slot 0 (the rightmost slot). If you start filling from slot 7 or skip filling the intermediate slot, the indication of DISK lamp will be incorrect.*

Installation

1. Open the front panel.
2. Fully open the lever of the hard disk drive and insert into the HDD cage until it hits the rear of the HDD cage.
3. Close the lever to fix the drive (a click occurs when it is locked).

Note: *Make sure of the orientation of the hard disk drive tray before inserting it into the cage. Also make sure that the hooks of the hard disk drive are engaged with the frame of the HDD cage.*

4. Close the front panel.

Removal

Caution: *Removing several hard disk drives at the same time while the server is powered on destroys the logical disk. Remove or replace hard disk drives one by one.*

Caution: *About data on the hard disk drive*

- *Be sure to take appropriate measures not to leak important data (e.g., customers' information or companies' management information) on the removed hard disk drive to any third parties.*
- *Data seems to be erased when you empty "Recycle Bin" of Windows or execute the "format" command of the operating system. However, the actual data remains written on the hard disk drive. Data not erased completely may be restored by special software and used for unexpected purposes.*
- *It is strongly recommended that the software or service (both available at stores) for data erasure should be used in order to avoid the trouble explained above. For details on data erasure, ask your sales representative.*

1. Open the front panel
2. Follow steps 2 and 3 of the installation procedure to remove the hard disk drive.
3. Close the front panel.

Upgrading Microprocessor

Your system is fitted with a processor installed in a socket LGA 1366. The server may have another CPU installed in addition to the factory-installed CPU.

Caution:

- *CPUs are easily affected by static electricity. Before handling a CPU, discharge the static electricity of your body by touching a metallic frame section of the server. Do not touch the CPU pins with bare hands. In addition, do not put a CPU directly on a desk. For more details on static electricity, see* *"Static Precautions" on page 96.*
- *Do not operate the system until you have confirmed that the additionally installed CPU is in normal state.*
- *Make sure to use a CPU authorized by the manufacturer. Installing a third-party CPU may cause a failure of the CPU as well as the motherboard.*

Installing a CPU

1. Remove the left side cover.
2. Firmly hold the server with your both hands so that its left side faces upward, and bring it down slowly and gently.
3. Remove the protection cover

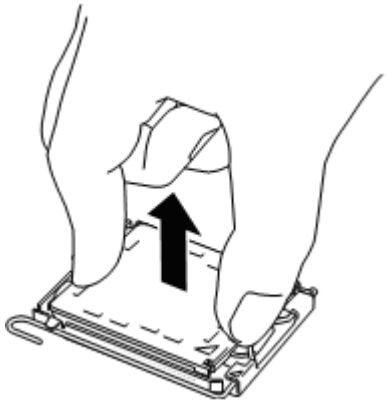


Figure 47: Removing the protection cover

4. Raise the lever on socket.

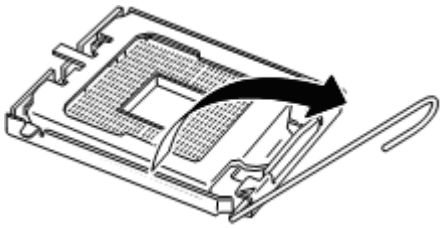


Figure 48: Raising the lever

5. Raise the holder

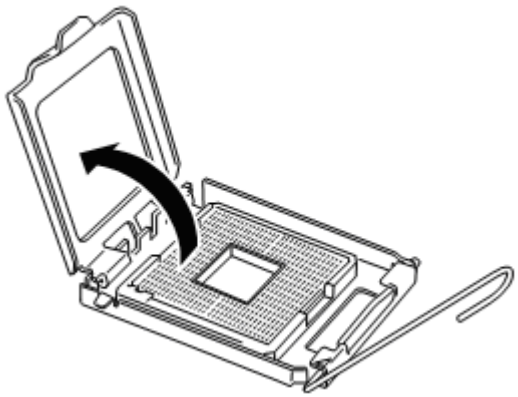


Figure 49: Raising the holder

6. Insert the CPU in the socket slowly and carefully, in the right orientation.

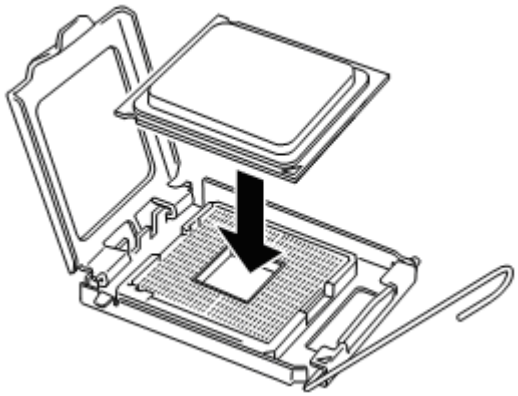


Figure 50: Inserting the CPU in the socket

7. Push the CPU lightly in the socket, and push down the holder.

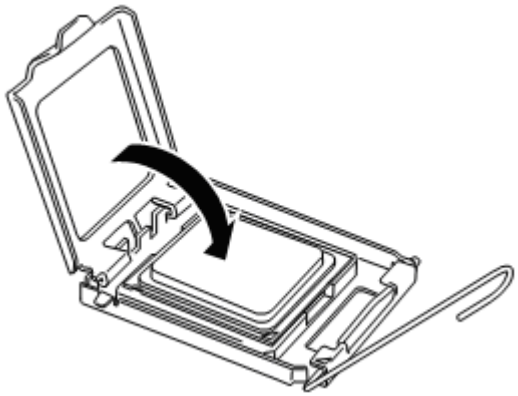


Figure 51: Pushing down the holder

8. Push down the lever to secure the CPU

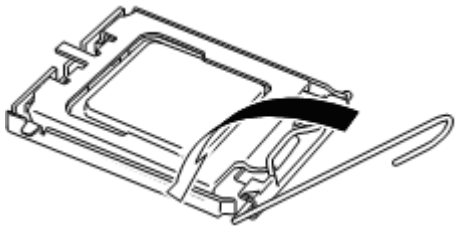


Figure 52: Pushing down the lever

9. Place the heatsink on the CPU

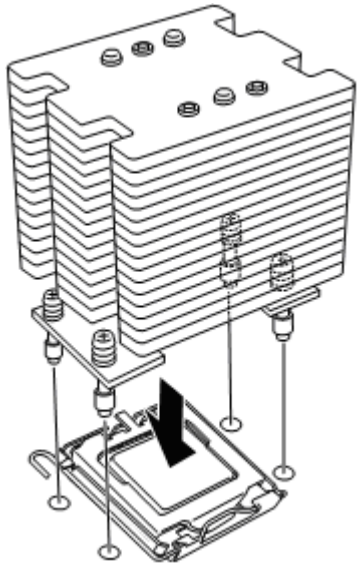


Figure 53: Placing the Heatsink

10. Secure the heatsink with four screws in the order shown in the figure below.

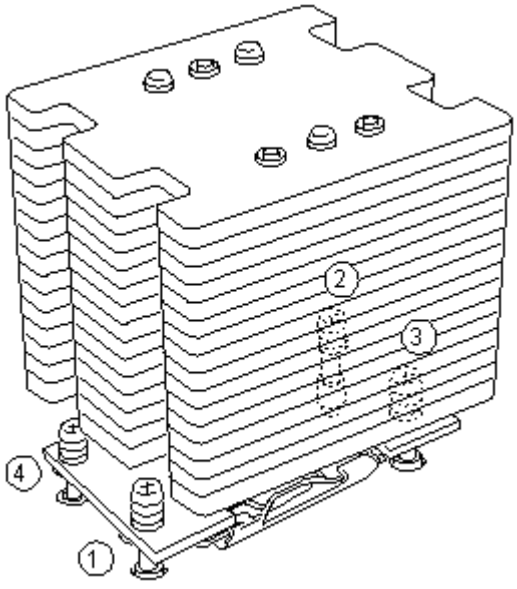


Figure 54: Securing the heatsink

Note: *Make sure that the heat sink is level with the motherboard.*

- *If the heat sink is not aligned with the motherboard, remove it and install it again. The following probably causes the heat sink not to be correctly placed:*
  - *-The CPU is not positioned correctly.*
  - *-The heat sink is not completely secured with the screws.*
- *Do not move the secured heat sink.*

11. Connect the heat sink cable on the CPU_2 fan connector.

12. Install the left side cover.

13. Turn on the system and flash the FRUSDR of the system. See *"Advanced Menu" on page 174* for details.

Removing a Processor

To remove the CPU, prepare for removal referring to steps 1 and 3 of the installation procedure and do the reverse procedure of steps 11 to 4. To remove the heat sink, first remove the screw, slightly move the heat sink, and then completely remove the heat sink.

Caution:

- *Do not remove any CPU unless it failed.*
- *After the operation, heat may make the cool seat at the bottom of the heat sink adhere to the CPU. To remove the heat sink from the CPU, first turn the heat sink to the left and right lightly to make sure that the heat sink is not stuck to the CPU. Removing the heat sink together with the CPU may cause the CPU and/or socket to be damaged.*

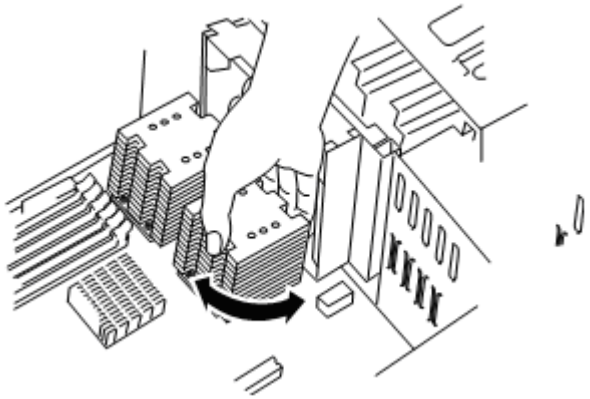


Figure 55: Turning the heatsink

If a CPU is removed (or replaced)

1. Start SETUP, then go to [Main] – [Processor Settings] – [Processor Retest] in order to clear the error information on the removed CPU.

When a CPU is replaced, go to [Main] – [Processor Settings] to confirm that the ID and L2 Cache Size of the additional CPU are normally defined .

2. Set [Reset Configuration Data] in the Advanced menu to [Yes].

This is required to update the hardware configuration information.

Refer to *"Advanced Menu" on page 174* for more information.

Upgrading Random Access Memory (RAM)

Recommended Memory Configuration

Refer to *"Memory Configuration" on page 29* for more information.

Removing and Replacing a DDR3 module

Figure 56: DDR3 Memory Module Sample

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

1. Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see *"General Safety Information" on page 96*).
2. Disconnect the monitor and peripheral devices (printers, for instance) from the system.
3. Remove the server cover. Refer to *"Removing the Left Side Door" on page 98*.
4. Locate the memory upgrade sockets on the motherboard. Refer to *"Memory Configuration" on page 29*.
5. Open the levers at both ends of the socket.

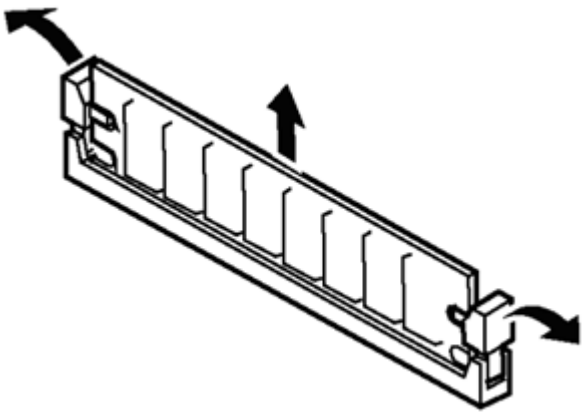


Figure 57: Opening the lever

6. Push the DIMM to the socket straight.

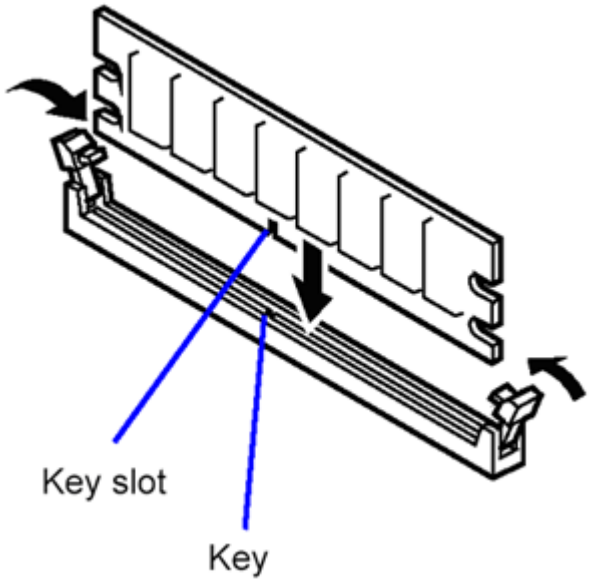


Figure 58: Pushing the memory to the socket

Note:

- *Make sure of the orientation of DIMM. The terminal side of the DIMM has key and key slot to prevent incorrect insertion.*
- *Use extreme care when installing a DIMM. Applying too much pressure can damage the socket.*

7. Close the levers securely.
8. Install the left side cover you have removed.
9. Turn on the power of the server. Make sure that no error message appears in the POST.
10. If POST displays an error message, take a note on the message and see the POST error messages listed in *"POST Error Messages" on page 163*.
11. Run the BIOS SETUP and select [Advanced] ® [Memory Configuration] to verify that the installed DIMM shows the status "Normal". Refer to *"Advanced Menu" on page 174* for details.
12. Select "Yes" for [Reset Configuration Data] on the [Advanced] menu.

    This is required to update the hardware configuration information. Refer to *"Advanced Menu" on page 174* for details.

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

Replacing the Battery

All motherboards use a battery to maintain system configuration information. If it fails to maintain system configuration, replace it with an identically rated battery from the same manufacturer.

Replace the battery as described below:

Caution: *Removing the battery from the motherboard causes the computer to lose system configuration information. Before removing it, run Setup and record the system configuration settings.*

Use this information to restore the system after replacing the battery.

1. Turn off and unplug the system unit and any external options connected to the system.
2. Open the server chassis.
3. Locate the battery on the motherboard. Refer to *"Motherboard" on page 25*.
4. Use your finger to carefully remove the battery from the battery socket on the motherboard.

Warning: ***The battery may explode if it is incorrectly replaced or improperly discarded.***

Use only an identically rated battery from the same manufacturer.

5. With the positive (+) side facing up, press the new battery into the socket.
6. Close the server chassis.
7. Connect the external peripherals and the power cables.
8. Run Setup to reconfigure system parameters.

Installing and Removing an Expansion Card

Your computer's motherboard features several expansion slots that can accommodate accessory expansion cards, such as a RAID board.

Specific Recommendations

RAID Controller

Take the following into consideration when installing either a S-ATA Disk array controller or a SCSI Disk array controller.

Refer to the manual that comes with the RAID controller for more details.

- Prepare the hard disk drives and cables corresponding to the RAID controller to be installed.
- Configure the Logical Settings of the hard disk drive.
- Prepare the number of hard disk drives required for the desired RAID (Redundant Array of Inexpensive [Independent] Disks) level. Refer to *"Configuring RAID" on page 73* .
- Installing hard disks in the disk array configuration or changing the RAID level initializes hard disks. Make sure to backup any valuable data that may be present on the hard disk drive before installing the disk mirroring controller board and configuring the array.
- Use hard disks of the same capacity and revolution for each pack to configure them in the array.
- The disk array configuration improves the disk reliability. On the other hand, the disk capacity is reduced (not equal to the sum of the array's hard disks total capacity).
- Use an appropriate RAID configuration utility to configure the RAID.
- When the disk array controller board is replaced, restore the disk array configuration information to the new disk array controller board. Use the configuration utility for the restoration. Refer to the RAID configuration utility specific to your card for more details.

Graphics Card

When installing 75W or greater add-in cards (especially graphic cards) in PCI-E connectors, the add-in cards must be individually powered.

Use available power cables from the system power supply and plug the connector onto the graphics cards.

⚠ **Caution:** *Failure to specifically power 75W or greater add-in cards may damage both the motherboard and the add-in cards.*

Installing an Expansion Card

Note: *You may want to install an operating system before installing any PCI add-in boards.*

1. Remove the left side cover. Refer to *"Removing the Left Side Door" on page 98*.
2. Remove the screw shown in figure *"Rear panel" on page 117*, and open the *retention panel.*

Figure 59: Rear panel

1- Screw

2- Retention panel

3- PCI slot shields

3. Remove the PCI slot shield, if it has not already been removed, by pushing the shield out from the inside of the chassis.
4. Remove the PCI add-in board from its protective wrapper.

Caution: *Be careful not to touch the components or gold-edge connectors. Place the board on an anti-static surface.*

5. Record the type and serial number of the add-in board in your equipment log. Refer to *"T840 E2 Equipment Log" on page 202*.
6. Set jumpers or switches on the board according to the manufacturer's instructions.
7. Hold the PCI add-in board by its top edge or upper corners. Firmly press the add-in board into an expansion slot on the server board.
8. Repeat the previous steps until all PCI add-in boards are installed.
9. Attach cables, if necessary.
10. Replace the left side door. Refer to *"Removing the Left Side Door" on page 98*.

Removing an Expansion Card

Caution: *PCI add-in boards are extremely sensitive to electric static discharge (ESD) and always require careful handling. After removing the add-in board from its protective wrapper or from the server board, place it with the component side up on a grounded, static-free surface or conductive foam pad. Do not slide the add-in board over any surface.*

1. Remove the left side door. Refer to *"Removing the Left Side Door" on page 98*.
2. Remove the screw of the retention panel, and open the retention panel.Refer to *"Rear panel" on page 117*.
3. Disconnect any cables that may be attached to the PCI add-in board that needs to be removed.
4. Firmly grab the PCI add-in board by its top edge or upper corners and remove it from the expansion slot on the server board (A).

   Place the removed add-in board in an anti-static protective wrapper.
5. If available, replace the PCI slot shield by pressing the slot shield into the opening on the chassis.
6. Replace the left side door.

Cabling SATA Devices

The S-ATA Cable

Your system comes equipped with several S-ATA cables.

Both connectors go either to a drive or to the motherboard.

Figure 60: S-ATA Cable

Note: *The color of the S-ATA cable and connectors may differ from the color of the cable shown in the picture.*

System Power Cables

Power cables come from the power supply and are attached to standard storage devices. System power cables vary in length and provide connector sizes to accommodate a variety of supported storage configurations. Power cable connectors are keyed to fit only in the correct position.

Depending on your configuration, the cables from the power supply are either of the:

- Molex type, and requires one of the adaptator below (included with your system),

Figure 61: S-ATA Storage Device Power Cable Adaptor

Figure 62: Slim S-ATA Storage Device Power Cable Adaptor

- or SATA type, and can be directly plugged in your SATA device.

Cabling a S-ATA Drive

All storage devices require power and DATA cable connections. Devices shipped with the system are already connected.

The following procedure explains how to attach the cables to a drive.

1. Connect the S-ATA cable connector to the matching pins on the storage device.
   - Take care to prevent bending drive connector pins.
   - Align the cable connector to the matching pins on the drive.
2. Locate an available power connector coming from the power supply.
3. Connect the appropriate power cable to the cable power adaptor.
4. Connect the power cable adaptor to the connector on the storage device.

Cabling SAS Devices

The SAS Cable

Your system comes equipped with one of the following SAS cables, depending on the hard disk drives controller you have selected.

Note: *The color of the SAS cable may differ from the color of the cable shown in the picture.*

Refer to the instructions included in the *Installing Hard Disk Drives* or *Hard Disk Drives Cage* chapters (depending on your configuration) for more information on the motherboard to backplane connection.

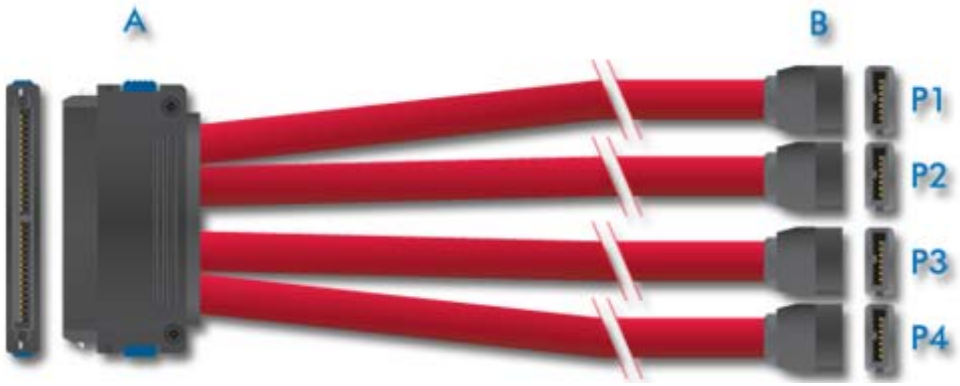


Figure 63: SAS Cable (1 to 4)

A: Backplane connector
B: Motherboard connectors (numbered P1 through P4)

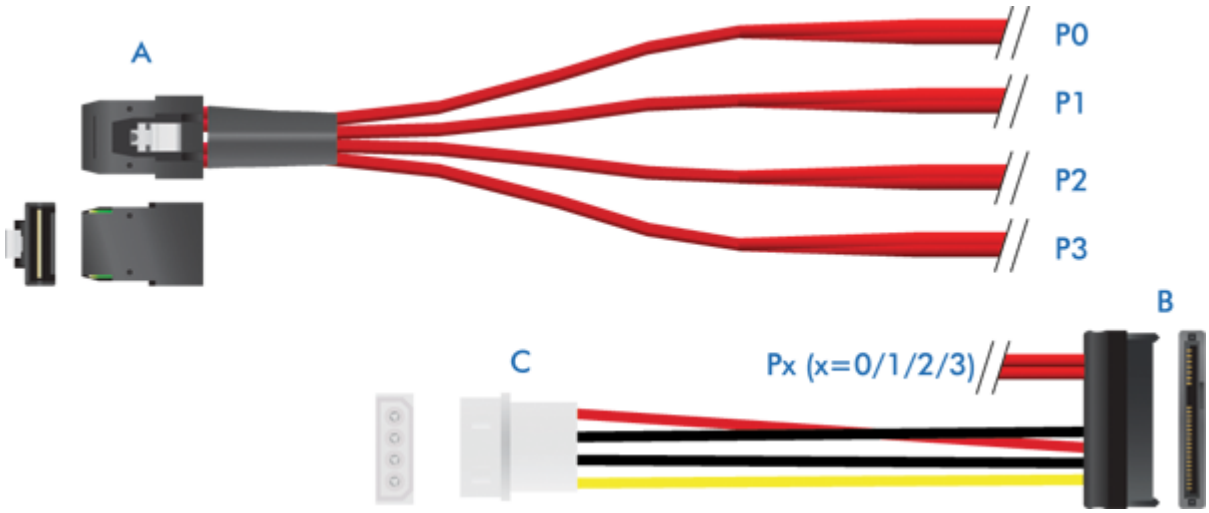


Figure 64: SAS Data and Power Cable (1 to 4)

A: Additional SAS controller connector
B: Hard disk drive connector
C: Power supply connector

Interrupt Requests

The BIOS automatically assigns IRQs to devices in the system for legacy compatibility. A method is not provided to manually configure the IRQs for devices.

Software

Installing and Using Utilities

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

With the ExpressBuilder DVD you can:

- Install the Operating System, using the Express Setup.
- Create a support disk; this disk will be used to manually install a Microsoft operating system.
- Install utilities, such as management software for Windows.

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

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

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

Software End-User License Agreement

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

Utilities

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

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

ExpressBuilder

ExpressBuilder is an automated software integration tool that helps simplify the process of installing and configuring your system. It provides a flexible, guided installation process for system administrators to install Microsoft® Windows Server® 2003 and Microsoft® Windows Server® 2008.

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

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

ExpressBuilder includes two distinct programs:

- ExpressBuilder (Windows-based)
- Express Setup

ExpressBuilder (Windows-Based)

Use this application to:

- Read the User's Guide or the other documents,
- Update the system, and
- Install software applications (depending on your configuration).

Note:

- *An internet-browser with XML language support is mandatory to use the ExpressBuilder software application.*
- *Some documents are provided in the PDF format. Use the Adobe Acrobat Reader to read these documents.*

Insert the ExpressBuilder disc into the optical disc drive, the autorun should start automatically and display the *ExpressBuilder* window.

If the Autorun function is invalid in your system, run **HTML\ar_menu\autorun_menu.exe** directly on the disc.

Click on the menu items to display the available services and options.

Bull System Client and Bull System Area Manager

Note: *Refer to the Bull System Area Manager and Bull System Client User Guides on the dedicated CD-ROM for more information, or contact your sales representative.*

Bull System Client

The Bull System Client is a tool for managing a server, a desktop or a notebook within an IT environment.

The Bull System Client manages one system at a time. To manage multiple systems simultaneously, we recommend installing Bull System Area Manager on a designated system.

Bull System Area Manager

The Bull System Area Manager is a single tool meant to manage remotely and simultaneously multiple servers, desktops, and notebooks within an IT environment.

Note: *Contact your sales representative for more information on these features. Please note that a licence key is required to monitor a system using the Bull System Area Manager.*

The Bull System Area Manager allows administrators to manage and monitor the key components of the IT infrastructure: servers, desktops, and notebooks. It empowers administrators to keep all of these systems functioning at peak efficiency and it helps them:

- Reduce power consumption across all systems.
- Manage and configure PCI RAID systems from different manufacturers with one simple interface, replacing the disparate interfaces from different manufacturers.

Note: *Some controllers may not be supported. In this case, use one of the other RAID Configuration utilities listed in this guide.*

- Dynamically gather highly detailed asset data on all products and generate reports for compliance and other purposes.
- Monitor and alert on a wide spectrum of system parameters including temperature, voltage, power redundancy, fan speeds, physical intrusions, disk capacity, memory module errors, and network connectivity status.
- Log and compile a variety of system events that can help administrators quickly track ongoing systems issues and respond to them quickly and efficiently.
- Configure alerting options that can assign different alerts to different groups – focusing key people on key tasks.
- Remotely identify root causes of problems, and even fix them without leaving their desk.

- Remotely Resolve non-operational systems using IPMI and vPro out-of-band management.
- Take over a remote system at the keyboard/video/mouse level and fix the issues.

Bull System Client and Bull System Area Manager Scopes

Table 4: Bull System Client and Bull System Area Manager Scopes

Product Features	Bull System Client	Bull System Area Manager
Asset Discovery and Monitoring	X	X
Remote Keyboard, Video, Mouse Control		X
Remote Out of Band Management (IPMI / AMT)		X
Power Management		X
Asset Change Tracking, Alerting and Reporting		X
Physical/Logical/RAID Storage Monitoring and Configuration	Monitor Only	X
Utilization and Performance Monitoring	X	X
Configurable Alerting Email/SMS/Pager/SNMP	Email Only	X
Enterprise Framework Integration (SNMP and Sys Event Log)		X

Installing the Operating System with Express Setup

This section describes information on using Express Setup to install and configure the following operating systems to the system.

- Microsoft® Windows Server® 2003
- Microsoft® Windows Server® 2008

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

About Express Setup

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

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

Microsoft Windows Server 2003

This subsection provides information on installing the Microsoft® Windows Server® 2003 Standard Edition x32 or x64 in the system. Read the instructions in this section before proceeding the installation.

Installation Notice

This section explains precautions and matters you should be aware of before beginning the installation in order to install Windows Server 2003 correctly.

Supported Operating System on this Model

The system supports Microsoft Windows Server 2003 Standard Edition (hereinafter, referred to as "Windows Server 2003") x32 and x64.

BIOS Specification

Before installing the Operating System, verify if the BIOS specification of the hardware is correct. Refer to *"BIOS Setup Utility" on page 171*.

Restrictions

- Before starting the installation, complete all the process of adding the optional device and the setup of system mainframe (BIOS and optional board specification)
- After completing Express Setup, see "Setup for Solving Problems" described later to specify the settings for trouble recovery such as "Specifying Memory Dump".

Installing on a RAID Pack

If you want to install Windows Server 2003 on a volume, the RAID pack needs to be configured first.

Creating Partition Size

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

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

Size necessary to install the system= 2900 MB

Paging File Size (Recommended)= Mounted Memory Size × 1.5

Dump file Size= Mounted Memory Size + 12 MB

Caution:

- *The above paging file size is necessary for collecting debug information (memory dump). If you set the default value of paging file size smaller than the 'recommended' value, the accurate debug information (memory dump) may not be collected.*

- *The maximum paging file size which can be set on one partition is 4095 MB. If the above paging file size exceeds 4095 MB, specify 4095 MB for the paging file size.*
- *If you install any application program or the like, add necessary space to the partition to install these programs.*

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

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

Installing Windows Server 2003

This section describes how to setup the system using Express Setup.

1. Turn on your system.
2. Insert the ExpressBuilder DVD in your optical disc drive.
3. Restart the system.

   To restart the system, press **Ctrl + Alt + Del** or turn off the system once, and turn it on again.
4. When prompted, select the language of your choice, and click **OK**.

Note: *At this step, the choosen language is set up for installation menus only. The language of Microsoft Windows Server 2003 is linked to the version you are going to install on your computer.*

5. Click on **Setup Windows**.
6. In the *ExpressSetup assistant* window, select the following options:
   - *Operating system to install.*
   - *System partition to create,* if you need to create one.
   - *Display settings.*
   - *Network identification,* if needed.
   - *Network options,* if needed.
   - *User information.*
   - *Country settings.*
   - *Computer's role.*
7. Click **START Installation,** and click **OK**.
8. When prompted to read the *Licence agreement*, do so, and click **Yes**.
9. When prompted to *insert the Microsoft Windows Server 2003 CD-ROM*, insert it, and click **OK**.
10. When prompted to do so, click on **Ctrl** + **Alt** + **Del** to logon.
11. Log on using **Administrator** as *User name*, without any password.
12. Follow the on-screen instructions provided by the operating system to complete the Windows Server 2003 installation.
13. See *"Updating the System" on page 131*.

The installation is completed.

Updating the System

To ensure normal system operation you should update your system using the following procedure.

Caution: *You should update your system if you have:*

- *Changed the system configuration (when adding or removing optional built-in devices, do not restart the system once the system configuration has been changed, but update the system.).*
- *Recovered the system using a recovery process*
- *Restored the system using a backup tool.*

Log on to the system using the administrator account or another account which is a member of the Administrators group.

1. Insert the ExpressBuilder disc into the optical device drive, the autorun should start automatically and display the *ExpressBuilder* window.

   If the Autorun function is invalid in your system, run **\ar_menu\autorun_menu.exe** directly on the disc**.**
2. In the *Menu Items*, click on *Setup Windows*, and select **Update the system**.

   Wait until the driver installation is completed.
3. Remove the ExpressBuilder disc from the optical device drive.
4. Restart your computer.

The update is completed.

Installing Drivers or Software

Proceed as follows to install specific drivers or software.

Log on to the system using the administrator account or another account which is a member of the Administrators group.

1. Insert the ExpressBuilder disc into the optical device drive, the autorun should start automatically and display the *ExpressBuilder* window.

   If the Autorun function is invalid in your system, run **HTML\ar_menu\autorun_menu.exe** directly on the disc**.**

2. In the *Menu Items*,
   - To install specific drivers: click on **Setup Windows**, select **Driver Directory**, and browse to the directory of your choice.
   - To install software applications: click on **Setup Software**, and select the application of your choice.
3. Follow the on-screen instructions

Note: *Prepare a blank floppy disk. You may need it when installing a driver.*

Installing Microsoft Windows Server 2008

Please refer to the additional documentation provided on the ExpressBuilder DVD.

Installing the Operating System without Express Setup

Microsoft Windows Server 2003

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

Before Installing Windows Server 2003

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

Installing Service Pack

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

Updating System

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

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

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

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

Manual Installation when the Disk Array Controllers are Connected

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

Magneto-Optical device

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

Partition Size

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

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

Caution:

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

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

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

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

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

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

Installing Microsoft Windows Server 2003

You will need the following for Windows Server 2003 installation:

- ExpressBuilder disc
- Microsoft Windows Server 2003 Standard Edition (disc)
- Windows Server 2003 OEM-DISK for ExpressBuilder

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

Creating the Windows 2003 OEM-DISK from the ExpressBuilder

Note: *An internet-browser with XML language support is mandatory to use the ExpressBuilder software application.*

Follow the steps below:

1. Prepare a formatted 3.5-inch floppy disk.
2. Run the operating system.
3. Insert the ExpressBuilder disc into the optical device drive, the autorun should start automatically and display the *ExpressBuilder* window.

   If the Autorun function is invalid in your system, run **HTML\ar_menu\autorun_menu.exe** directly on the disc**.**

4. In the *Menu Items*, click on **Create drivers disk**, and select the option corresponding to your system configuration.
5. Insert the floppy disk into the floppy disk drive, click on **Copy It** and wait until the floppy disk is created.
6. Click on **OK** and close the *Floppy disk copy* window.
7. Eject, write-protect and label the diskette, then keep it safely.

Windows Server 2003 Installation

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

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

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

   If no bootable operating system is installed on the hard disk, this step is unnecessary.

   The Windows Server 2003 setup screen will be displayed. If the screen is not displayed, **Enter** was not pressed properly. Retry after turning the system off then on again.
4. If a RAID controller is installed, press **F6** while:

   – "Setup is inspecting your computer's hardware configuration..." is displayed.

   – A screen with a solid blue background is displayed.

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

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

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

   The following message is displayed.

Please insert the disk labeled manufacturer-supplied hardware support disk into Drive A: *Press ENTER when ready.

6. Insert the Windows Server 2003 OEM-DISK for ExpressBuilder into the floppy drive, and press **Enter**.
7. Follow the on-screen instructions to complete the installation.
8. After the installation is completed, be sure to follow the procedures described in *"Updating the System" on page 139* and *"Installing Drivers or Software" on page 139*.

Reinstallation to Multiple Logical drives

This section describes the procedure for reinstalling the operating system if the multiple logical drives exist.

Before Re-installing the Operating System

Be sure to make backup copies before re-installing the operating system just in case.

Re-installing the Operating System

1. Start the clean installation following the procedure described in this guide.
2. Specify the partition in which you want to install the operating system when the following message appears:

> The following list shows the existing partitions and unpartitioned space on this computer.
>
> Use the UP and DOWN ARROW keys to select an item in the list.
>
> * Cannot modify the drive letter of your system or boot volume. Confirm the proper drive letter is assigned and then, continue the setup.

3. Continue the clean installation following the procedure described earlier in this chapter.

Note: *The drive letter of the re-installed system may differ from the one of the previous system. If you need to modify the drive letter, follow the procedure in "Modifying the Drive Letter".*

Modifying the Drive Letter

Be aware that the drive letter of the system or boot volume cannot be modified using the following procedure.

1. Click the **Start** menu, right-click **My Computer**, and specify **Manage** to start *Computer Management*.
2. Specify the *Disk Management* in the left side of the window.
3. Right-click the volume you want to modify the drive letter and specify the **Change Drive Letter and Path...**.
4. Click **Yes**.
5. Choose **Assign a drive letter** and specify the drive letter you want to assign.
6. Click **OK**.
7. If the following message appears, click **Yes**:

> Changing the drive letter of a volume may cause programs to no longer run.
>
> Are you sure you want to change this drive letter?

8. Close the *Computer Management* window.

Updating the System

To ensure normal system operation you should update your system using the following procedure.

Caution: *You should update your system if you have:*

- *Changed the system configuration (when adding or removing optional built-in devices, do not restart the system once the system configuration has been changed, but update the system.).*
- *Recovered the system using a recovery process*
- *Restored the system using a backup tool.*

Log on to the system using the administrator account or another account which is a member of the Administrators group.

1. Insert the ExpressBuilder disc into the optical device drive, the autorun should start automatically and display the *ExpressBuilder* window.

   If the Autorun function is invalid in your system, run **\ar_menu\autorun_menu.exe** directly on the disc**.**
2. In the *Menu Items*, click on *Setup Windows*, and select **Update the system**.

   Wait until the driver installation is completed.
3. Remove the ExpressBuilder disc from the optical device drive.
4. Restart your computer.

The update is completed.

Installing Drivers or Software

Proceed as follows to install specific drivers or software.

Log on to the system using the administrator account or another account which is a member of the Administrators group.

1. Insert the ExpressBuilder disc into the optical device drive, the autorun should start automatically and display the *ExpressBuilder* window.

   If the Autorun function is invalid in your system, run **HTML\ar_menu\autorun_menu.exe** directly on the disc**.**
2. In the *Menu Items*,
   - To install specific drivers: click on **Setup Windows**, select **Driver Directory**, and browse to the directory of your choice.
   - To install software applications: click on **Setup Software**, and select the application of your choice.
3. Follow the on-screen instructions

Note: ***Note****: Prepare a blank floppy disk. You may need it when installing a driver.*

Available Switch Options for Windows Server 2003 Boot.ini File

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

- Microsoft Knowledge Base - Article ID: 833721

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

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

However, the Microsoft operating system products which support /PAE switch option are limited. Refer to the following article in Microsoft Knowledge Base to check the supported products.

- Microsoft Knowledge Base - Article ID: 291988

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

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

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

   <Example of Boot.ini file>

   [boot loader]

   timeout=30

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

   [operating systems]

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

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

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

This is the end of editing Boot.ini file.

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

Collecting the Memory Dump

If applicable, set to collect the memory dump (debug information).

Installing Microsoft Windows Server 2008

Please refer to the additional documentation provided on the ExpressBuilder DVD to install Windows Server 2008 without using the Express Setup tool.

Maintenance

This chapter describes the daily maintenance of the system and precautions when relocating or storing the system.

Making Backup Copies

We recommend you make backup copies of your valuable data stored in hard disks of the system on a regular basis. For backup storage devices suitable for the system and backup tools, consult with your sales agent.

We also recommend you make a backup copy of the disk array configuration data if your system is in an array configuration. Perform the backup copy again if your hard disks have been auto-rebuilt due to a failure. To make a backup copy of the configuration data, use the configuration utility that is resident in the FLASH memory on the optional disk array controller board. Refer to the manual supplied with the board.

Cleaning

Clean the system on a regular basis to keep the system in a good shape.

Warning:

- ***Do not disassemble, repair, or alter the system.***
- ***Do not look into the optical device drive.***
- ***Do not remove the lithium battery.***
- ***Disconnect the power plug before working with the system.***

Cleaning the External Surfaces of the system

Caution:

- *To avoid altering the material and color of the system, do not use volatile solvents such as thinner and benzene to clean the system.*
- *The power receptacle, the cables, the connectors on the rear panel of system, and the inside of the system must be kept dry. Do not moisten them with water.*

For daily cleaning, wipe the external surfaces of the system with a dry soft cloth

If stains remain on the surfaces:

1. Make sure that the system is powered off (the POWER/SLEEP lamp is unlit).
2. Unplug the power cord of the system from a power outlet.
3. Wipe off the dust from the power cord plug with a dry cloth.
4. Soak a soft cloth in a neutral detergent diluted with cold or lukewarm water, and squeeze it firmly.
5. Rub off the stains from the system with the cloth prepared in Step 4.
6. Soak a soft cloth in water, squeeze it firmly, and wipe the system with it once again.
7. Wipe the system with a dry cloth.
8. Wipe off dust from the fan exhaust openings with a dry cloth.

Cleaning the Interior of the system

One of the most important items of a good maintenance program is a regular and thorough cleaning of the inside of the server, especially around the base board.

Dust buildup inside the server can lead to several problems. As dust acts as a thermal insulator, a buildup can prevent proper system cooling. Excessive heat will shorten the life of the server components. The dust may also contain conductive or corrosive materials that can cause short circuits or corrosion of the electrical contacts.

The frequency at which you should clean the inside of the server depends on the environment in which it is located. For most office environments, every 12 months is probably sufficient. For more severe environments, clean the inside every 6 months.

Cleaning the interior of the server implies powering off the server and removing the left side cover. You will need a small vacuum cleaner (with a plastic tipped nozzle and electrostatic protection), computer grade canned air, and a small brush.

Warning: ***Unplug all power cords before performing any maintenance. Voltage is present inside the system and display unit even after the power is turned off. All voltage is removed only when the power cord is unplugged.***

Do not use a brush made of chemical fabric, it may generate static electricity.

To clean the interior of the system:

1. Turn off the system and unplug all the power cables.
2. Remove thecover.
3. Use a small brush to loosen any dust and debris on the motherboard.
4. Use computer grade canned air to blow dust off components on the motherboard.
5. Use a small vacuum cleaner with plastic tip to vacuum out the dust and debris from the inside of the system.
6. Reinstall the cover.
7. Reconnect all the power cables and turn on the system.

Cleaning the Keyboard

1. Power off the system and peripheral devices.
   The POWER/SLEEP lamp is unlit.
2. Wipe the keyboard surface with a dry cloth.

Cleaning the Mouse

Mechanical mouse

The mouse operation depends on the degree of smoothness of the internal ball rotation. To keep the mouse ball clean, use the mouse in a place with little dust.

1. Prepare cold or lukewarm water, neutral detergent, alcohol, two dry soft clothes, and cotton swabs.

2. Power off the system.
   The POWER/SLEEP lamp is unlit.
3. Turn the mouse upside down, and rotate the mouse ball cover counter clockwise to remove it.
4. Take out the ball from the mouse. Cover the bottom of the mouse with your hand, and turn your hand holding the mouse (the mouse is on your palm with the button upward). The mouse ball is released onto your palm.
5. Soak a soft cloth in neutral detergent that is diluted with cold or lukewarm water, and squeeze it firmly.
6. Rub off stains on the mouse ball. Softly wipe the mouse ball with the cloth prepared in Step 5.
7. Wipe the mouse ball with a dry soft cloth.
8. Wipe three small rollers inside the mouse with a cotton swab soaked with alcohol. Wipe stains slowly and carefully by rotating rollers with the tip of the cotton swab.
9. Blow out any dust from the mouse. Protect your eyes from the dust.
10. Put the mouse ball back into the mouse.
11. Place the mouse ball cover, and rotate it clockwise until it is locked.

Optical Mouse

An optical mouse is an advanced computer pointing device that uses a light-emitting diode (LED), an optical sensor, and digital signal processing (DSP). Movements of the mouse are detected by sensing changes in the reflected light, rather than by interpreting the motion of a rolling sphere as with a mechanical mouse.

Tips for correct use

The optical mouse takes microscopic snapshots of the working surface at a rate of more than 1,000 images per second. If the mouse is moved, the image changes. The smallest irregularities in the surface can produce images that are sufficient for the sensor and DSP to generate usable movement data.

Considering the way the optical mouse works:

- Avoid mouse pads that are very glossy or highly reflective.
- Avoid dark mouse pads.
- Use your mouse on colors such as white, tan, or grey.
- Use your mouse on surfaces with a flat, non-reflective finish.
- Use your mouse on surfaces that reflect but also scatter the light, such a a white sheet of drawing paper.

Note: *If you experience erratic mouse behavior, test it on a plain white sheet of paper.*

Cleaning the Light-Emitting Diode (LED)

Turn the mouse over and inspect the light-emitting diode "LED" area to make sure it is clean. In practice, an optical mouse does not have the issues with debris build-up that the older, mechanical ball mice experience.

- If there is a smudge on the lens area, gently clean with a plain cotton swab.
- If there are some debris in the lens area, gently blow them away.

Cleaning the Soft Pads

Over time, dust may collect on the soft pads located on the bottom of the mouse.We recommend you remove the dust on each softpad using a coin. You can also place the mouse on a white sheet of paper, and run the mouse over it (apply soft pressure on the mouse while doing so).

Note: *Do not use a sharp instrument, it could damage the soft pads.*

Cleaning an Optical Disc Drive

A dust-accumulated tray or a dusty optical drive may cause the device not to read data correctly.

To Clean an Optical Drive:

1. Power on the system.
   The POWER/SLEEP lamp is lit.
2. Press the optical drive tray Open/Close button on the front of the optical drive.
   The tray opens.
3. Hold the disc and take it out from the tray.

Note: *Do not touch the signal side of the disc with your fingers.*

4. Wipe the tray with a dry soft cloth.

Caution: *Do not wipe the lens of the optical drive. Doing so may damage the lens and may cause a malfunction of the drive.*

5. Push on the tray front to close the tray.

To Clean an Optical Disc

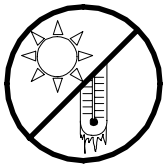
Wipe the signal side of the disk with a dry soft cloth.

Caution:

- *Wipe disks from the center to the outside.*
- *Use only a specific disc cleaner if necessary. Cleaning a disc with record spray/cleaner, benzene, or thinner causes damage to the disk contents. At worst, inserting the disk into the system may cause failure.*

Care and Handling

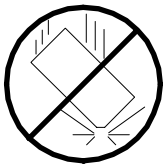
Use the following guidelines to properly handle and care for your system.



Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.

Keep the system away from magnetic forces.

Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.

Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.

Keep the system away from dust, sand, and dirt.

Solving Problems

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last section includes BIOS and system user information.

Warning:

- ***The DC push-button on/off switch on the front panel does not turn off completely the system AC power. +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis.***
- ***Not disconnecting power before opening your system can result in personal injury and equipment damage***
- ***Running your system with the cover removed can damage your system components.***
- ***For proper cooling and airflow, always replace the covers before powering on your system.***

Static Precautions

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

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

Troubleshooting Guide

This section provides you a guide to identify a problem and locate its source.

Warning: ***The system power and any peripheral devices should be turned off before connecting or disconnecting peripheral devices to or from the system.***

Otherwise, you could permanently damage the system or peripheral devices.

1. Turn off the system and any peripheral devices. Disconnect all external peripherals from the system, except for the keyboard and monitor. The system´s power cord must be plugged into a grounded electrical outlet.
2. Make sure your keyboard and monitor are properly connected to the system. Turn the monitor on, then adjust its brightness and contrast controls to suit your preference (see your monitor´s documentation).
3. Turn the system on. If the power indicator does not light up, but the system seems to be operating normally, the indicator may need replacement.
4. Monitor the power-on self test (POST) execution. Each time you turn on the system, the POST checks the system board, memory, keyboard, and certain peripheral devices.
5. Check the following during the POST:
   - If the POST does not detect any errors, the system should boot up.not prevent the boot process (non-fatal errors) display a message that may appear similar to the following display:
   - (Error Message Line 1)
   - (Error Message Line 2)
   - Press <F1> to continue,
   - <DEL> to enter Setup
   - You should note the error and press **F1** to resume the boot-up process, or **DEL** to enter Setup.
6. Errors that prevent the boot process from continuing (fatal errors) are communicated by a series of audible beeps. If this type of error occurs, record the information and refer to the Error Messages: Beep Codes section.

System Viewers

Monitor the occurrence of fault with the Remote Manager (NEC ESMPRO, ASWM or another utility, depending on your system) during the system operation.

Especially take note on whether any alert is reported to the Remote Manager on the management PC.

Problems at initial System Start-up

Problems that occur at initial system start-up are often caused by incorrect installation of components or incorrect configuration. Hardware failure is a less frequent cause.

- Are all cables properly connected and secure?
- Is AC power available at the wall outlet?
- Are the configuration settings correct in Setup? Are all drivers properly installed?
- Are all the expansion cards fully seated in their slots on the motherboard?
- Are all DIMMs installed correctly?
- Is the processor fully seated in its socket on the motherboard?
- Are switches and jumpers on the system board correct (if they have been changed from their original default settings)?
- Are all jumper and switch settings on optional add-on cards and peripheral devices set correctly? Check the documentation included with these devices for details. Ensure that there are no system resource conflicts between hardware components. (For example, two add-on cards could inadvertently share the same interrupt, resulting in a conflict.)
- Are adapter cards and disk drives correctly installed?
- Is the keyboard properly connected to the system and is it connected in the right USB port?
- Is a bootable diskette installed in your system's floppy drive A:? (if a floppy disk drive is intalled).
- Is the hard disk properly formatted or defined?
- Is the operating system properly loaded? Check the operating system documentation.

Problems After the System Has Been Running Correctly

After the system hardware and software have been running correctly, problems can indicate equipment failure. Use the checklist below to try and correct the situation.

If the problem recurs after you have checked these items, refer to *"Troubleshooting Guide" on page 149*.

- If you are running software from a diskette or CD, try using a new copy.
- If you are running software from a hard disk drive, make sure that all of the necessary files are installed. There may be a problem with the copy on the hard disk. Reinstall the software on the hard disk and try again.
- If problems appear intermittently, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), or other random component failures.
- A transient voltage spike, power cut, or brownout may have occurred. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands. If necessary, exit any open applications and shut down your system power. Reboot the system, then load the software and try again.
- Voltage spikes can occasionally cause the heads of the disk drive to contact the disk. This can corrupt or destroy data files. If you are experiencing voltage spikes on the AC electrical power line, install an uninterruptible power supply between the power outlet and the system's power cord.

Problems Running New Application Software

Problems occurring when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. Use the checklist below to see if the situation may be easily corrected. If the problem persists after you have checked these items, contact the software vendor's customer service.

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorised copy? Unauthorised copies often do not work. Obtain an authorised copy of the software.
- If you are running the software from a CD or a floppy disk, is it a good copy?
- If you are running the software from a CD, is the disc scratched or dirty?
- Is the software correctly installed? Were all necessary procedures followed and files installed?
- Are the correct device drivers installed?
- Is the software correctly configured for the system?
- Are you using the software correctly?

Problems and Suggestions

Contact your Authorised Service Representative if the suggested actions do not solve the problem.

Table 5: Problems and Suggestions

What to do	What to do
Application software problems	Make sure all cables are installed correctly. Verify that your system hardware configuration is set correctly. In Setup, check the values against the system settings that you previously recorded. If an error is evident (wrong type of drive specified, for example), make the change in Setup and reboot the system. Record your change. Make sure the software is properly configured for the system. Refer to the software documentation for information. Try a different copy of the software to see if the problem is with the copy you are using. If other software runs correctly on the system, contact the vendor of the failing software.
Characters on screen are distorted or incorrect	Make sure the brightness and contrast controls are properly adjusted. Make sure the monitor's video signal cable and power cables are properly installed. (Shut down system power before reconnecting cables.) Make sure your monitor is compatible with the video mode you have selected. (Check your monitor's documentation.)
Characters do not appear on screen	Make sure the monitor is plugged in and turned on. Are the brightness and contrast controls properly adjusted? Make sure that the video signal cable is properly connected. (Turn the system power off before reconnecting cables). Make sure your system's video adapter card is installed, enabled. Reboot the system.
CMOS RAM settings are wrong	If system settings stored in CMOS RAM change for no apparent reason (for example, the time of day is in error), the backup battery may no longer have enough power to maintain the settings. Replace the battery.
Diskette drive light does not go on when drive is in use or is tested by POST.	Make sure the power and signal cables for the drive are properly installed. Check that the drive is properly configured and enabled in Setup.
Hard drive light does not go on when drive is in use or is tested by POST.	Make sure the power and signal cables for the drive are properly installed. Make sure the front panel connector is securely attached to the system board headers. Check that the drive is properly configured and enabled in Setup. Check the drive manufacturer's manual for proper configuration for remote hard disk drive activity. If your HDDs are plugged onto a PCI card, this is normal. The LED will light only when detecting activity on the optical drives.
Power on light does not go on	If the system is operating normally, check the connector between the system board and the front panel. If OK, the light may be defective.

Problems with the System

Fail to power on the system:

- Is the system is properly supplied with power?
  - Check if the power cord is connected to a power outlet (or UPS) that meets the power specifications for the system.
  - Check the power cord for broken shield or bent plugs.
  - Make sure the power breaker for the connected power outlet is on.
  - If the power cord is plugged to a UPS, make sure the UPS is powered and it outputs power. See the manual that comes with the UPS for details.
- Did you press the POWER/SLEEP switch?
  - Press the POWER/SLEEP switch on the front of the system to turn on the power (the POWER/SLEEP lamp lights).

Fail to power off the system

- Is the power switch enabled?
  - Restart the system and start the BIOS setup utility

No screen display appears and beep occurs.

- Is the DIMM board installed securely?
  - Check whether the DIMM board is inserted into the mating connector securely.
  - Make sure the jumper switches have been returned to their original positions after CMOS clearing. for the positions of the jumper switches.

POST fails to complete:

- Is the memory size large?
  - The memory check may take a few seconds if the memory size is large. Wait for a while.
- Did you perform any keyboard or mouse operation immediately after you started the system?
  - If you perform any keyboard or mouse operation immediately after start-up, POST may accidentally detect a keyboard controller error and stops proceeding. In such a case, restart the system once again. Do not perform any keyboard or mouse operation until the BIOS start-up message appears when you restart the system.
- Does the system contain appropriate memory boards or PCI devices?
  - Operation of the system with unauthorized devices is not guaranteed.

Fail to access to internal or external devices (or such devices fail to operate):

- Are cables properly connected?
  - Make sure that the interface cables and power cord are properly connected. Also make sure that the cables are connected in the correct order.
- Is the power-on order correct?
  - When the system has any external devices connected, power on the external devices first, then the system.
- Did you install drivers for connected optional devices?
  - Some optional devices require specific device drivers. Refer to the manual that comes with the device to install its driver.
- Is BIOS configuration correct?
  - Some devices connected to the serial or parallel port may require I/O port address or operation mode settings. Refer to the manual that comes with the board for details to make correct settings.

The keyboard or mouse fails to operate:

- Is the cable properly connected?
  - Make sure that the cable is connected to the correct connector on the rear of the system.
  - The keyboard or mouse does not operate if it is connected when the system is powered (not applicable to USB devices). Power of the system first and connect it properly.
- Are the system drivers installed?
  - Refer to the manual that comes with your OS to check that the keyboard and mouse drivers are installed. (These drivers are installed along with the OS.) Some OS's allow you to change the keyboard and mouse settings. Refer to manual that comes with your OS to check that the keyboard and mouse settings are correct.

Fail to access (read or write) to the floppy disk:

- Does the floppy disk drive contain a floppy disk?
  - Insert a floppy disk into the floppy disk drive until it clicks.
- Is the floppy disk write-protected?
  - Place the write-protect switch on the floppy disk to the "Write-enabled" position.
- Is the floppy disk formatted?
  - Use a formatted floppy disk or format the floppy disk in the floppy disk drive. Refer to the manual that comes with the OS for formatting a floppy disk.

Fail to access to the disc:

- Is the disc properly set in the disc drive tray?
  - The tray is provided with a holder to secure the disc. Make sure that the disc is placed properly in the holder.
- Is the disc applicable to the system?
  - The disc for Macintosh is not available for use.
  - For the disk which does not conform to the CD standard, the playback of such a disk with the CD drive is not guaranteed.

Inserted the correct disc but an error message is displayed:

> The CD-ROM is not inserted or the wrong CD-ROM is inserted.
> Please insert the correct CD-ROM.
> OK

- Is the data side of the disc dirty or injured?
  - Take the disc out of the disc drive, check that it is not dirty or injured, reset and click [OK].

Fail to access the hard disk

(Refer to the documentation supplied with the disk array controller.)

- Is the hard disk applicable to the system?
  - Operation of any device that we do not authorize is not guaranteed.
- Is the hard disk properly installed?
- Is the hard disk properly configured?

Fail to access the (internal or external) SCSI devices:

- Is the SCSI device applicable to the system?
  - Operation of any SCSI device that we do not authorize is not guaranteed.
- Is the cable connection changed?
- Are SCSI devices properly configured?
  - When the system has external SCSI devices connected, devices settings, including SCSI ID and terminator, are required. Refer to the manual that comes with the SCSI device for details.
- Is cable length exceeded?
  - Refer to the manual that comes with the SCSI device for details.
- Are the optional SCSI controllers properly configured?

- When the system has an optional SCSI controller installed and SCSI devices connected to it, use the POST Setup utility that comes with the optional SCSI controller for proper configuration. See the manual that comes with the optional SCSI controller for details.

The system is not found on the network:

- Is the LAN cable connected?
  - Make sure to connect the LAN cable to the network port on the rear of the system. Also make sure that the LAN cable to use conforms with the network interface standard.

- Is the BIOS configuration correct?
  - The internal LAN controller may be disabled with the BIOS SETUP utility of the system. Check the setting with the BIOS SETUP utility.

- Have the protocol and service already configured?
  - Install the distinctive network driver for the system. Make sure that the protocol, such as TCP/IP, and services are properly specified.

- Is the transfer speed correct?
  - Open the network property dialog box in control panel to specify the "Link Speed & Duplex" value the same as the value specified for HUB.

Wake on LAN does not start from standby state.

- Is Hub set to Auto-Negotiation? Or, Is the client set to Auto-Negotiation/optimum speed?
  - For both hub and client, Wake on LAN does not start from the standby state if the speed is fixed to 1000Mbps.

Problems with Windows Server 2003

A log appears and no network cable is connected to the network port:

When network cable is not connected with a port, a log (see the example below) may be found in event log. But this has no affect on the behavior of Lan driver.
Event ID: 6
Source: E100B
Type: Error
Description: Hardware failure detected.
Machine: (Name of your system)
Lan: 100BASE
Solution: Connect a network cable in a port and then reboot the system or change the [Smart Power Down] value to "Off", the log will not be found in event log any more.

The system displays the message below and fails to log on:

This copy of Windows must be activated with Microsoft before you can continue. You cannot log on until you activate Windows. To shut down the computer click Cancel.

In Windows Server 2003, the above message will be displayed if you use the operating system without executing the license authentication. Select "Yes", and execute the procedure for license authentication.

Cannot install the operating system correctly.

■ Did you check the notes on installing the operating system?

During installation, the following warning is registered in the System Log of the Event Viewer:
Error detected on the device \Device\CdRom0 during the paging operation.

- There is no problem on this issue.

Fail to start the OS:

■ Is a floppy disk in the floppy disk drive?

- Take out the floppy disk and restart the system.

■ Is the ExpressBuilder disc in the disc drive?

- Take out the ExpressBuilder disc and restart the system.

■ Is the OS broken?

- Use the recovery process to recover the system.

The OS presents unstable operation:

■ Did you update the system?

- Installing a network drive after installation of the OS may cause unstable operation. Use the ExpressBuilder disc to update the system.

The system does not restart automatically when a stop error occurs, though the system is adjusted to automatically restarting:

- When the system does not restart automatically, restart it manually.

The system restarts automatically when a stop error occurs, though the system is NOT adjusted to automatically restarting:

- There is no problem about this issue. Check the System Event Log to check that STOP error occurred.

Cannot turn the power OFF at the blue screen:

- If you want to turn off the power at the blue screen, execute forced shutdown (forced shutdown: continue to press POWER/SLEEP switch for 4 seconds). The power will not be turned off if you press the switch for less than 3 seconds.

The PXE boot (network boot) fails or the system is not found on the network:

- Is the cable connected properly?
  - Connect the proper cable to the network port on the rear of the Express server. In addition, make sure that the used cable conforms to the network interface standard.
- Is BIOS configuration correct?
  - The internal LAN controller may be disabled with the CMOS Setup utility of the system. Check the setting with the BIOS setup utility.
- Have the protocol and service already configured?
  - Install the distinctive network driver for the system. Make sure that the protocol, such as TCP/IP, and services are properly specified.
- Is the transfer speed correct?
  - Open the network property dialog box in control panel to specify the link speed and duplex value the same as the value specified for HUB.

Problems with ExpressBuilder

When the system does not boot from the ExpressBuilder disc, check the following:

- Did you set the ExpressBuilder during POST and restart the system?
  - If you do not set the ExpressBuilder during POST and restart the system, an error message will appear or the OS will boot.
- Is BIOS configuration correct?
  - The boot device order may be specified with the CMOS Setup utility of the system. Use the CMOS Setup utility to change the boot device order to boot the system from the disc drive first.
    <Menu to check: [Boot]>
- Has an error message appeared?
  - When an error occurs while the ExpressBuilder is in progress, the following message appears. After this message appears, check the error and take the appropriate corrective action according to the message listed in the table below.

Table 6: Error Messages

Message	Cause and Solution
This machine is not supported	This ExpressBuilder version is not designed for this system. Execute the ExpressBuilder on the compliant system.
Hard disk access error	The hard disk is not connected or has failed. Check whether the hard disk is correctly connected.

Table 6: Error Messages (Continued)

Message	Cause and Solution
NvRAM access error	An access to the non-volatile memory (NvRAM) has failed.
The system-specific information does not exist on the baseboard. Please restore the backup data or write the data by using [System Information Management] of the Off-line Maintenance Utility. Only the authorized personnel are allowed to do this operation.	The system-specific information can't be acquired on the mother board.

Problems with Express Setup

- Following message appears when you try to install Express Setup to the hard disk that has smaller capacity than the specified partition size:

  "The specified partition size has exceeded the capacity of the hard disk. The setup created the partition at the maximum size that can be reserved on the hard disk. Setup will continue the process."

  Then the system displays the OK button.

  - It is not an abnormal condition. Press Enter to continue the installation.

- The message "Press R to retry" can not be displayed correctly when copying the files from disc or checking disc:

  - Press R. When the message appears again even if you press R, restart the Express Setup from the beginning. In case the same result occurred after the restart of installation, contact Maintenance Service Company and ask them to check the disc drive.

- Express Setup terminated and asks to input setup information.

  - There are some errors on the specified setup information. Follow the instruction to input the correct value. It is not necessary to cancel the installation.

- Specified to join the Domain, but the system is installed as Workgroup.

  - When the setup fails to join the Domain during the installation, it will install the system as Workgroup. Open [System] in Control Panel to specify joining the Domain.

- Entered the incorrect Product ID/CD key.

  - Even if you entered the incorrect Product ID/CD key, Express Setup will start. However, the setup will stop and asks you to re-enter the correct value. Also in this case, input request will occur when rebooting after GUI setup completed during Express Setup. If these 2 inputs are done correctly, there is no problem on Windows setup.

- Unable to specify the details of Network adapter.

- In Express Setup, you can not specify the details of Network adapter. Specify them from Control Panel after starting Windows.

Problems with Disk Array Configuration

Refer to the manual supplied with the RAID controller.

Collecting Event Log

This section describes on how to collect the log of various events that occurred on the system.

Caution: *If STOP error, system error, or stall occurred, follow the procedure below after restarting the system.*

1. Click [Management Tool]: [Event Viewer] from the Control Panel.
2. Select the type of the log to collect.
   On [Application Log], the events related to the running application is archived. On [Security Log], the events related to the security is archived. On [System Log], the events occurred at the item which configures Windows system is archived.
3. Click [Save as...] in the [Run] menu.
4. Input the file name of archived log in the [File Name] box.
5. Select the type of the log file you want to save in the [File Type] list box and click [OK].

For more information, refer to Windows Online Help.

Collecting Configuration Information

This section describes how to collect the information on hardware configuration and inside specification.

In order to collect information, "Diagnostic Program" is used.

Caution: *If STOP error, system error, or stall occurred, follow the procedure below after restarting the system.*

1. Point to [Settings] in Start menu, and click [Control Panel].
   The [Control Panel] dialog box appears.
2. Double-click [Management Tool], and double-click [Computer Management].
   The [Computer Management] dialog box appears.
3. Click [System Tool]: [System Information].
4. Click [Save as System Information File] in the [Operation] menu.
5. Enter the file name to save in the [File Name] box.
6. Click [Save].

Collecting Dr. Watson Diagnostic Information

Dr. Watson collects diagnostic information related to application errors. The location to save the information can be specified as you like.

Memory Dump (depending on your configuration)

If an error occurs, the dump file should be saved to acquire necessary information.

If you saved the dump to DAT, write down that it is saved as "NTBackup" or "ARCServe" on the label. You can specify the location to save the diagnostic information as you like...

Caution:

- *Consult with your sales agent before dumping the memory. Dumping the memory while the system is in process may affect the system operation.*
- *Restarting the system due to an error may display a message indicating insufficient virtual memory. Ignore this message and proceed. Restarting the system may result in dumping improper data.*

If You Need Assistance

If you have a problem with your computer, first review the sections of *"Solving Problems" on page 148*.

Note: *Refer to the warranty booklet delivered with your system to find out how to contact the local office in your country.*

For technical support such as BIOS upgrades, consult our Web site at the following address: *http://support.bull.com*

Error Messages

This section details the POST error codes and messages, and the meaning of the diagnostic LEDs colour combinations.

POST Error Messages

Whenever a recoverable error occurs during POST, BIOS displays a message on the video display screen and causes the speaker to beep as the message appears. BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails or if an external ROM module does not have the correct checksum.

The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

The Response section in the following table is divided into two types:

- Pause: the message is displayed in the Error Manager screen, an error is logged to the SEL, and user input is required to continue. The user can take immediate corrective action or choose to continue booting.
- Halt: the message is displayed in the Error Manager screen, an error is logged to the SEL, and the system cannot boot unless the error is resolved. The user needs to replace the faulty part and restart the system.

Table 7: POST Error Messages and Handling

Error message	Response
CMOS date / time not set	Pause
Configuration cleared by jumper	Pause
Configuration default loaded	Pause
Password check failed	Halt
PCI resource conflict	Pause
Insufficient memory to shadow PCI ROM	Pause
Processor 01 thermal trip error on last boot	Pause

POST Error Beep Codes

The following table lists POST error beep codes. Prior to system Video initialization, BIOS uses these beep codes to inform users on error conditions. The beep code is followed by a user visible code on the diagnostic LEDs.

Table 8: POST Error Beep Codes

Beeps	Error Message	Description
3	Memory error	System halted because a fatal error related to the memory was detected.

POST Error Pause Option

For POST error(s) that are listed as Pause, the BIOS enters the error manager and waits for the user to press an appropriate key before booting the operating system or entering BIOS Setup.

The user can override this option by setting POST Error Pause to disabled in the BIOS Setup utility Main menu page. If POST Error Pause is set to disabled, the system will boot the operating system without user-intervention. The default value is set to enabled.

Diagnostic LEDs

During the system boot process, the BIOS executes a number of platform configuration processes, each of which is assigned a specific hex POST code number. As each configuration routine is started, the BIOS displays the POST code to the POST Code Diagnostic LEDs on the back edge of the server board. To assist in troubleshooting a system hang during the POST process, you can use the Diagnostic LEDs to identify the last POST process that was executed.

Each POST code is represented by the Eight amber Diagnostic LEDs. The POST codes are divided into two nibbles, an upper nibble and a lower nibble. The upper nibble bits are represented by Diagnostic LEDs #4, #5, #6, and #7. The lower nibble bits are represented by Diagnostics LEDs #0, #1, #2, and #3. Given the bit is set in the upper and lower nibbles, then corresponding LED is lit. If the bit is clear, corresponding LED is off.

The Diagnostic LED #7 is labeled as “MSB”, and the Diagnostic LED #0 is labeled with “LSB”.

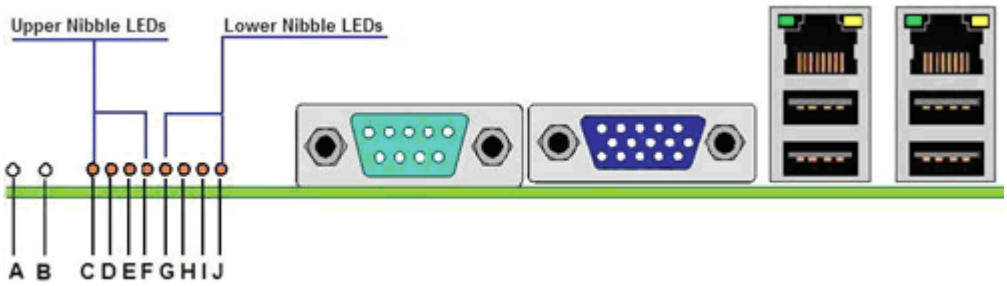


Figure 65: Diagnostic LED Placement Diagram

A. ID LED	F. Diagnostic LED #4
B. Status LED	G. Diagnostic LED #3
C. Diagnostic LED #7 (MSB LED)	H. Diagnostic LED #2
D. Diagnostic LED #6	I. Diagnostic LED #1
E. Diagnostic LED #5	J. Diagnostic LED #0 (LSB LED)

In the following example, the BIOS sends a value of ACh to the diagnostic LED decoder. The LEDs are decoded as follows.

LEDs	Upper Nibble LEDs				Lower Nibble LEDs			
	MSB							LSB
	LED #7	LED #6	LED #5	LED #4	LED #3	LED #2	LED #1	LED #0
	8h	4h	2h	1h	8h	4h	2h	1h
Status	ON	OFF	ON	OFF	ON	ON	OFF	OFF
Results	1	0	1	0	1	1	0	0
	Ah				Ch			

- Upper nibble bits = 1010b = Ah; Lower nibble bits = 1100b = Ch; the two are concatenated as ACh.

Figure 66: POST Progress Code LED Example

	Diagnostic LED Decoder								
Checkpoint	O = On, X = Off								Description
	Upper Nibble				Lower Nibble				
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED	#7	#6	#5	#4	#3	#2	#1	#0	
Host Processor									
0x10h	X	X	X	O	X	X	X	X	Power-on initialization of the host processor (bootstrap processor)
0x11h	X	X	X	O	X	X	X	O	Host processor cache initialization (including AP)
0x12h	X	X	X	O	X	X	O	X	Starting application processor initialization
0x13h	X	X	X	O	X	X	O	O	SMM initialization
Chipset									
0x21h	X	X	O	X	X	X	X	O	Initializing a chipset component

Figure 67: Diagnostic LED POST Code Decoder

Memory									
0x22h	X	X	O	X	X	X	O	X	Reading configuration data from memory (SPD on FBDIMM)
0x23h	X	X	O	X	X	X	O	O	Detecting presence of memory
0x24h	X	X	O	X	X	O	X	X	Programming timing parameters in the memory controller
0x25h	X	X	O	X	X	O	X	O	Configuring memory parameters in the memory controller
0x26h	X	X	O	X	X	O	O	X	Optimizing memory controller settings
0x27h	X	X	O	X	X	O	O	O	Initializing memory, such as ECC init
0x28h	X	X	O	X	O	X	X	X	Testing memory

Figure 68: Diagnostic LED POST Code Decoder (continued)

PCI Bus									
0x50h	X	O	X	O	X	X	X	X	Enumerating PCI buses
0x51h	X	O	X	O	X	X	X	O	Allocating resources to PCI buses
0x52h	X	O	X	O	X	X	O	X	Hot Plug PCI controller initialization
0x53h	X	O	X	O	X	X	O	O	Reserved for PCI bus
0x54h	X	O	X	O	X	O	X	X	Reserved for PCI bus
0x55h	X	O	X	O	X	O	X	O	Reserved for PCI bus
0x56h	X	O	X	O	X	O	O	X	Reserved for PCI bus
0x57h	X	O	X	O	X	O	O	O	Reserved for PCI bus
USB									
0x58h	X	O	X	O	O	X	X	X	Resetting USB bus
0x59h	X	O	X	O	O	X	X	O	Reserved for USB devices
ATA / ATAPI / SATA									
0x5Ah	X	O	X	O	O	X	O	X	Resetting SATA bus and all devices
0x5Bh	X	O	X	O	O	X	O	O	Reserved for ATA

Figure 69: Diagnostic LED POST Code Decoder (continued)

SMBUS									
0x5Ch	X	O	X	O	O	O	X	X	Resetting SMBUS
0x5Dh	X	O	X	O	O	O	X	O	Reserved for SMBUS
Local Console									
0x70h	X	O	O	O	X	X	X	X	Resetting the video controller (VGA)
0x71h	X	O	O	O	X	X	X	O	Disabling the video controller (VGA)
0x72h	X	O	O	O	X	X	O	X	Enabling the video controller (VGA)
Remote Console									
0x78h	X	O	O	O	O	X	X	X	Resetting the console controller
0x79h	X	O	O	O	O	X	X	O	Disabling the console controller
0x7Ah	X	O	O	O	O	X	O	X	Enabling the console controller

Figure 70: Diagnostic LED POST Code Decoder (continued)

Keyboard (only USB)									
0x90h	O	X	X	O	X	X	X	X	Resetting the keyboard
0x91h	O	X	X	O	X	X	X	O	Disabling the keyboard
0x92h	O	X	X	O	X	X	O	X	Detecting the presence of the keyboard
0x93h	O	X	X	O	X	X	O	O	Enabling the keyboard
0x94h	O	X	X	O	X	O	X	X	Clearing keyboard input buffer
0x95	O	X	X	O	X	O	X	X	Instructing keyboard controller to run Self Test (PS/2 only)
Mouse (only USB)									
0x98h	O	X	X	O	X	X	O	X	Resetting the mouse
0x99h	O	X	X	O	X	X	O	O	Detecting the mouse
0x9Ah	O	X	X	O	X	O	O	X	Detecting the presence of mouse
0x9Bh	O	X	X	O	X	O	O	O	Enabling the mouse

Figure 71: Diagnostic LED POST Code Decoder (continued)

Fixed Media									
0xB0h	O	X	O	O	X	X	X	X	Resetting fixed media device
0xB1h	O	X	O	O	X	X	X	O	Disabling fixed media device
0xB2h	O	X	O	O	X	X	O	X	Detecting presence of a fixed media device (IDE hard drive detection, and so on)
0xB3h	O	X	O	O	X	X	O	O	Enabling / configuring a fixed media device
Removable Media									
0xB8h	O	X	O	O	O	X	X	X	Resetting removable media device
0xB9h	O	X	O	O	O	X	X	O	Disabling removable media device
0xBAh	O	X	O	O	O	X	O	X	Detecting presence of a removable media device (IDE CD-ROM detection, and so on)
0xBCh	O	X	O	O	O	O	X	X	Enabling / configuring a removable media device

Figure 72: Diagnostic LED POST Code Decoder (continued)

Boot Device Selection (BDS)									
0xD0	O	O	X	O	X	X	X	X	Trying to boot device selection 0
0xD1	O	O	X	O	X	X	X	O	Trying to boot device selection 1
0xD2	O	O	X	O	X	X	O	X	Trying to boot device selection 2
0xD3	O	O	X	O	X	X	O	O	Trying to boot device selection 3
0xD4	O	O	X	O	X	O	X	X	Trying to boot device selection 4
0xD5	O	O	X	O	X	O	X	O	Trying to boot device selection 5
0xD6	O	O	X	O	X	O	O	X	Trying to boot device selection 6
0xD7	O	O	X	O	X	O	O	O	Trying to boot device selection 7
0xD8	O	O	X	O	O	X	X	X	Trying to boot device selection 9
0xD9	O	O	X	O	O	X	X	X	Trying to boot device selection 9
0xDA	O	O	X	O	O	X	O	X	Trying to boot device selection A
0xDB	O	O	X	O	O	X	O	O	Trying to boot device selection B
0xDC	O	O	X	O	O	O	X	X	Trying to boot device selection C
0xDD	O	O	X	O	O	O	X	X	Trying to boot device selection D
0xDE	O	O	X	O	O	O	O	X	Trying to boot device selection E
0xDF	O	O	X	O	O	O	O	O	Trying to boot device selection F

Figure 73: Diagnostic LED POST Code Decoder (continued)

Pre-EFI Initialization (PEI) Core									
0xE0h	O	O	O	X	X	X	X	X	Started dispatching early initialization modules (PEIM)
0xE1h	O	O	O	X	X	X	X	O	Reserved for initialization module use (PEIM)
0xE2h	O	O	O	X	X	X	O	X	Initial memory found, configured, and installed correctly
0xE3h	O	O	O	X	X	X	O	O	Reserved for initialization module use (PEIM)
Driver Execution Environment (DXE) Core (not accompanied by a beep code)									
0xE4h	O	O	O	X	X	O	X	X	Entered EFI driver execution phase (DXE)
0xE5h	O	O	O	X	X	O	X	O	Started dispatching drivers
0xE6h	O	O	O	X	X	O	O	X	Started connecting drivers
DXE Drivers (not accompanied by a beep code)									
0xE7h	O	O	O	X	O	O	X	O	Waiting for user input
0xE8h	O	O	O	X	O	X	X	X	Checking password
0xE9h	O	O	O	X	O	X	X	O	Entering BIOS setup
0xEAh	O	O	O	X	O	O	X	X	Flash Update
0xEEh	O	O	O	X	O	O	X	X	Calling Int 19. One beep unless silent boot is enabled.
0xEFh	O	O	O	X	O	O	X	O	Unrecoverable boot failure

Figure 74: Diagnostic LED POST Code Decoder (continued)

Runtime Phase / EFI Operating System Boot									
0xF4h	O	O	O	O	X	O	X	X	Entering Sleep state
0xF5h	O	O	O	O	X	O	X	O	Exiting Sleep state
0xF8h	O	O	O	O	X	O	X	X	Operating system has requested EFI to close boot services (ExitBootServices ( ) has been called)
0xF9h	O	O	O	O	X	O	X	O	Operating system has switched to virtual address mode (SetVirtualAddressMap ( ) has been called)
0xFAh	O	O	O	O	O	X	O	X	Operating system has requested the system to reset (ResetSystem () has been called)
Pre-EFI Initialization Module (PEIM) / Recovery									
0x30h	X	X	O	O	X	X	X	X	Crisis recovery has been initiated because of a user request

Figure 75: Diagnostic LED POST Code Decoder (continued)

0x31h	X	X	O	O	X	X	X	O	Crisis recovery has been initiated by software (corrupt flash)
0x34h	X	X	O	O	X	O	X	X	Loading crisis recovery capsule
0x35h	X	X	O	O	X	O	X	O	Handing off control to the crisis recovery capsule
0x3Fh	X	X	O	O	O	O	O	O	Unable to complete crisis recovery capsule
Memory Error Codes (Accompanied by a beep code									
0xE8h	O	O	O	X	O	X	X	X	No Usable Memory Error: No memory in the system, or SPD bad so no memory could be detected
0xE8h	O	O	O	X	O	X	O	O	Memory Test Error: memory failed Hardware BIST
0xEDh	O	O	O	X	O	O	X	O	Population Error: RDIMMs and UDIMMs cannot be mixed in the system
0xEEh	O	O	O	X	O	O	O	X	Mismatch Error: More than 2 Quad-Ranked DIMMs in a channel

Figure 76: Diagnostic LED POST Code Decoder (continued)

Diagnostic LEDs

The Intel® Server Board 5500BC includes LEDs that can aid in troubleshooting your system. The following lists these LEDs with a description of their use.

This section provides the LEDs locations and meanings.

Table 9: LEDs Summary

LED Name	Function	Location	LED Color	Notes
Power	Indicates system power is on or off	Front control panel	Green	Off: Power is off or in sleep state S5 On: Power is on or in sleep state S0
ID	Aid in server identification from the back panel	Front control panel and board rear left corner	Blue	Press the ID button or use the server Management software to turn the LED on or off.
System Fault	Visible fault warning	Control panel and board rear left corner	Green or Amber	Green: No fault Blinking green: degraded condition Blinking amber: non-critical error Amber: critical or non-recoverable error

LED Name	Function	Location	LED Color	Notes
ID	Aid in server function from the back panel	Front Panel and board rear left corner	Blue	Press ID LED button or user Server Management software to turn off the LED.
System fault	Visible fault warning	Front panel and board rear left corner	Green or Amber	• On = No Fault • Green Blink = degraded • Amber = critical error or non-recoverable • Amber blink = non-critical
IDE activity	Front panel	Front panel and board left side	Green	Blinking = Activity. No action required.
Memory fault 1-8	Identify failing memory module	DIMM end front of board	Amber	On = Fault
POST code 1-8	Display boot 80 POST code	Left rear of board	Each LED can be Off, Green, Amber, Red	See the POST code table
Fan Pack Fault	Warn on fan failure	Front center board	Amber	On = Fault
CPU 1 & 2 Fan Fault	Identify fan failure	Front center board	Amber	On = Fault
CPU 1 & 2 Fault	Identify processor failure	1 inch behind processor socket	Amber	On = Fault
5v Standby	Identify 5 V standby power on state	Front left board	Amber	On = 5 V standby power on
Power LED	Identify the power state of the system	Front Panel	Green	• Off = Power is off (off or S5) • On = Power on or S0) • Slow Blink = Low power state (S1 - S3)

Figure 77: LEDs information

BIOS Setup Utility

The BIOS Setup Utility is used to change system configuration parameters. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run.

Using the BIOS Setup Utility

You access the BIOS Setup utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure:

1. Power-on or reboot the system. “Press <F2> to enter SETUP” displays.
2. Press **F2**. The BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections:

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (listed in the table below) to cycle through the allowable values for the selected field. Use the Exit menu’s “Save Changes” selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press **ENTER**. An arrow precedes selections with submenus.

Refer to the following table for information on the keys that you use with BIOS Setup. These keys are also listed at the bottom of the Setup menu.

Table 10: BIOS Setup Keys

Key	Function in Setup Menu
F1	Get Help about an item.
ESC	The <Esc> key provides a mechanism for backing out of any field. This key will undo the pressing of the Enter key. When the <Esc> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <Esc> key is pressed in any sub-menu, the parent menu is re-entered. When the <Esc> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If “No” is selected and the <Enter> key is pressed, or if the <Esc> key is pressed, the user is returned to where he/she was before <Esc> was pressed, without affecting any existing any settings. If “Yes” is selected and the <Enter> key is pressed, setup is exited and the BIOS returns to the main System Options Menu screen.
Left or right arrow keys	The left and right arrow keys are used to move between the major menu pages. The keys have no affect if a sub-menu or pick list is displayed.

Table 10: BIOS Setup Keys (Continued)

Key	Function in Setup Menu
Up or down arrow keys	The up/down arrow is used to select the previous/next value in a pick list, or the previous/next option in a menu item's option list. The selected item must then be activated by pressing the <Enter> key.
-	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list.
+	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list.
Enter	The <Enter> key is used to activate sub-menus when the selected feature is a submenu, or to display a pick list if a selected option has a value field, or to select a sub-field for multi-valued features like time and date. If a pick list is displayed, the <Enter> key will select the currently highlighted item, undo the pick list, and return the focus to the parent menu.
Tab	The <Tab> key is used to move between fields. For example, <Tab> can be used to move from hours to minutes in the time item in the main menu.
F9	Load default configuration values.
F10	Save configuration values and exit.

BIOS Setup Configuration Settings

The BIOS Setup Configuration tables show the default settings for the BIOS Setup Utility and provide a place for you to record any changes you make to these settings. Recommended values are bold in the following tables.

Main Menu

Table 11: Standard BIOS Features Menu

Feature	Choices or Display Only	Description	Your Setting
Logged in as	Display only	Information only. Displays password level that setup is running: Administrator or User. With no passwords set, Administrator is the default mode.	
Platform ID	Display only	Information only. Displays the platform ID.	
System BIOS			
Version	Display only	Information only. Displays the BIOS version. xx = major version yy = minor version zzzz = build number	
Build Date	Display only	Information only. Displays the BIOS build date.	
Memory			
Size	Display only	Information only. Displays the total physical memory installed in the system, in MB or GB. The term physical memory indicates the total memory discovered in the form of installed DDR-3 DIMMs.	
Quiet Boot	**Enabled** Disabled	If enabled, the logo screeen is displayed during POST. If disabled, the diagnostic screen is displayed during POST.	
POST Error Pause	Enabled **Disabled**	If enabled, go to the Error Manager for critical POST errors. It takes the system to the error manager to review the errors when major errors occur. Minor and fatal error displays are not affected by this setting. If disabled, attempt to boot and do not go to the Error Manager for critical POST errors.	
System Date	[MM/DD/YYYY]	Month valid values are 1 to 12. Day valid values are 1 to 31. Year valid values are 1998 to 2099. Use *Enter* or *Tab* key to select the next field. Use + or - key to modify the selected field.	
System Time	[HH:MM:SS]	Hours valid values are 0 to 23. Minutes valid values are 0 to 59. Seconds valid values are 0 to 59.	

Note: *The BIOS may display more options that presented here.*

Advanced Menu

Table 12: Advanced Menu

Feature	Choices or Display Only	Description	Your Setting
Processor Configuration	Press Enter	Press **Enter** to open the submenu	
Memory Configuration	Press Enter	Press **Enter** to open the submenu	
Mass Storage Controller Configuration	Press Enter	Press **Enter** to open the submenu	
Serial Port Configuration	Press Enter	Press **Enter** to open the submenu	
USB Configuration	Press Enter	Press **Enter** to open the submenu	
PCI Configuration	Press Enter	Press **Enter** to open the submenu	
System Acoustic and Performance Configuration	Press Enter	Press **Enter** to open the submenu	

Processor Submenu

Table 13: Processor Submenu

Feature	Choices or Display Only	Description	Your Setting
Processor ID	Display only	Designation of the CPUID	
Processor Frequency	Display only	Frequency at which the processor currently runs.	
Core Frequency	Display only	Frequency at which the processors are curently running.	
Microcode revision	Display only	Revision of the loaded microcode.	
L1 Cache RAM	Display only	L1 Cache Size	
L2 Cache Size	Display only	L2 Cache Size	
L3 Cache Size	Display only	L3 Cache Size	
Processor 1 version	Display only	ID string from the processor.	
Processor 2 version	Display only	ID string from the processor.	
Current Intel QPI Link Speed	Display only	Current frenquency that the QPI link is unsing.	
Turbo Mode	**Enabled** Disabled	Turbo Mode allows the CPU to automatically increase its frequency if it is running below power, temperature, and current specifications. This option is visible if all CPUs in the system support Turbo Mode.	
Enhanced Intel SpeedStep® Technology	**Enabled** Disabled	Enables or disables the Enhanced Intel SpeedStep® Technology on the processors. This technology allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.	
Intel® Hyper-Threading Technology	**Enabled** Disabled	Intel® HT Technology allows multithreaded software applications to execute threads in parallel within each processor.	
Core Multi-Processing	**All** 1 2	Enable 1, 2 or All cores of installed processors packages.	
Execute Disable Bit	**Enabled** Disabled	When enabled, helps prevent certain classes of malicious buffer overflow attacks.	
Intel Virtualization Technology	Enabled **Disabled**	It allows a platform to run multiple operating systems and applications in independent partitions. *Note:* A change to this option requires the system to be powered off and then back on before the setting takes effect.	
Intel Virtualization Technology for Directed I/O	Enabled **Disabled**	Report th I/O device assignments to VMM through DMAR ACPI Tables.	

Table 13: Processor Submenu (Continued)

Feature	Choices or Display Only	Description	Your Setting
Interrupt Remapping	**Enabled** Disabled	Enables or disables Intel VT-d Interrupt Remapping support. It only appears when Intel Virtualization Technology for Directed I/O is enabled.	
Coherency support	Enabled **Disabled**	It only appears when Intel Virtualization Technology for Directed I/O is enabled.	
ATS Support	**Enabled** Disabled	Enables or disables Intel VT-d Address Translation Services (ATS) support. It only appears when Intel Virtualization Technology for Directed I/O is enabled.	
Pass-trhough DMA Support	**Enabled** Disabled	It only appears when Intel Virtualization Technology for Directed I/O is enabled.	
Hardware Prefetcher	**Enabled** Disabled	It is a speculative prefetch unit within the preocessor(s). *Note:* modifying this setting may affect system performance.	
Adjacent Cache Line Prefectch	**Enabled** Disabled	When enabled, cache lines are fetched in pairs (even line + odd line). When disabled, only the current cache line required is fetched. *Note*: Modifying this setting may affect system performance.	
Direct Cache Access	**Enabled** Disabled	Allows processors to increase th I/O performance by placing data from I/O devices directly into processor cache.	

Memory Configuration Submenu

Table 14: Memory Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Total Memory	Display only	Displays the amount of memory available in the system in the form of installed FBDIMMs, in units of MB or GB.	
Effective Memory	Display only	Displays the amount of memory available to the operating system in MB or GB. The Effective Memory is the difference between the Total Physical Memory and the sum of all the memory reserved for internal usage. This difference also includes the sum of all the DIMMs that failed the Memory Test during POST.	
Current Configuration	Display only	Displays one of the following: **Independent Mode**: System memory is configured for optimal performance and efficiency and no RAS is enabled. **Mirror Mode**: System memory is configured for maximum reliability in the form of memory mirroring. **Sparing Mode**: System memory is configured for RAS with optimal effective memory.	
Current Memory Speed	Display only	Displays the current memory speed.	

Table 14: Memory Configuration Submenu (Continued)

Feature	Choices or Display Only	Description	Your Setting
Memory RAS and Performance Configuration		Configure memory RAS (Reliability, Availability, and Serviceability) and view current memory performance information and settings. Select to configure the memory RAS and performance. This takes the user to a different screen	
DIMM_XY		Displays the state of each DIMM socket present on the board. Each DIMM socket field reflects one of the following possible states: **Installed**: There is a DDR-3 DIMM installed in this slot. **Not Installed**: There is no DDR-3 DIMM installed in this slot. **Disabled**: The DDR-3 DIMM installed in this slot was disabled by the BIOS to optimize memory configuration. **Failed**: The DDR-3 DIMM installed in this slot is faulty / malfunctioning. **Spare Unit**: The DDR-3 DIMM is functioning as a spare unit for memory RAS purposes. *Note*: X denotes the Channel Identifier and Y denotes the DIMM Identifier within the Channel.	

Table 15: Memory RAS and Performance Configuration

Feature	Choices or Display Only	Description	Your Setting
Memory Mirroring Possible	Yes/No	Information only. Only displayed on systems with chipsets capable of Memory Mirroring.	
Memory Sparing Possible	Yes/NO	Information only	

Table 15: Memory RAS and Performance Configuration (Continued)

Feature	Choices or Display Only	Description	Your Setting
Select Memory RS Configuration	**Maximumum Performance** Mirroring Sparing	Available modes depend on the current memory population. Only available if Mirroring or Sparing are possible. **Maximum Performance** - Optimizes system performance. **Mirroring** - Optimizes reliability by using half of physical memory as a backup. **Sparing** - Improves reliability by reserving memory for use as a replacement in the event of a DIMM failure.	
NUMA Optimized	**Enabled** Disabled	If enabled, BIOS includes ACPI tables that are required for NUMA aware Operating Systems.	

SATA Controller Configuration Submenu

Table 16: SATA Controller Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Intel Entry SAS RAID Module	**Enabled** Disabled	Enables or disables the Intel(R) SAS Entry RAID Module. Unavailable if the SAS Module (AXX4SASMOD) is not present.	
Configure Intel Entry SAS RAID Module	**LSI® Integrated RAID** Intel® ESRTII	LSI® Integrated RAID - Supports RAID 0, RAID 1, and RAID 1e, as well as IT (JBOD) mode; Intel® ESRTII - Intel® Embedded Server RAID Technology II, which supports RAID 0, RAID 1, RAID 10 and RAID 5 mode. RAID 5 support requires optional Software RAID 5 Activation Key. Unavailable if the SAS Module (AXX4SASMOD) is disabled or not present.	
Onboard SATA Controller	**Enabled** Disabled	When enabled, the SATA contoller can be configured in IDE, RAID, or AHCI Mode. RAID and AHCI modes are mutually exclusive.	
SATA Mode	**ENHANCED** Compatibility ACHCI SW RAID	**ENHANCED** - Supports up to 6 SATA ports with IDE Native Mode. Disappears when the Onboard SATA Controller is disabled. **COMPATIBILITY** - Supports up to 4 SATA ports [0/1/2/3] with IDE Legacy mode and 2 SATA ports [4/5] with IDE Native Mode. Changing this setting requires a reboot before you can set HDD boot order. **AHCI** - Supports all SATA ports using the Advanced Host Controller Interface. **SW RAID** - Supports configuration of SATA ports for RAID via RAID configuration software. This option is unavailable when EFI Optimized Boot is Enabled. SW RAID can only be used in Legacy Boot mode.	
SATA 0		Information only.	
SATA 1		Information only.	
SATA 2		Information only.	
SATA 3		Information only.	
SATA 4		Information only.	
SATA 5		Information only.	

Serial Port Configuration

Table 17: Serial Ports Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
SERIAL A Enable	**Enabled** Disabled	Enables or disables the serial Port A.	
Address	**3F8h** 2F8h 3E8h 2E8h	Selects the base I/O address for the serial Port A.	
IRQ	3 **4**	Selects the Interrupt Request line for the serial Port A.	
SERIAL B Enable	**Enabled** Disabled	Enables or disables the serial Port B.	
Address	3F8h **2F8h** 3E8h 2E8h	Selects the base I/O address for the serial Port B.	
IRQ	**3** 4	Selects the Interrupt Request line for the serial Port B.	

USB Configuration Submenu

Table 18: USB Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Detected USB Devices		Information only. Shows the number of USB devices in the system.	
USB Controller	**Enabled** Disabled	When **Disabled**, all of the USB controllers will be turned off and inaccessable by the OS.	
Legacy USB Support	**Enabled** Disabled Auto	Enables the Legacy USB support. The **Auto** option disables the legacy support if no USB devices are connected.	
Port 60/64 Emulation	**Enabled** Disabled	I/O port 60h/64h emulation support. *Note*: This may be needed for legacy USB keyboard support when using an OS that is USB unaware.	

Table 18: USB Configuration Submenu (Continued)

Feature	Choices or Display Only	Description	Your Setting
Make USB Devices Non-Bootable	Enabled **Disabled**	Excludes USB in Boot Table. **Enabled** - This removes all USB Mass Storage devices as Boot options. **Disabled** - This allows all USB Mass Storage devices as Boot options.	
Device Reset Timeout	10s **20s** 30s 40s	Defines the USB mass storage device Start Unit command timeout.	
One line for each mass storage device in system	**Auto** Floppy Forced HDD Hard Disk CD-ROM	**Auto** - USB devices less than 530 MB are emulated as floppies. **Forced FDD** - HDD formatted drive are emulated as a FDD (e.g., ZIP drive). Hidden if no USB Mass storage devices are installed. This setup screen can show a maximum of eight devices on this screen. If more than eight devices are installed in the system, the 'USB Devices Enabled' displays the correct count, but only displays the first eight devices.	
USB 2.0 Controller	**Enabled** Disabled	When **Disabled**, all the USB2.0 controllers will be turned off and inacessable by the operating system.	

PCI Configuration Submenu

Table 19: PCI Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Maximize Memory below 4GB	Enabled **Disabled**	When enabled, the BIOS maximizes usage of memory below 4 GB for OS without PAE by limiting PCIE Extended Configuration Space to 64 buses.	
Memory Mapped I/O above 4GB	Enabled **Disabled**	Enables or disables memory mapped I/O of 64-bit PCI devices to 4 GB or greater address space.	
Onboard Video	**Enabled** Disabled	When disabled, the system requires an add-in video card in order for the video to be seen. *Warning*: System video is completely disabled if this option is disabled and an add-in video adapter is not installed.	
Dual Monitor Video	Enabled **Disabled**	When **Enabled**, both the onboard video controller and an add-in video adapter will be enabled for system video. The onboard video controller will be the primary video device.	
Onboard NIC1 ROM	**Enabled** Disabled	When **Enabled**, loads the embedded option ROM for the onboard network controllers. If it is **Disabled**, NIC1 and NIC2 cannot be used to boot or wake the sytem.	
Onboard NIC2 ROM	**Enabled** Disabled	If enabled, loads the embedded option ROM for the onboard network controllers. *Warning*: If [Disabled] is selected, NIC2 cannot be used to boot or wake the system.	
Onboard NIC iSCSI ROM	Enabled **Disabled**	If enabled, loads the embedded option ROM for the onboard network controllers. *Warning*: If [Disabled] is selected, NIC1 and NIC2 cannot be used to boot or wake the system. This option is grayed out and not accessible if either the NIC1 or NIC2 ROMs are enabled.	
NIC 1 MAC Address		Information only	
NIC 2 MAC Address		Information only	

Table 20: System Acoustic and Performance Configuration Submenu

Feature	Choices or Display Only	Description	Your setting
Set Throttling Mode	**Auto** CLTT OLTT	[Auto] – Auto Throttling mode. [CLTT] – Closed Loop Thermal Throttling Mode. [OLTT] – Open Loop Thermal Throttling Mode. Note: The OLTT option is shown only for informational purposes. If the user selects OLTT, the system overrides that selection if it can support CLTT.	
Altitude	300m or less **301m - 900m** 901m - 1500m Higher than 1500m	**300m or less** (980ft or less). Optimal performance setting near sea level. **301m - 900m** (980ft - 2950ft) Optimal performance setting at moderate elevation. **901m – 1500m** (2950ft – 4920ft) Optimal performance setting at high elevation. **Higher than 1500m** (4920ft or greater). Optimal performance setting at the highest elevations *Note*: this item does not appear on some models.	
Set Fan Profile	**Performance** Acoustics	**Performance** - Fan control provides primary system cooling before attempting to throttle memory. **Acoustic** - The system will favor using throttling of memory over boosting fans to cool the system if thermal thresholds are met. This option is grayed out if CLTT is enabled.	

Security Menu

Table 12: Security Menu

Feature	Choices or Display Only	Description	Your Setting
Administrator Password Status	Installed Not Installed	Indicates whether the administrator password is set (display only).	
User Password Status	Set Not Installed	Indicates whether the user password is set (display only).	
Set Administrator Password	Up to 7 alphanumeric characters	Press **Enter** to display the supervisor password entry screen. With the supervisor password, all SETUP menus are available for access. This option is available only when you log into the SETUP utility with the supervisor password. Clearing the Administrator password also clears the user password.	
Set User Password	Up to 7 alphanumeric characters	Press **Enter** to display the user password entry screen. With a user password, only certain menus are accessible. This option is available only if the Supervisor Password is set.	
Front Panel Lockout	**Disabled** Enabled	Locks the power button on the system front panel. When set to **Enabled**, power and reset must be controlled via a system management interface.	

Table 12: Security Menu (Continued)

Feature	Choices or Display Only	Description	Your Setting
TPM State	Enabled and Activated Enabled and Deactivated Disabled and Activated Disable and Deactivated	Information only. Shows the current TPM device state. A disabled TPM device does not execute commands that use the TPM functions and TPM security operations are not available. An enabled and deactivated TPM is in the same state as a disabled TPM except if setting of the TPM ownership is allowed if not present already. An enabled and activated TPM executes all commands that use the TPM functions and TPM security operations are also available.	
TPM Administrative Control	**No Operation** Turn On Turn Off Clear Ownership	**No Operation** - No changes to current state. **Turn On** - Enables and activates TPM. **Turn Off** - Disables and deactivates TPM. **Clear Ownership** - Removes the TPM ownership authentication and returns the TPM to a factory default state. *Note*: The BIOS setting returns to [No Operation] on every boot cycle by default.	

Server Management Menu

Table 13: Server Management Menu

Feature	Choices or Display Only	Description	Your Setting
Assert NMI on SERR	**Enabled** Disabled	When **Enabled**, on SERR, generate an NMI and log an error. *Note*: [Enabled] must be selected for the Assert NMI on PERR setup option to be visible.	
Assert NMI on PERR	**Enabled** Disabled	(Displayed only when Assert NMI on SERR is **Enabled**.) When **Enabled**, on PERR, generate an NMI and log an error. *Note*: This option is only active if the Assert NMI on SERR option is [Enabled] selected.	
Resume on AC Power Loss	**Stay Off** Last State Reset	Defines the system action to take on an AC power loss recovery. When set to **Stay Off**, the system stays off. When set to **Last State**, the system returns to the same state before the AC power loss. When set to **Reset**, the system powers on.	
Clear System Event Log	Enabled **Disabled**	Clears the System Event Log. All the current entris will be lost. This option will be reset to Disabled after reboot	
FRB-2 Enable	**Enabled** Disabled	When **Enabled**, the BMC will reset the system if the BIOS does not complete the Power On Self Test before the FRB-2 timer expires.	
O/S Boot Watchdog Timer	Enabled **Disabled**	When **Enabled**, the BIOS sets the watchdog timer with the timeout value selected. If the OS does not complete booting before the timer expires, the BMC will reset the system and an error will be logged.	
O/S Boot Watchdog Timer Policy	Reset **Power Off**	If the OS watchdog timer is **Enabled**, this is the system action taken if the watchdog timer expires.	
O/S Boot Watchdog Timer Timeout	5 minutes **10 minutes** 15 minutes 20 minutes	If the OS watchdog timer is **Enabled**, this is the timeout value the BIOS will use to configure the watchdog timer.	
Plug& Play BMC Detection	Enabled **Disabled**	If enabled, the BMC is detectable by OSs that support plug and play loading of an IPMI driver. Do not enable if your OS does not support this driver.	
ACPI 1.0 Support	Enabled **Disabled**	[Enabled] - Publish ACPI 1.0 version of FADT in Root System Description Table. May be required for compatibility with OS versions that only support ACPI 1.0.	

Table 13: Server Management Menu (Continued)

Feature	Choices or Display Only	Description	Your Setting
Console Redirection	Press **Enter**		
System Information	Press **Enter**		

Console Redirection Submenu

Table 14: Console Redirection submenu

Feature	Choices or Display Only	Description	Your Setting
Console redirection	**Disabled** Serial Port A Serial Port B	Enables and disables the ability of the system to redirect screen data across serial connection.	
Flow Control	**None** RTS/CTS	Flow control is the handshake protocol. Setting must match the remote terminal application. [None] - Configure for no flow control. [RTS/CTS] - Configure for hardware flow control.	
Baud Rate	**9600** 19.2K 38.4K 57.6K 115.2K	Serial port transmission speed. Setting must match the remote terminal application.	
terminbal Type	PC-ANSI **VT100** VT100+ VT-UTF8	Character formatting used for console redirection. Setting must match the remote terminal application.	
Legacy OS Redirection	**Disabled** Enabled	This option enables legacy OS redirection (i.e., DOS) on serial port. If it is enabled, the associated serial port is hidden from the legacy OS.	

System Information Submenu

Table 15: System Information submenu

Feature	Choices or Display Only	Description	Your Setting
Board Part Number		Information only	
Board Serial Number		Information only	
System Part Number		Information only	
Sytem Serial Number		Information only	
Chassis Part Number		Information only	
Chassis Serial Number		Information only	
BMC Firmware Revision		Information only	
HSC Firmware Revision		Information only	
SDR Revision		Information only	
UUID		Information only	

Boot Options Menu

Table 16: Boot Options Menu

Feature	Choices or Display Only	Description	Your Setting
Boot Timeout	**0 -** 65535	Sets the default timeout value before system boot. The 656535 value will disable the timeout completely. After entering the preferred timeout value, press the Enter key to register that timeout value to the system. These settings are in seconds.	
Boot Option #N	List of the boot devices	Sets the system boot order.	
Hard Disk Order	[Enter]	Sets the system boot order. Appears when 1 or more hard disk drives are in the system.	
CDRom Order	[Enter]	Sets the system boot order. Appears when 1 or more cd-rom drives are in the system.	
Floppy Order	[Enter]	Sets the system boot order. Appears when 1 or more floppy drives are in the system.	
Network Device Order	[Enter]	Press **Enter** to set the network device boot order by selecting the boot option for this position. Add-in or onboard network devices with a PXE option ROM are two examples of network boot devices.	
BEV Device Order	[Enter]	Set the order of the legacy devices in this group. Appears when 1 or more of these devices are available in the system.	
Add New Boot Option	[Enter]	Add a new EFI boot option to the boot order. This option is only displayed if an EFI bootable device is available to the system (for example, a USB drive).	
Delete Boot Option	[Enter]	Remove an EFI boot option from the boot order. If the EFI shell is deleted, it is restored on the next system reboot. It cannot be permanently deleted.	
EFI Optimized Boot	Enabled **Disabled**	If enabled, the BIOS only loads modules required for booting EFI-aware Operating Systems. Grayed out when [SW RAID] SATA Mode is Enabled. SW RAID can only be used in Legacy Boot mode.	

Table 16: Boot Options Menu (Continued)

Feature	Choices or Display Only	Description	Your Setting
Use Legacy Video for EFI OS	Enabled **Disabled**	If enabled, the BIOS will use the legacy video ROM instead of the EFI video ROM. Only appears when EFI Optimized Boot is enabled.	
Boot Option Retry	Enabled **Disabled**	When set to **Enabled**, continually retries NON-EFI based boot options without waiting for user input.	
USB Boot Priority	**Enabled** Disabled	If enabled newly discovered USB devices will be put to the top of their boot device category. If disabled newly discovered USB devices will be put at the bottom of the respective list	

Table 17: Add New Boot Options Submenu

Feature	Choices or Display only	Description	Your setting
Add boo option label		Create the label for the new boot option	
Select File System		Select one file system from the list	
Path for boot option		Enter the path to boot option in the format: \path\filename.efi	
Save		Save boot option	

Table 18: Delete Boot Option Submenu

Feature	Choices or Display only	Description	Your setting
Hard Disk #1		Set system boot order by selecting the boot option for this position.	
Hard Disk #2		Set system boot order by selecting the boot option for this position.	

Table 19: CDROM Order Submenu

Feature	Choices or Display only	Description	Your setting
CDROM #1		Set system boot order by selecting the boot option for this position.	
CDROM #2		Set system boot order by selecting the boot option for this position.	

Table 20: Floppy Order Submenu

Feature	Choices or Display only	Description	Your setting
Floppy Disk #1		Set system boot order by selecting the boot option for this position.	
Floppy Disk #2		Set system boot order by selecting the boot option for this position.	

Table 21: Network Device Order Submenu

Feature	Choices or Display only	Description	Your setting
Network Device #1		Set system boot order by selecting the boot option for this position.	
Network Device #2		Set system boot order by selecting the boot option for this position.	

Table 22: BEV Device Order Submenu

Feature	Choices or Display only	Description	Your setting
BEV Device #1		Set system boot order by selecting the boot option for this position.	
BEV Device #2		Set system boot order by selecting the boot option for this position.	

Boot Manager Menu

Table 23: Boot Manager

Feature	Choices or Display Only	Description	Your Setting
Internal EFI Shell		Select this option to boot now. *Note*: This list is not the system boot option order. Use the Boot Options menu to view and configure the system boot option order.	
Boot Device #x		Select this option to boot now. *Note*: This list is not the system boot option order. Use the Boot Options menu to view and configure the system boot option order.	

Error Manager Menu

The Error Manager Menu displays any errors encountered during POST.

EXit Menu

You can make the following exit selections on the Main Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option.

You must select one of the items from the menu or menu bar to exit.

Table 24: Exit Menu

Choices	Description
Save Changes and Exit	Exits after writing all modified Setup item values to NVRAM. F10 key can be used for this operation.
Discard Changes and Exit	Reads previous values of all Setup items from NVRAM and exits the BIOS Setup. ESC key can be used for this operation.
Save Changes	Saves all modified Setup item values to NVRAM.
Discard Changes	Reads previous values of all Setup items from NVRAM.
Load default Values	Load default values for all SETUP items. F9 key can be used for this operation.
Save as User Default Values	Saves current values so that they can be restored later. Settings will be reset to factory defaults if the ocnfiguration is cleared.
Load User Default Values	Restores previously saved user default values.

Updating the BIOS

The update utility allows you to update the BIOS stored in the flash memory. The code and data in the update file include the following:

- On-board system BIOS, including the recovery code, BIOS Setup Utility, and strings.
- On-board video BIOS, and other option ROMs for devices embedded on the server board.

Recording the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:
   Press <F2> Key if you want to run SETUP
2. Write down the current settings in the BIOS Setup program.

Note: *Do not skip step 2. You will need these settings to configure your computer at the end of the procedure.*

Performing the BIOS Update

We recommend you update your system BIOS using the Bull Boot CD.

1. Consult our Web site at the following address: **http://support.bull.com** and type **Boot CD** in the *Search* field.
2. Click on Boot_CD to open the Flash CD page.
3. Download and read the text files, and download the Boot CD compressed file.
4. Extract the ISO file and burn the image on a CD.
5. Insert the Boot CD in the optical disc drive, and reboot your system.
6. Follow the instructions in the Read Me file to choose the group in which your system's file is located, and press **Enter**.
7. Type **CRC** to run a CRC check, and press **Enter** to reboot your system when prompted to do so.
8. Type the system name as listed on the screen, and follow the on-screen instructions until the system has been successfully updated.

How to Identify BIOS Revision Level

To identify your system's current BIOS revision level, perform the following procedure:

1. Power-on or reboot the system.
   “Press <F2> to enter SETUP” is displayed.
2. Press **F2**.
3. In the **Main** menu, check the value that appears in the BIOS Version field.

Recovering BIOS

If at any point in time the BIOS appears to malfunction, clear the CMOS to return to a default configuration. If this does not help, process with the BIOS recovery as described below.

1. Remove the BIOS jumper.
2. Update the BIOS.
3. Power off the server.
4. Remove the A/C power.
5. Replace the jumper to the Normal position (1-2).
6. Plug in AC power.
7. Wait for thirty seconds and power on.

For more information on the BIOS Recovery jumper, refer to *"Recovering the BIOS" on page 27*.

T840 E2 Specifications

Table 25: T840 E2 Specifications

Item		Description			
Cabinet design		Tower or Rack (with optional conversion kit)			
Chipset		Intel® Tylersburg 24D I/O Controller Hub (IOH) Intel ® I/O Controller Hub 10 RAID (ICH10R) ServerEngines* LLC Pilot II BMC controller (Integrated BMC)			
CPU	Type	Intel® Xeon® Nehalem-EP processors with Intel® QuickPath Interconnect and Integrated Memory controllers.			
	Number of processors	1 (max: 2)			
	Socket	LGA1366			
Memory	Type	Eight DDR3 DIMM slots supporting DDR3 800/1066/1333 MT/s ECC Registered DIMM and ECC or Non-ECC unbuffered DIMM. Four slots support CPU_1, and four slots support CPU_2.			
Hard Disk Drive	Technology	S-ATA		SAS	
	RPM	7,200		10,000	15,000
Hard Disk Drive bays	Hot-swap	4 slots: 3.5”		8 slots: 2.5”	
Hard Drive Controller		Support up to six Serial ATA II hard drives through six on-board SATA II connectors			
External accessible bays	5.25-inch bay	3 slots			
	3.5-inch bay	1 slot			
On-board Connectors Headers	DDR3 DIMM	Eight 240-Pin connectors			
	PCI Express	Three Gen2 x8 connectors			
		One Gen1 x4 connector			
	PCI	One 5V 32bit/33MHz connector			
	RJ-45	Two stacked connectors with Magnetics and LEDs and two USB combo connectors			
	Serial Port	One external Header (9 pin)			
	USB	Two internal 2x5 pin headers, each supports two USB 2.0 ports			
	Main power	One 24-pin connector			
	CPU power	One 8-pin CPU power connector			
	Auxiliary power	One 5-pin connector			
	VGA	One DB-15 connector			
	Serial port	One DB-9 connector			
	SATA II	Six 7-pin connectors			
	SGPIO	One 4-pin connector			
	XDP	One 60-pin XDP connector			
	0.10” pitch fan	Five 4-pin headers			
	Front Panel	One 24-pin connector			
	Chassis Intrusion	One 2-pin header			
	RMM3	One connector			

Table 25: T840 E2 Specifications (Continued)

Item	Description		
LAN	82574LGbE	PCI Express* Network Controller connects to the Gen2 x1 interface on the Intel® Tylersburg IOH.	
	82567	Gigabit Network Connection that connects to the Gigabit LAN. Connect Interface / LAN Connect Interface on the Intel® ICH10R	
	10/100/1000 Base-TX	2 Interfaces through RJ-45 connectors with integrated magnetics.	
		Link and Speed LEDs on the RJ-45 Connector.	
Video		On-board ServerEngines* LLC Pilot II BMC controller: - Integrated 2D video controller - 32 MB DDR2 667 MHz memory	
Fans		Five 4-pin fan headers supporting two processor fans and three system fans	
Add-in PCI, PCI Express Cards	Slot 6	One half-length (6.6 inches) PCI Express* Gen2 x8 connector with X8 link width (support riser card)	
	Slot 7	One half-length (6.6 inches) PCI Express* Gen2 x8 connector with x8 link width	
	Slot 5	One half-length (6.6 inches) PCI Express* Gen2 x8 connector with x4 link width	
	Slot 3	One half-length (6.6 inches) PCI Express* x4 connector with x4 link width	
	Slot 4	One half-length (6.6 inches) 5V PCI 32 bit / 33 MHz connector	
USB	USB 1.1	One USB 1.1 Port connected to the Integrated BMC for KB/MS function	
	USB 2.0	Four USB 2.0 Ports connected to the Server Rear Panel	
		Four USB 2.0 Ports connected to Headers on the motherboard	
		One USB 2.0 Port connected to the Integrated BMC for remote storage function	
BIOS	Award BIOS	Power On Self Test (POST)	
External dimensions		450 (height) × 205 (width) mm × 599 (depth)	
Weight		25 kg (max)	
Power supply (depending on your system)	Type	Hot-swappable	Fixed
	Input voltages	110 to 220V	110 to 220V
	Power consumption	Output: 600W	Minimum Output : 665W
Environmental requirements	Temperature	10 to 35°C	
	Humidity	20 to 80% RH (no condensation)	

T840 E2 Equipment Log

Use this equipment log form to record pertinent information about your system. You will need some of this information to run the System Setup Utility. Be sure to update the equipment log when you add options.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the name of the vendor from whom the component was purchased. Be sure to record the same information for any components added to the system, such as a power supply, hard disk drives, add-in boards, or printers.

Record the model and serial numbers of the unit and system board. The model and serial numbers of the system unit are recorded on a label attached to the rear of the unit.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another. Literature accompanying these products should illustrate or describe the location of model and serial numbers.

Hardware

Main Unit						
	Model name		Serial No.		Date installed	
CPU						
#1	Clock		Serial No.		Date installed	
#2	Clock		Serial No.		Date installed	
Memory						
#1	Size		Serial No.		Date installed	
#2	Size		Serial No.		Date installed	
#3	Size		Serial No.		Date installed	
#4	Size		Serial No.		Date installed	
#5	Size		Serial No.		Date installed	
#6	Size		Serial No.		Date installed	
#7	Size		Serial No.		Date installed	
#8	Size		Serial No.		Date installed	
Monitor						
	Type		Model name		Serial No.	
					Date installed	
HDD cage						
	Model name				Serial No.	
					Date installed	
Hot-swap SATA Hard Disks						
#1	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#2	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#3	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#4	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#5	Type			Serial No.		
	Capacity			Date installed		

	Type number					
#6	Type			Serial No.		
	Capacity			Date installed		
	Type number					
Fixed SATA Hard Disks						
#1	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#2	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#3	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#4	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#5	Type			Serial No.		
	Capacity			Date installed		
	Type number					
#6	Type			Serial No.		
	Capacity			Date installed		
	Type number					
	Type number					
5.25-inch Device #1						
	Size		Capacity		Serial No.	
	Model name		Type number		Date installed	
5.25-inch Device #2						
	Size		Capacity		Serial No.	
	Model name		Type number		Date installed	
5.25-inch Device #3						
	Size		Capacity		Serial No.	
	Model name		Type number		Date installed	
5.25-inch Device #4						
	Size		Capacity		Serial No.	
	Model name		Type number		Date installed	

PCI Slot				
	Model name		Serial No.	
			Date installed	
PCI-E 4x Slot				
	Model name		Serial No.	
			Date installed	
PCI-E 8x Slot				
	Model name		Serial No.	
			Date installed	
PCI-E 8x Slot				
	Model name		Serial No.	
			Date installed	
PCI-E 8x Slot				
	Model name		Serial No.	
			Date installed	
Printer				
	Model name		Serial No.	
	Manufacturer		Date installed	
External USB Device 1				
	Model name		Serial No.	
	Manufacturer		Date installed	
External USB Device 2				
	Model name		Serial No.	
	Manufacturer		Date installed	
External USB Device 3				
	Model name		Serial No.	
	Manufacturer		Date installed	
External USB Device 4				
	Model name		Serial No.	
	Manufacturer		Date installed	
External USB Device 5				
	Model name		Serial No.	
	Manufacturer		Date installed	
External USB Device 6				
	Model name		Serial No.	
	Manufacturer		Date installed	

External Serial Device 1				
	Model name		Serial No.	
	Manufacturer		Date installed	

Software

Firmware version				
OS Application of RUR media	Apply	Name: Name:		Version Version
File system	FAT	HPFS	NTFS	
	Others ( )			
Bundled software installed				
Licensed software installed				
Application running when a failure occurred				

Technical publication remarks form

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Date:	May 2009

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