RS500-E6/PS4

1U Rackmount Server
User Guide

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Notices

Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

> WARNING! The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This Class B digital apparatus complies with Canadian ICES-003.

> **DO NOT** throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

> **DO NOT** throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

Safety information

Electrical Safety

- Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.
- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing any additional devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your dealer.

Operation Safety

- Any mechanical operation on this server must be conducted by certified or experienced engineers.
- Before operating the server, carefully read all the manuals included with the server package.
- Before using the server, ensure all cables are correctly connected and the power cables are not damaged. If any damage is detected, contact your dealer as soon as possible.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Place the server on a stable surface.

> This product is equipped with a three-wire power cable and plug for the user's safety. Use the power cable with a properly grounded electrical outlet to avoid electrical shock.

Lithium-Ion Battery Warning

CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

CD-ROM Drive Safety Warning

CLASS 1 LASER PRODUCT

Heavy System

CAUTION! This server system is heavy. Ask for assistance when moving or carrying the system.

About this guide

Audience

This user guide is intended for system integrators, and experienced users with at least basic knowledge of configuring a server.

Contents

This guide contains the following parts:

1. **Chapter 1: Product introduction**

    This chapter describes the general features of the server, including sections on front panel and rear panel specifications.

2. **Chapter 2: Hardware setup**

    This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

3. **Chapter 3: Installation options**

    This chapter describes how to install optional components into the barebone server.

4. **Chapter 4: Motherboard information**

    This chapter gives information about the motherboard that comes with the server. This chapter includes the motherboard layout, jumper settings, and connector locations.

5. **Chapter 5: BIOS information**

    This chapter tells how to change system settings through the BIOS Setup menus and describes the BIOS parameters.

6. **Chapter 6: RAID configuration**

    This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

7   **Chapter 7: Driver installation**

    This chapter provides instructions for installing the necessary drivers for different system components.

Conventions

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Instructions that you MUST follow to complete a task.

NOTE: Tips and additional information to help you complete a task.

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.
	Example: <Enter> means that you must press the Enter or Return key.
<Key1+Key2+Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).
	Example: <Ctrl+Alt+D>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.
	Example: At the DOS prompt, type the command line: `format A:/S`

References

Refer to the following sources for additional information, and for product and software updates.

1.   ASUS Server Web-based Management (ASWM) user guide

This manual tells how to set up and use the proprietary ASUS server management utility.

2.   ASUS websites

The ASUS websites worldwide provide updated information for all ASUS hardware and software products. Refer to the ASUS contact information.

Chapter 1

This chapter describes the general features of the chassis kit. It includes sections on front panel and rear panel specifications.

Product introduction

1.1   System package contents

Check your system package for the following items.

Model Name	RS500-E6/PS4
Chassis	ASUS R10A 1U Rackmount Chassis
Motherboard	ASUS Z8NR-D12-SYS Server Board
Component	1 x 600W 80+ Single Power Supply 1 x SATAII/SAS HDD Backplane (BP4LX-R10A) 4 x hot-swap HDD trays (varies by territories) 1 x Front I/O Board (FPB-AR14) 6 x System Fans (40 x 56mm) 1 x Air Duct 1 x Riser Card
Accessories	2 x CPU Heatsinks (varies by territories) 1 x RS500-E6/PS4 User's Guide 1 x ASWM 2.0 User Guide 1 x RS500-E6/PS4 Support CD (including ASWM*) 1 x Bag of Screws 1 x AC Power Cable 1 x Rackmount Kit
Optional Items	1 x CA eTrust Anti-virus Software CD 1 x ASMB4 Series server management board 1 x Slim-Type Optical Device 1 x PIKE 1064E/1078

*ASUS System Web-based Management

If any of the above items is damaged or missing, contact your retailer.

1.2   Serial number label

Before requesting support from the ASUS Technical Support team, you must take note of the product's serial number containing 12 characters such as xxxxxxxxxxxx. See the figure below.

With the correct serial number of the product, ASUS Technical Support team members can then offer a quicker and satisfying solution to your problems.

1.3   System specifications

The ASUS RS500-E6/PS4 is a server featuring the ASUS Z8NR-D12-SYS server board. The server supports Intel® LGA1366 Xeon® 5500 series processors with EM64T technology, plus other latest technologies through the chipsets onboard.

Model Name		RS500-E6/PS4
Processor / System Bus		2 x Socket LGA1366
		Intel® Xeon® 5500 series processors (45nm)
		Quad-Core / Dual-Core
		QPI 4.8 / 5.86 / 6.4 GT/s
Core Logic		Intel® 5500 I/O Hub
		Intel® ICH10R
ASUS Features	Smart Fan	√
	ASWM 2.0	√
Memory	Total Slots	12 (3-channel per CPU, 6 DIMMs per CPU)
	Capacity	Maximum up to 96GB (RDIMM) Maximum up to 48GB (UDIMM)
	Memory Type	DDR3 1333 / 1066 / 800 Reg DIMM / Unbuffered DIMM with ECC
	Memory Size	512MB, 1GB, 2GB, 4GB and 8GB
Expansion Slots	Total PCI/PCI-X/ PCI-E Slots	3
	Slot Type	1 x PCI-E G2 x16 slot (G2 x8 link) (Full-Height/ Half-Length) 1 x PCI-E G2 x8 slot (G2 x8 link) (Full-Height/ Half-Length)
	Additional Slot	1 x PIKE slot with PCI-E G1 x4 link
Storage	SATA Controller	Intel® ICH10R: - 6 x SATA2 300MB/s ports - Intel® Matrix Storage (for Windows only) - Supports software RAID 0, 1, 5 & 10 LSI MegaRAID (for Linux / Windows) - Supports software RAID 0, 1 & 10
	SAS Controller	Optional: ASUS PIKE 1064E 4-port SAS RAID card - Supports software RAID 0, 1 & 1E ASUS PIKE 1078 8-port SAS RAID card - Supports hardware RAID 0, 1, 10, 5 & 6
HDD Bays	I = Internal A or S will be hot-swappable	4 x Hot-swap 3.5" SAS/SATA HDD Bays

(continued on the next page)

Networking	LAN	2 x Intel® 82574L PCI-E GbE LANs
Graphic	VGA	Aspeed AST2050 / 8MB
Auxiliary Storage CD / DVD		1 x Slim-type Optical Device Bay Options: No Device / DVD-RW
Onboard I/O		1 x External Serial Port 3 x RJ-45 ports 4 x USB 2.0 ports (Front x 2, Rear x 2) 1 x VGA port 1 x PS/2 keyboard port 1 x PS/2 mouse port
OS Support		Windows® Server 2008 R2 Enterprise 32 / 64-bit Windows® Server 2003 R2 Enterprise 32 / 64-bit RedHat® Enterprise Linux AS5.0 32 / 64-bit SuSE® Linux Enterprise Server 10.0 32 / 64-bit 　(Subject to change without any notice)
Anti-virus Software		CA® eTrust™ 7.1 anti-virus software (Optional)
Management Solution	Out of Band Remote Hardware	Onboard IPMI Solution ASMB4-iKVM for KVM-over-IP support (Optional)
	Software	ASUS ASWM 2.0 and SNMP®
Dimension (HH x WW x DD)		615mm x 444mm x 43.4mm
Net Weight Kg (CPU, DRAM & HDD not inclu ded)		14 Kg
Power Supply		600W 80+ Single Power Supply
Environment		Operation temperature: 10°C – 35°C / Non operation 　temperature: -40°C – 70°C Non operation humidity: 20% ~ 90% (Non-condensing)

*Specifications are subject to change without notice.

1.4   Front panel features

The barebone server displays a simple yet stylish front panel with easily accessible features. The power and reset buttons, LED indicators, optical drive, and two USB ports are located on the front panel.

Refer to section **1.7.1 Front panel LEDs** for the LED descriptions.

Rack screw   HDD 1   HDD 2   HDD 3   HDD 4   Rack screw

Optical drive

USB ports
HDD Access LED
LAN2 LED
LAN1 LED
Message LED
Reset button
Location LED
Location switch

Power
button
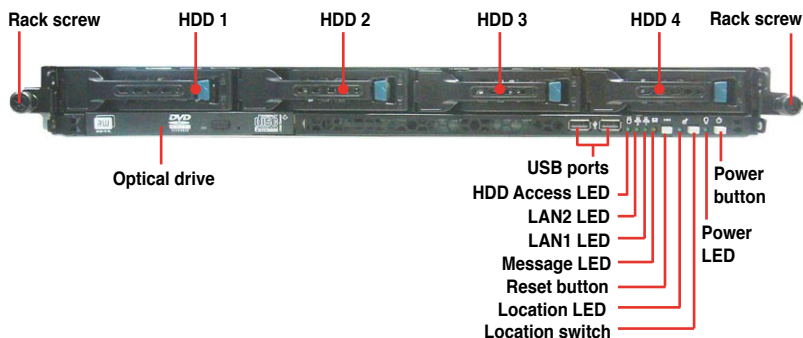
Power
LED

1.5   Rear panel features

The rear panel includes the expansion slots, system power socket, and rear fans. The middle part includes the I/O shield with openings for the rear panel connectors on the motherboard.

Power cord connector
Power supply fan
PS/2 mouse port
PS/2 keyboard port
LAN port 3*
USB ports
Serial port
VGA port
LAN port 1
LAN port 2
Expansion slots
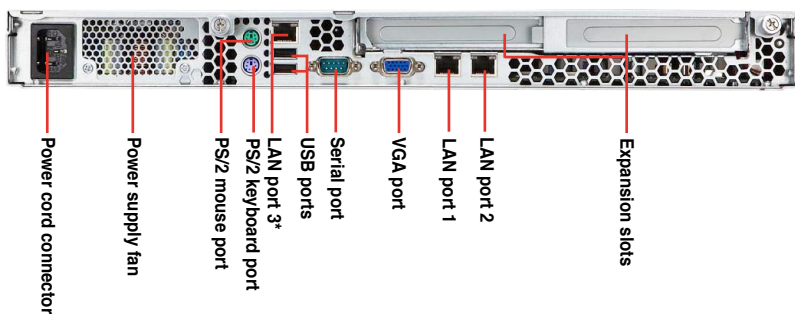
• The ports for the PS/2 keyboard, PS/2 mouse, USB, VGA, and Gigabit LAN do not appear on the rear panel if motherboard is not present.

• *The port is for ASUS ASMB4-iKVM controller card only.

1.6 Internal features

The barebone server includes the basic components as shown.
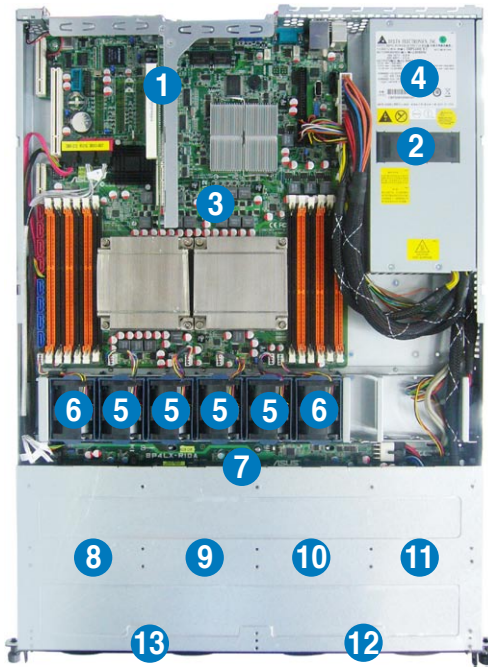
1. PCI Express G2 x16 slot + PCI Express G2 x8 slot Riser Card (at x8 link)

2. Power fans

3. ASUS Z8NR-D12-SYS server board

4. Power supply

5. Nidec® R40W12BS4AC system fans*

6. Nidec® W40S12BS4A5 or R40W12BS4AC system fans*

7. SATA/SAS backplane

8. Hot-swap HDD tray 1 - Connects to SATA1 port (Port 0)

9. Hot-swap HDD tray 2 - Connects to SATA2 port (Port 1)

10. Hot-swap HDD tray 3 - Connects to SATA3 port (Port 2)

11. Hot-swap HDD tray 4 - Connects to SATA4 port (Port 3)

12. Front I/O board (hidden)

13. Slim-type optical drive

The barebone server does not include a floppy disk drive. Connect a USB floppy disk drive to any of the USB ports on the front or rear panel if you need to use a floppy disk.

```
*WARNING
HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY
```

1.7 LED information

1.7.1 Front panel LEDs

HDD Access LED
LAN2 LED
LAN1 LED
Message LED
Location LED
Power LED
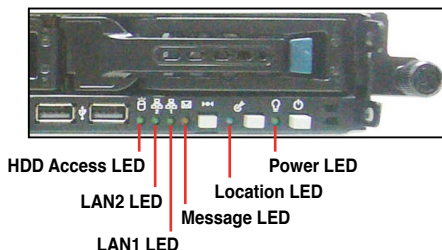
LED	Icon	Display status	Description
Power LED	💡	ON	System power ON
HDD Access LED	🖴	OFF Blinking	No activity Read/write data into the HDD
Message LED	✉	OFF Blinking	System is normal; no incoming event ASWM indicates a HW monitor event
Location LED	🔗	OFF ON	Normal status Location switch is pressed (Press the location switch again to turn off)
LAN LEDs	🖧 🖧	OFF Blinking ON	No LAN connection LAN is transmitting or receiving data LAN connection is present

1.7.2 LAN (RJ-45) LEDs

SPEED LED
ACT/LINK LED
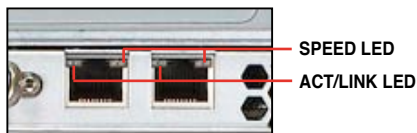
ACT/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
GREEN	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

1.7.3   HDD status LED

HDD status LED
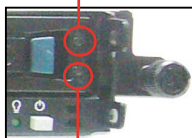
HDD Activity LED

SATAII/SAS HDD LED Description			
HDD Status LED	GREEN	ON	SATAII/SAS HDD power ON
	RED	ON	HDD has failed and should be swapped immediately
	GREEN/ RED	Blinking	RAID rebuilding
HDD Activity LED	GREEN	Blinking	Read/write data from/into the SATAII/SAS HDD

Chapter 2

This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

Hardware setup

2.1 Chassis cover

Removing the rear cover

1. Loosen the two thumbscrews on the rear panel to release the rear cover from the chassis.

Thumbscrews
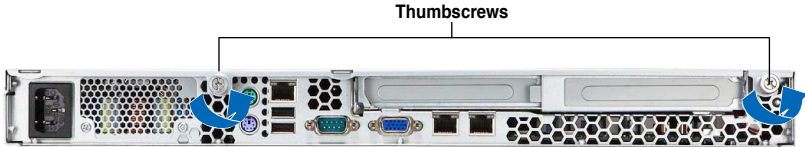
2. Firmly hold the cover and slide it toward the rear panel for about half an inch until it is disengaged from the chassis.

1/2 inch distance
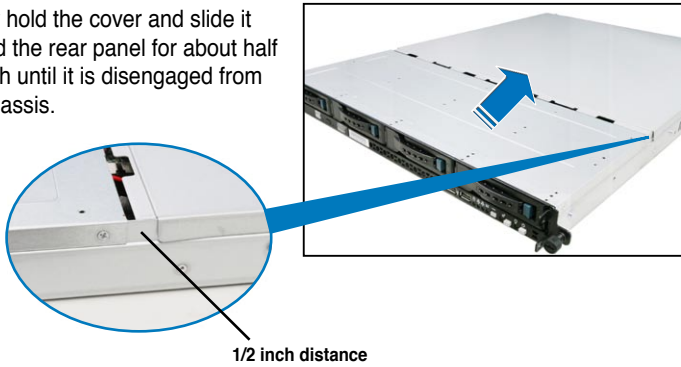
3. Lift the cover from the chassis.

2.2 Central Processing Unit (CPU)

The motherboard comes with two surface mount LGA1366 sockets designed for the Intel® Xeon® Dual/Quad Core processor.

> • Your boxed Intel® Xeon® LGA1366 processor package should come with installation instructions for the CPU and heatsink. If the instructions in this section do not match the CPU documentation, follow the latter.
>
> • Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
>
> • Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1366 socket.
>
> • The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/ incorrect removal of the PnP cap.

2.2.1 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.
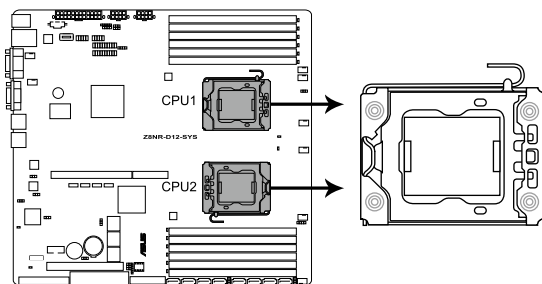
Z8NR-D12-SYS CPU LGA1366 Socket

> Before installing the CPU, ensure that the socket box is facing towards you and the load lever is on your left.

2. Press the load lever with your thumb (A), then move it to the left (B) until it is released from the retention tab.

⚠️ To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

Retention tab

A

B
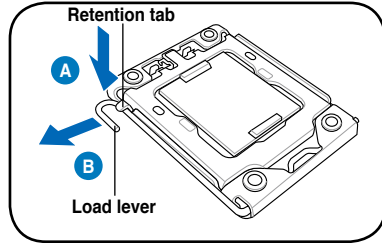
Load lever

3. Lift the load lever in the direction of the arrow to a 135º angle.

4. Lift the load plate with your thumb and forefinger to a 100º angle.

Load plate

4

3
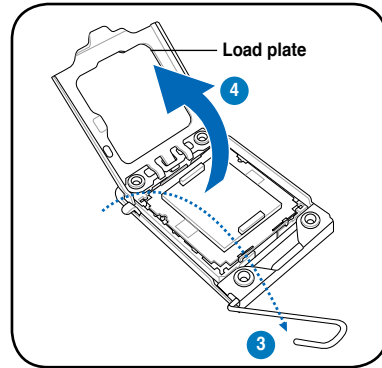
5. Remove the PnP cap from the CPU socket.

PnP cap
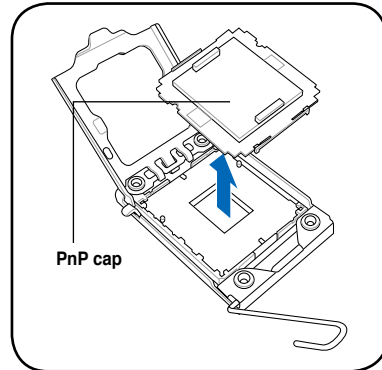
6. Position the CPU over the socket, ensuring that the gold triangle is on the bottom-left corner of the socket, and then fit the socket alignment key into the CPU notch.

> The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

Gold triangle mark

CPU notch

Alignment key
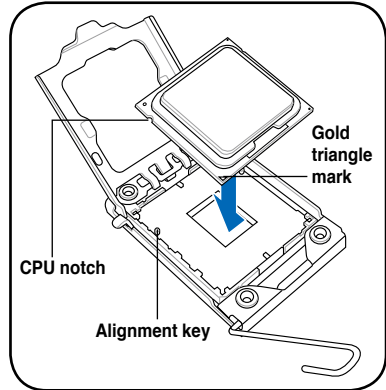
7. Apply some Thermal Interface Material to the exposed area of the CPU that the heatsink will be in contact with, ensuring that it is spread in an even thin layer.

> Some heatsinks come with pre-applied thermal paste. If so, skip this step.

> DO NOT eat the thermal Interface Material. If it gets into your eyes or touches your skin, ensure that you wash it off immediately and seek professional medical help.
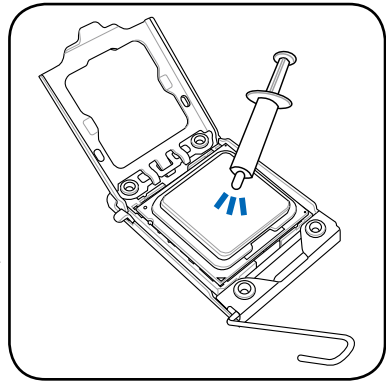
> To prevent contaminating the paste, DO NOT spread the paste with your finger directly.

8. Close the load plate (A), and then push the load lever (B) until it snaps into the retention tab.

A

B
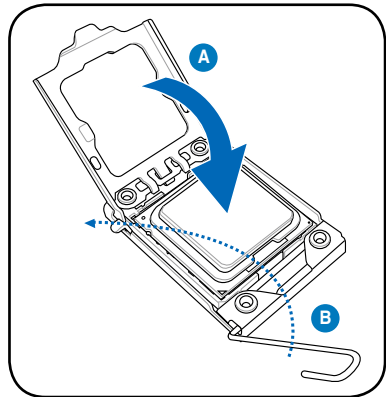
2.2.2 Installing the CPU heatsink and airduct

To install the CPU heatsink:

1. Place the heatsink on top of the installed CPU, ensuring that the four fasteners match the holes on the motherboard.
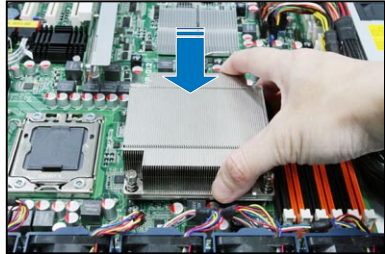
2. Twist each of the four screws with a Philips (cross) screwdriver just enough to attach the heatsink to the motherboard. When the four screws are attached, tighten them one by one to completely secure the heatsink.
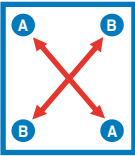
Tighten the four heatsink screws in a diagonal sequence.

To install the airduct:

1. Position the airduct on top of the heatsink.
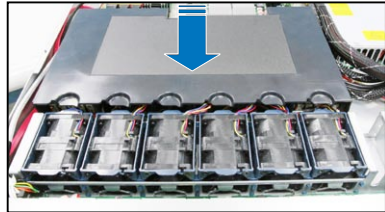
2. Carefully lower the airduct until it fits in place.

2.3 System memory

2.3.1 Overview

The motherboard comes with twelve (12) Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) sockets.

The figure illustrates the location of the DDR3 DIMM sockets:

Z8NR-D12-SYS 240-pin DDR3 DIMM sockets
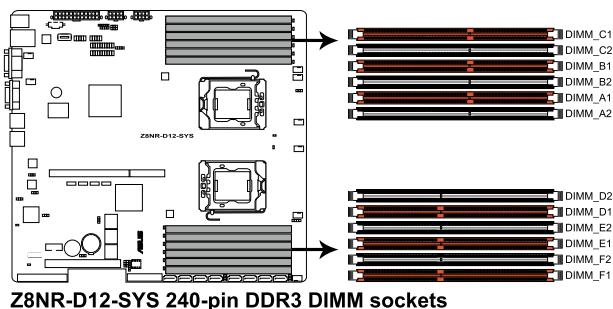
Recommended CPU1 memory configuration

Mode	Sockets					
	DIMM_C1	DIMM_C2	DIMM_B1	DIMM_B2	DIMM_A1	DIMM_A2
2 DIMMs	-	-	Populated	-	Populated	-
3 DIMMs	Populated	-	Populated	-	Populated	-
4 DIMMs	Populated	-	Populated	-	Populated	Populated
6 DIMMs	Populated	Populated	Populated	Populated	Populated	Populated

Recommended CPU2 memory configuration

Mode	Sockets					
	DIMM_D1	DIMM_D2	DIMM_E1	DIMM_E2	DIMM_F1	DIMM_F2
2 DIMMs	Populated	-	Populated	-	-	-
3 DIMMs	Populated	-	Populated	-	Populated	-
4 DIMMs	Populated	Populated	Populated	-	Populated	-
6 DIMMs	Populated	Populated	Populated	Populated	Populated	Populated

Due to Intel CPU spec definition, the system will not boot if only one DIMM is installed in DIMM slot A2, B2, or C2 for CPU1, or D2, E2 or F2 for CPU2. Follow the table above for recommended memory configuration.

2.3.2   Memory configurations

You may install 512 MB, 1 GB, 2 GB, 4 GB and 8GB registered DIMMs or Unbuffered DIMM with ECC / non- ECC into the DIMM sockets.

- •   Always install DIMMs with the same CAS latency. For optimum compatibility, we recommend that you obtain memory modules from the same vendor. Refer to the Qualified Vendors List on the ASUS web site.

- •   You may install varying memory sizes in Channel A, Channel B and Channel C. The system maps the total size of the lower-sized channel for the dual-channel or triple-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.

- •   Due to the memory address limitation on 32-bit Windows OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you install a 64-bit Windows OS when having 4GB or more memory installed on the motherboard.

- •   This motherboard does not support memory modules made up of 256 Mb chips.

2.3.3   Installing a DIMM

⚠️ Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1.   Unlock a DIMM socket by pressing the retaining clips outward.

2.   Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.

DIMM notch

Unlocked retaining clip
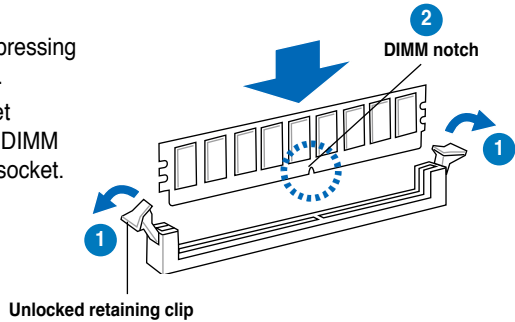
✏️ A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

3.   Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.

Locked Retaining Clip
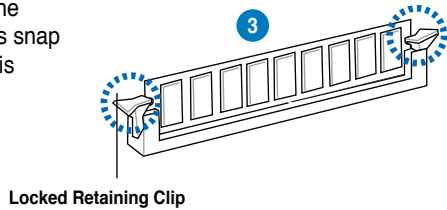
2.3.4   Removing a DIMM

Follow these steps to remove a DIMM.

1.   Simultaneously press the retaining clips outward to unlock the DIMM.

DIMM notch
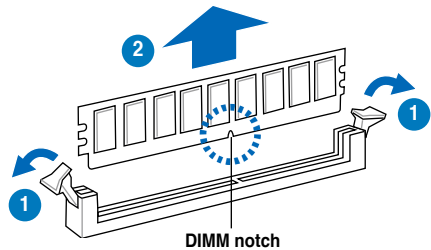
✏️ Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.

2.   Remove the DIMM from the socket.

2.4   Hard disk drives

The system supports four hot-swap SATAII/SAS hard disk drives. The hard disk drive installed on the drive tray connects to the motherboard SATAII/SAS ports via the SATAII/SAS backplane.

To install a hot-swap SATAII/SAS HDD:

spring lock

1.   Release a drive tray by pushing the spring lock to the right, then pulling the tray lever outward. The drive tray ejects slightly after you pull out the lever.
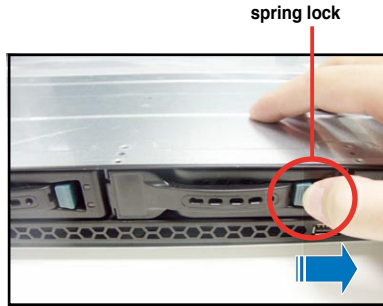
2.   Firmly hold the tray lever and pull the drive tray out of the bay.

3.   Take note of the drive tray holes. Each side has three holes to fit different types of hard disk drives. Use two screws on each side to secure the hard disk drive.
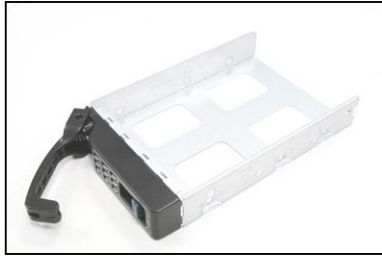
4.   Place a SATAII/SAS hard disk drive on the tray, then secure it with four screws.

5. Carefully insert the drive tray and push it all the way to the depth of the bay until just a small fraction of the tray edge protrudes.

When installed, the SATAII/SAS connector on the drive connects to the SATAII/SAS interface on the backplane.

6. Push the tray lever until it clicks, and secures the drive tray in place. The drive tray is correctly placed when its front edge aligns with the bay edge.

7. Repeat steps 1 to 6 if you wish to install a second SATAII/SAS drive.

2.5 Expansion slot

2.5.1 Installing an expansion card to the riser card bracket

The barebone server comes with a riser card bracket. You need to remove the bracket if you want to install PCI Express x8 or x16 expansion cards.

To install a PCI Express x8 or x16 card:

1. Firmly hold the riser card bracket, then pull it up to detach it from the PCI Express x16 slot on the motherboard.
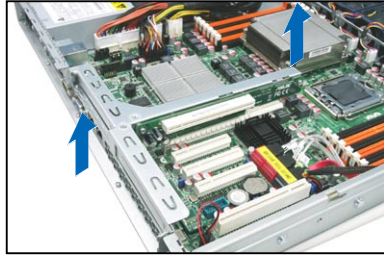
2. Place the riser card bracket on a flat and stable surface, then remove the screw from the slot bay.

PCI Express x16 slot
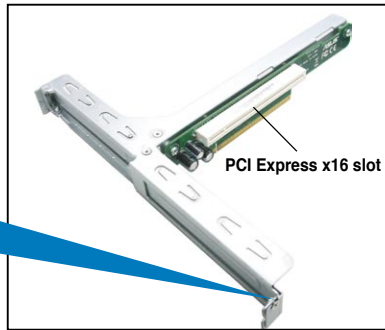
3. Install a PCI Express x8 or x16 card to the bracket as shown, then secure the card with a screw.
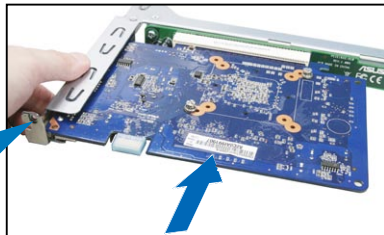
4. Repeat the previous steps to Install another PCI Express x8 or x16 card if needed.

To reinstall the riser card bracket:

1. Align the riser card bracket with the cards to the PCI Express x16 slot on the motherboard.

2. Press the riser card bracket until the golden connectors completely fit the slot and the bracket aligns with the rear panel.

3. Connect the cable(s) to the card, if applicable.
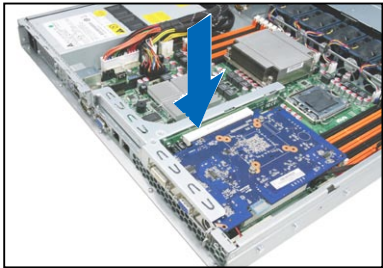
2.5.2   Configuring an expansion card

After installing the expansion card, configure the it by adjusting the software settings.

1.   Turn on the system and change the necessary BIOS settings, if any. See Chapter 5 for information on BIOS setup.

2.   Assign an IRQ to the card. Refer to the following tables.

3.   Install the software drivers for the expansion card.

Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
3*	11	Communications Port (COM2)
4*	12	Communications Port (COM1)
5*	13	--
6	14	Floppy Disk Controller
7*	15	--
8	3	System CMOS/Real Time Clock
9*	4	ACPI Mode when used
10*	5	IRQ Holder for PCI Steering
11*	6	IRQ Holder for PCI Steering
12*	7	PS/2 Compatible Mouse Port
13	8	Numeric Data Processor
14*	9	Primary IDE Channel
15*	10	Secondary IDE Channel

* These IRQs are usually available for ISA or PCI devices.

2.6 Cable connections

- The bundled system cables are pre-connected before shipment. You do not need to disconnect these cables unless you will remove pre-installed components to install additional devices.
- Refer to Chapter 4 for detailed information on the connectors.

Z8NR-D12-SYS

DDR3 DIMM_C1 (64bit, 240-pin module)
DDR3 DIMM_C2 (64bit, 240-pin module)
DDR3 DIMM_B1 (64bit, 240-pin module)
DDR3 DIMM_B2 (64bit, 240-pin module)
DDR3 DIMM_A1 (64bit, 240-pin module)
DDR3 DIMM_A2 (64bit, 240-pin module)
DDR3 DIMM_D2 (64bit, 240-pin module)
DDR3 DIMM_D1 (64bit, 240-pin module)
DDR3 DIMM_E2 (64bit, 240-pin module)
DDR3 DIMM_E1 (64bit, 240-pin module)
DDR3 DIMM_F2 (64bit, 240-pin module)
DDR3 DIMM_F1 (64bit, 240-pin module)

Pre-connected system cables

1. 24-pin SSI power connector (from power supply to motherboard)
2. 8-pin SSI power connector (from power supply to motherboard)
3. SMBus connector
4. System fan connectors (from motherboard FRNT_FAN1, CPU_FAN1 FRNT_FAN2, FRNT_FAN3, CPU_FAN2, and FRNT_FAN4 to system fans)
5. USB connector (from motherboard to front I/O board)
6. Panel connector (from motherboard to front I/O board)
7. SATA connectors (from motherboard to SATAII/SAS backplane board)
8. SAS connectors (from motherboard to SATAII/SAS backplane board)
9. Auxiliary panel connector (from motherboard to front I/O board)

2.7 SATAII/SAS backplane cabling

SGPIO_SEL jumper:
pins 1-2 (Onboard)
pins 2-3 (Add-on card)

Connects a
8-pin plug from
power supply

Connects the data cables
connected to the motherboard

Connect the SATAII/SAS HDDs
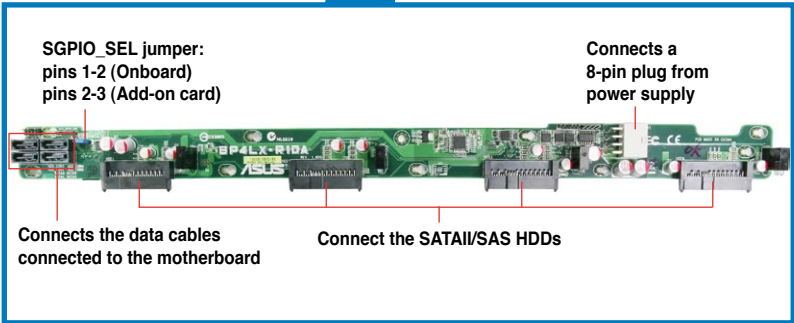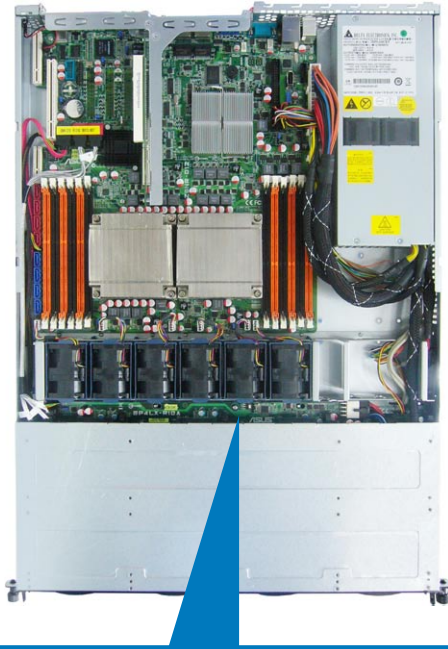
2.8 Removable/optional components

You may need to remove previously installed system components when installing or removing system devices. Or you may need to install the optional components into the system. This section tells how to remove/install the following components:

1. System fans
2. ASUS PIKE RAID card (optional)
3. ASUS ASMB4-iKVM (optional)

Ensure that the system is turned off before removing any components.

2.8.1 System fans

To uninstall the system fans:

1. Disconnect the system fan cable from the fan connector on the motherboard.
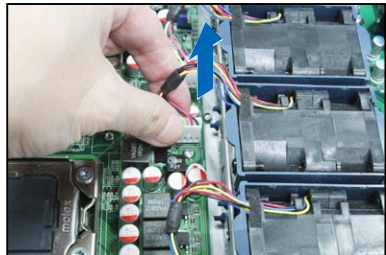
2. Lift the fan, then set aside.
3. Repeat steps 1 to 2 to uninstall the other system fans.
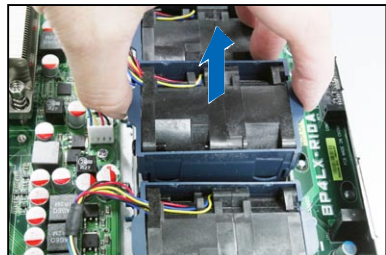
To reinstall the system fans

1. Insert the fan to the fan cage. The airflow directional arrow on the fan side should point towards the system rear panel.
2. Connect the system fan cable to the fan connector on the motherboard.
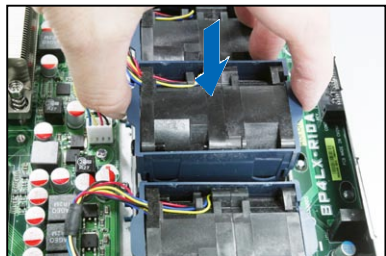
2.8.2 Installing ASUS PIKE RAID card (optional)

Follow the steps below to install an optional ASUS RAID card on your motherboard.

1. Locate the PIKE RAID card slot on the motherboard.
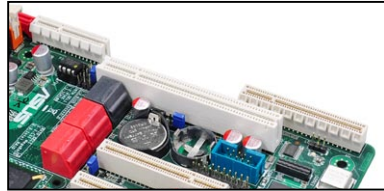
2. Align the golden fingers of the RAID card with the PIKE RAID card slot.
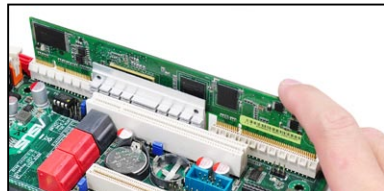
3. Insert the RAID card into the PIKE RAID card slot. Ensure that it is completely seated on the PIKE RAID card slot.
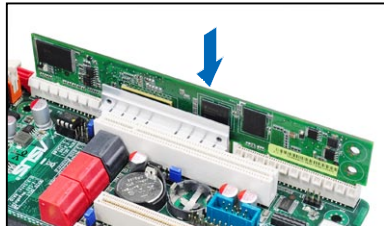
4. Remove the data cables connected to the SATA connectors on the motherboard.
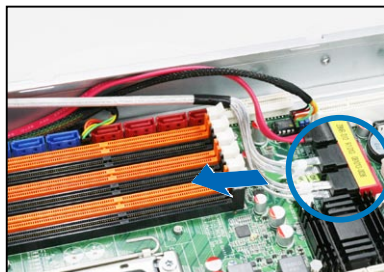
5. Connect the data cables, by numerial order, to the SAS connectors labeled SAS1-4 (red) on the motherboard.
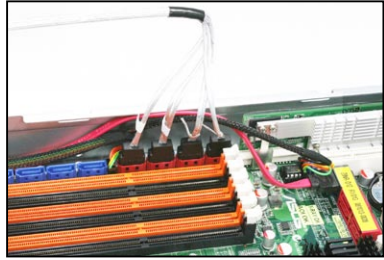
6. Set the SGPIO_SEL1 jumper on the backplane to pin 2-3 when connecting data cables to the SAS connectors on the motherboard.
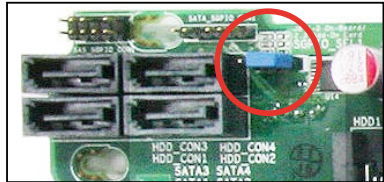
The heatsink on PIKE 1078 might interfere the components on the expansion card. Ensure that the height of the components is less than 6.7 mm.

Installing i Button (for PIKE 1078 only)

Follow the steps below to install an optional i Button on your motherboard.

1. Locate the I Button slot on the motherboard.
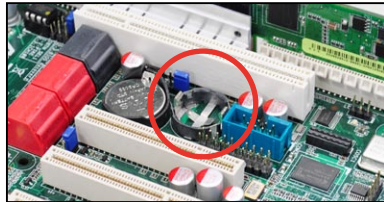
2. Snap the I Button in place.
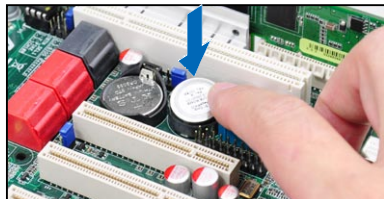
2.8.3 Installing ASMB4 series management board (optional)

Follow the steps below to install an optional ASMB4 series management board on your motherboard.

1. Locate the Baseboard Management Controller (BMC) connector on the motherboard.
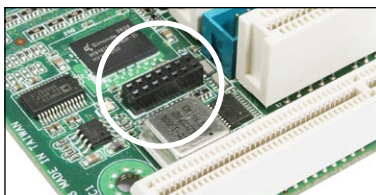
2. Place the board on the BMC connector of the motherboard, aligning with the pin connectors.
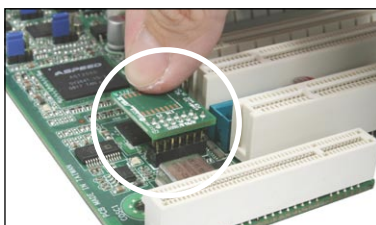
3. Press the board firmly until it is completely seated in place.
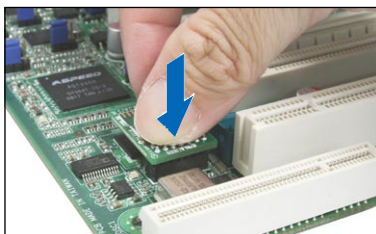
4. When installed, the board appears as shown.
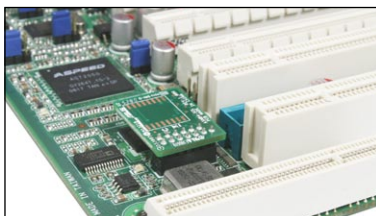
5. Insert the LAN cable plug to the LAN port 3 (dedicated LAN) or LAN port 1 (shared LAN) for server management.

LAN port 3   **LAN port 1**

Chapter 3

This chapter describes how to install the optional components and devices into the barebone server.

Installation options

3.1 Rackmount rail kit items (optional)

Your rackmount rail kit package contains:

- two pair of server rails (for the server)
- two pairs of rack rails (for the rack)
- Nut-and-bolt type screws

Nuts and screws   **Rear end**   **Front end**   **Rack rails**
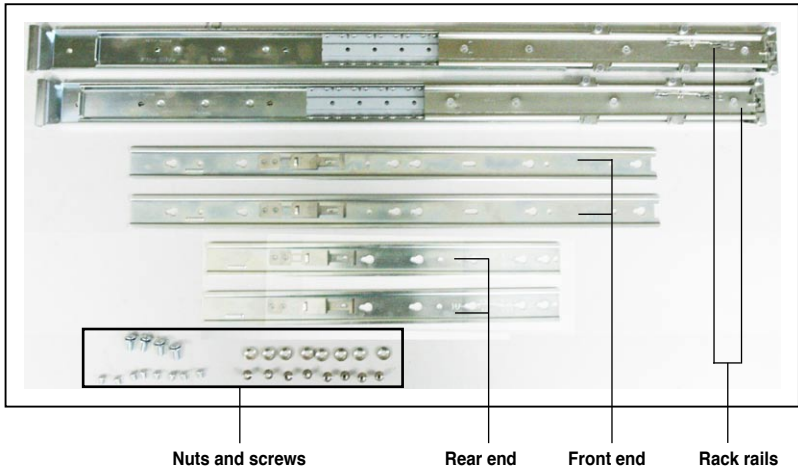
3.2 Attaching the rails to the server

To attach the server rails:

1. Attach the front end of the server rail to the side of the chassis, matching each of the three hooks to the holes on the rail. Then slide the rail toward the front panel until it locks in place.

2. Secure the front end of the server rail to the side of the chassis with one screw.
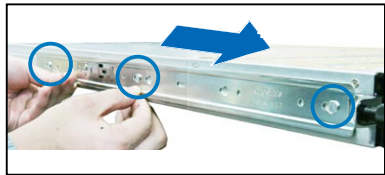
3. Attach the rear end of the server rail to the side of the chassis, matching each of the two hooks to the holes on the rail. Then slide the rail toward the front panel until it locks in place.
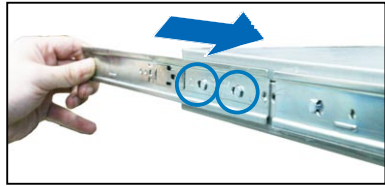
4. Secure the rear end of the server rail to the side of the chassis with one screw.

5. Repeat steps 1 to 4 to attach the second server rail to the other side of the chassis.

3.3   Attaching the rack rails

To attach the rack rails:

1. Select one unit of space (1U) on the rack where you want to install the barebone server.
2. Install the nuts on the holes of the 1U space on the rack front.
3. Install the nuts on the holes of the 1U space on the corresponding rack rear.
4. Measure the depth of the rack to determine the length of the rack rails.
5. Measure the rack rail when assembled to ensure that it fits the rack.

6. Position the rack rail to the 1U space on the rack. Ensure that the front end of the rack rail goes to the front of the rack space.
7. Secure the front end of the rail with two rack screws.
8. Secure the rear end of the rail with two rack screws.
9. Repeat steps 5 to 8 to assemble and attach the second rack rail.

3.4   Rackmounting the server

To mount the server to the rack:

1.   Align the server rails with the rack rails, then push the server all the way to the depth of the rack.

2.   Tighten the two rack screws to secure the server in place.
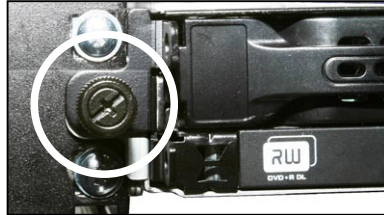
To uninstall the server from the rack:

1.   Loosen the rack screws that secured the server to the rack.

2.   Pull the server from the rack.

Remember to press the latches on both sides to release the server from the rack.
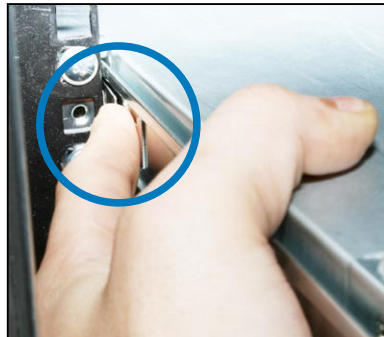
Chapter 4

This chapter includes the motherboard layout, and brief descriptions of the jumpers and internal connectors.

Motherboard info

4.1   Motherboard layouts

The motherboard layout diagram shows the **Z8NR-D12-SYS** with the following labeled components:

- ATXPWR1
- KBMS1
- PSUSMB1
- BPSMB1
- HDLED1
- ATX12V2
- ATX12V1
- TR1
- TR2
- USB12_LAN3
- USB7
- USB34
- USB56
- AUX_PANEL1
- RTLU001
- COM1
- REAR_FAN1
- LVDDR3_SEL1
- PANEL1
- EPU
- VGA1
- REAR_FAN2
- BUZZ1
- Intel® Tylersburg-24D
- Super I/O
- LAN1
- LAN2
- Intel® 82574L
- PCIE1
- LAN_SW2
- ASM1442
- ASM1440
- ASM1442
- ASM1440
- Intel® 82574L
- LAN_SW1
- IPMI_SEL1
- Intel® ICH10R
- ASPEED AST2050
- VGA_SW1
- RAID_SEL1
- SATA2 / SATA1
- SATA4 / SATA3
- COM2
- Lithium Cell CMOS Power
- I_BTN1
- SATA6 / SATA5
- BMC_FW1
- CLRTC1
- RECOVERY1
- BTN_SEL1
- SGPIO1
- BIOS1
- PIKE1
- PCI5
- PIKE2
- EPU
- DDR3 DIMM_C1 (64bit, 240-pin module)
- DDR3 DIMM_C2 (64bit, 240-pin module)
- DDR3 DIMM_B1 (64bit, 240-pin module)
- DDR3 DIMM_B2 (64bit, 240-pin module)
- DDR3 DIMM_A1 (64bit, 240-pin module)
- DDR3 DIMM_A2 (64bit, 240-pin module)
- ERR_DIMMC1
- ERR_DIMMC2
- ERR_DIMMB1
- ERR_DIMMB2
- ERR_DIMMA1
- ERR_DIMMA2
- FRNT_FAN1
- CPU_FAN1
- FAN_SEL1
- CPU1
- FRNT_FAN2
- ERR_CPU1
- FRNT_FAN3
- ERR_CPU2
- CPU2
- CPU_FAN2
- LVDDR3_SEL2
- ERR_DIMMD2
- DDR3 DIMM_D2 (64bit, 240-pin module)
- ERR_DIMMD1
- DDR3 DIMM_D1 (64bit, 240-pin module)
- ERR_DIMME2
- DDR3 DIMM_E2 (64bit, 240-pin module)
- ERR_DIMME1
- DDR3 DIMM_E1 (64bit, 240-pin module)
- ERR_DIMMF2
- DDR3 DIMM_F2 (64bit, 240-pin module)
- ERR_DIMMF1
- DDR3 DIMM_F1 (64bit, 240-pin module)
- SGPIO3
- FRNT_FAN4
- SAS1, SAS2, SAS3, SAS4, SGPIO2, SAS5, SAS6, SAS7, SAS8

Layout contents

Jumpers		Page
1.	Clear RTC RAM (CLRTC1)	4-4
2.	VGA controller setting (3-pin VGA_SW1)	4-5
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4.	iBTN RAID setting (3-pin IBTN_SEL1)	4-6
5.	RAID configuration utility selection (3-pin RAID_SEL1)	4-6
6.	Force BIOS recovery setting (3-pin RECOVERY1)	4-7
7.	IPMI setting (3-in IPMI_SEL1)	4-7
8,	Fan controller setting (3-pin FAN_SEL1)	4-8
9.	DDR3 voltage setting (4-pin LVDDR3_SEL1/2)	4-8

Internal connectors		Page
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8.	Serial port connectors (10-1 pin COM2)	4-12
9.	Power supply SMBus connector (5-pin PSUSMB1)	4-13
10.	Baseboard Management Controller (BMC) connector (14-pin BMC_FW1)	4-13
11.	SSI power connectors (24-pin ATXPWR1, 8-pin ATX12V1/2)	4-14
12.	System panel connector (20-1 pin PANEL1 [white])	4-15
13.	Auxiliary panel connector (20-pin AUX_PANEL1 [black])	4-16

4.2 Jumpers

1. **Clear RTC RAM (CLRTC1)**

   This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

   To erase the RTC RAM:

   1. Turn OFF the computer and unplug the power cord.
   2. Move the jumper cap from pins 1–2 (default) to pins 2–3. Keep the cap on pins 2–3 for about 5–10 seconds, then move the cap back to pins 1–2.
   3. Plug the power cord and turn ON the computer.
   4. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

   > Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!

   > If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.

Z8NR-D12-SYS Clear RTC RAM

CLRTC1

1 2   2 3

Normal   Clear CMOS
(Default)
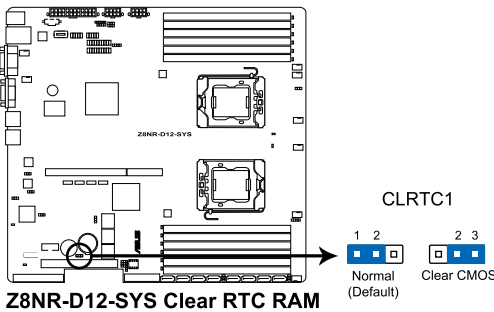
2. **VGA controller setting (3-pin VGA_SW1)**

   This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1–2 to activate the VGA feature.

   VGA_SW1

   1 2   2 3
   Enable   Disable
   (Default)

   Z8NR-D12-SYS VGA setting
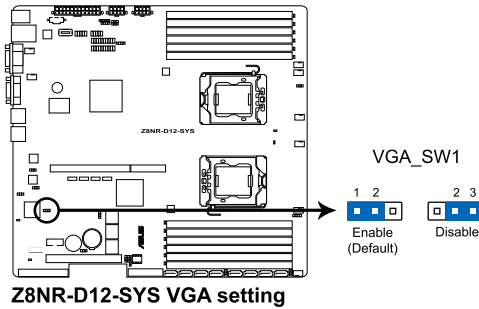
3. **LAN controller setting (3-pin LAN_SW1, LAN_SW2)**

   These jumpers allow you to enable or disable the onboard Intel® WG82574L Gigabit LAN1/2 controller. Set to pins 1–2 to activate the Gigabit LAN feature.

   LAN_SW2

   1 2   2 3
   Enable   Disable
   (Default)

   LAN_SW1

   1 2   2 3
   Enable   Disable
   (Default)

   Z8NR-D12-SYS LAN setting
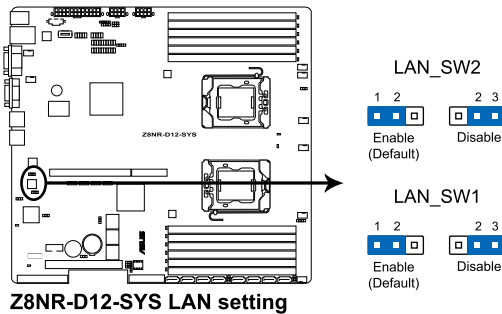
4. **iBTN RAID setting (3-pin IBTN_SEL1)**

   This jumper allows you to select the RAID configuration utility to use when you create disk arrays. Place the jumper caps on pins 1–2 if you install a PIKE RAID card to the motherboard and want to use the LSI Logic MPT Setup Utility (default). Or you can place the jumper caps on pins 2–3 to create the LSI Mega RAID 5 by supported Intel® ICH10R SATA controller.

   IBTN_SEL1

   PIKE
   (Default)

   ICH10R

   Z8NR-D12-SYS IBTN setting
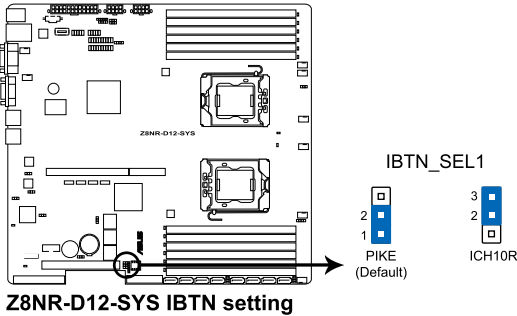
   - • LSI Logic MPT Setup Utility is available only when you install a PIKE RAID card.

   - • LSI Mega RAID 5 fucntion is available only when you place the iBTN to I_BTN1 slot and install an optional ASUS PIKE RAID card.

5. **RAID configuration utility selection (3-pin RAID_SEL1)**

   This jumper allows you to select the RAID configuration utility to use when you create disk arrays. Place the jumper caps over pins 1–2 if you want to use the LSI Logic Embedded SATA RAID Setup Utility (default); otherwise, place the jumper caps to pins 2–3 to use the Intel® Matrix Storage Manager.

   RAID_SEL1

   LSI MegaRAID
   (Default)

   Intel RAID

   Z8NR-D12-SYS RAID setting
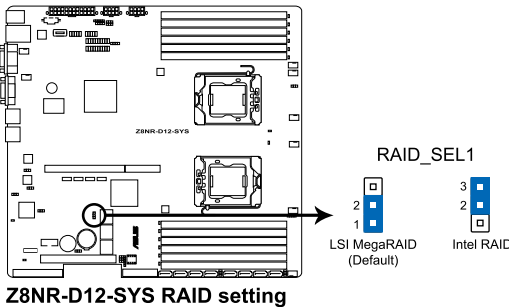
6. **Force BIOS recovery setting (3-pin RECOVERY1)**

This jumper allows you to quickly update or recover the BIOS settings when it becomes corrupted.

To update the BIOS:

1. Prepare a USB flash disk that contains the original or latest BIOS for the motherboard (XXXXXX.ROM) and the AFUDOS.EXE utility.
2. Set the jumper to pins 2–3.
3. Insert the USB flash disk then turn on the system to update the BIOS.
4. Shut down the system.
5. Set the jumper back to pins 1–2.
6. Turn on the system.

Z8NR-D12-SYS BIOS recovery setting
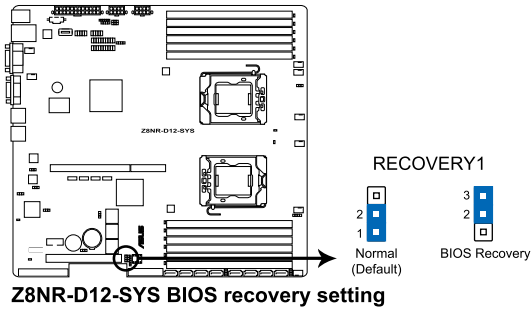
Use the AFUDOS uitility version 2.38 to flash the BIOS.

7. **IPMI setting (3-pin IPMI_SEL1)**

This jumper allows you to use the IPMI feature through the dedicated LAN or share LAN. Place the jumper caps on pins 1–2 if you want to use IPMI through the dedicated LAN (default). Or you can place the jumper caps on pins 2–3 to use IPMI through the shared LAN.

Z8NR-D12-SYS IPMI setting
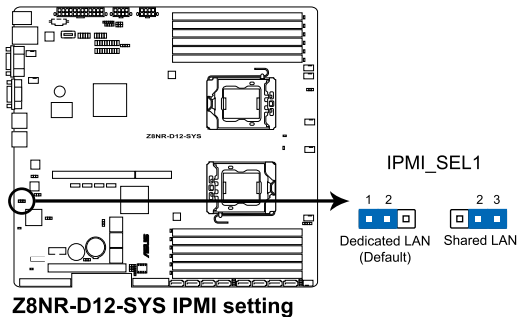
8. Fan control setting (3-pin FAN_SEL1)

This jumper allows you to switch for fan pin selection. Set to pins 1–2 when using 4-pin fans or pins 2–3 when using 3-pin fans.
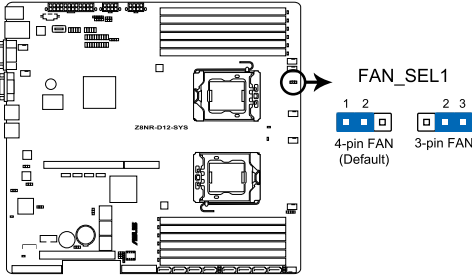
Z8NR-D12-SYS FAN setting

- • If you use a 4-pin fan but set the jumper to pin 2-3, the fan you installed may not work.
- • If you use a 3-pin fan but set the jumper for a 4-pin fan, the fan controll will not work and the fan you installed will always run at full speed.

9. DDR3 voltage setting (4-pin LVDDR3_SEL1/2)

These jumpers allow you to select DDR3 DIMM voltage settings. Place the jumper caps on pins 1–2 if you want to control DDR3 voltage by BIOS settings (default). Place the jumper caps on pins 2–3 to force the DDR3 DIMMs to run at +1.2V. Or you can place the jumper caps on pins 3–4 to force the DDR3 DIMMs to run at +1.35V.
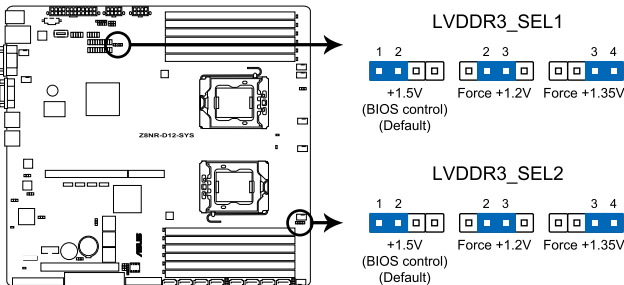
Z8NR-D12-SYS LVDDR3 setting

4.3 Internal connectors

1.   Serial ATA connectors (7-pin SATA1–4 [red], SATA5–6 [black])

These connectors, controlled by southbridge ICH10R, are for the Serial ATA signal cables for Serial ATA hard disk drives.

Z8NR-D12-SYS SATA connectors
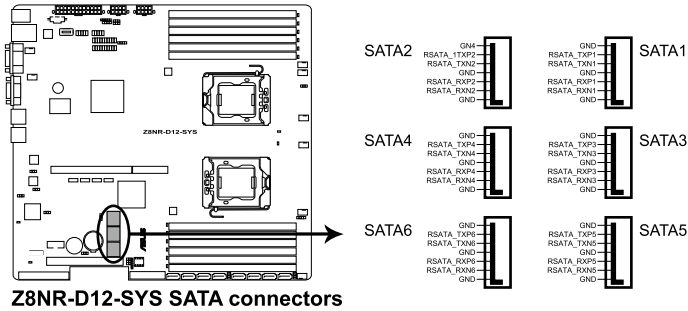
2.   SAS connectors (7-pin SAS1–4 [red]; 7-pin SAS5–8 [blue])

This motherboard comes with eight (8) Serial Attached SCSI (SAS) connectors, the next-generation technology that supports both Serial Attached SCSI (SAS) and Serial ATA (SATA). Each connector supports one device.

Z8NR-D12-SYS SAS connectors
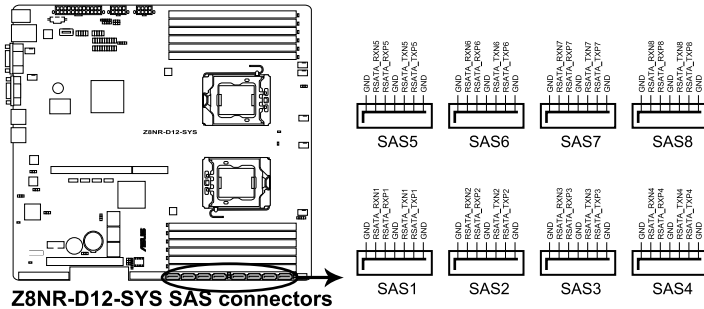
•   These connectors function only when you install a PIKE RAID card.

•   Connect the SAS hard disk drives to SAS connectors 1–4 (red) when installing a 4-port PIKE RAID card.

---

3.   Hard disk activity LED connector (4-pin HDLED1)

This connector is used to connect to a hard disk drive active LED connector on the SCSI or RAID card.

HDLED1

NC
ADD_IN_CARD-
ADD_IN_CARD-
NC
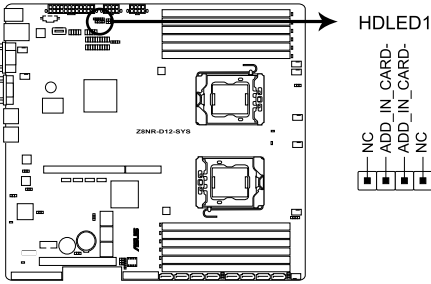
Z8NR-D12-SYS Storage card activity LED connector

4.   Serial General Purpose Input/Output connector (6-1 pin SGPIO1)

This connector is used for the SGPIO peripherals for the LSI embedded SATA RAID or Intel Matrix RAID.

SGPIO1

SGPIO_SCLK
SGPIO_SLOAD
GND

SGPIO_SDATAOUT1
SGPIO_SDATAOUT0

PIN1
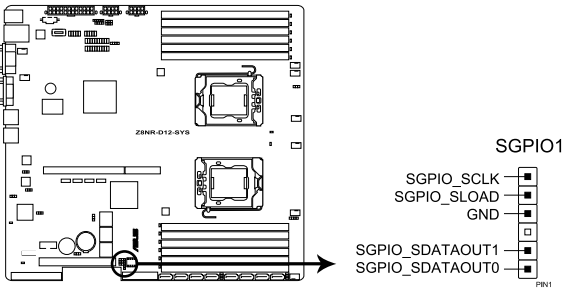
Z8NR-D12-SYS SGPIO connector

5.   Serial General Purpose Input/Output connectors (6-1 pin SGPIO2/3)

These connector is used for the SAS chip SIO interface that controls the LED pattern generation, device information and general purpose data.

Z8NR-D12-SYS SGPIO2/3 connectors

Ⓐ SGPIO2

	SIO_CLK
GND	SIO_END
SIO_DOUT	GND
SIO_DIN	GND

PIN 1

Ⓑ SGPIO3

	SIO_CLK
GND	SIO_END
SIO_DOUT	GND
SIO_DIN	GND

PIN 1
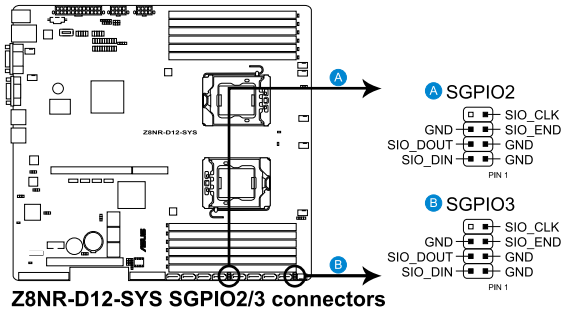
These connectors functions only when you install a PIKE SAS RAID card.

6.   USB connectors (10-1 pin USB34, USB56; 4-pin USB7)

The USB34 and USB56 connectors are for USB 2.0 ports. Connect the USB module cable to the connectors, and then install the module to a slot opening at the back of the system chassis. The USB7 connector is for a A-type internal USB 2.0 device. The USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.

USB7   USB34   USB56

Z8NR-D12-SYS USB 2.0 connectors
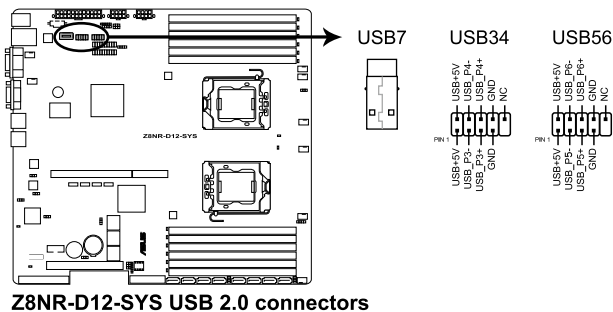
The USB port module is purchased separately.

7. CPU and system fan connectors
(4-pin CPU_FAN1/2, REAR_FAN1/2, FRNT_FAN1/2/3/4)

The fan connectors support cooling fans of 350 mA–740 mA (8.88 W max.) or a total of 3.15 A–6.66 A (53.28 W max.) at +12V. Connect the fan cables to the fan connectors on the motherboard, making sure that the black wire of each cable matches the ground pin of the connector.

DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! DO NOT place jumper caps on the fan connectors!

Z8NR-D12-SYS FAN connectors
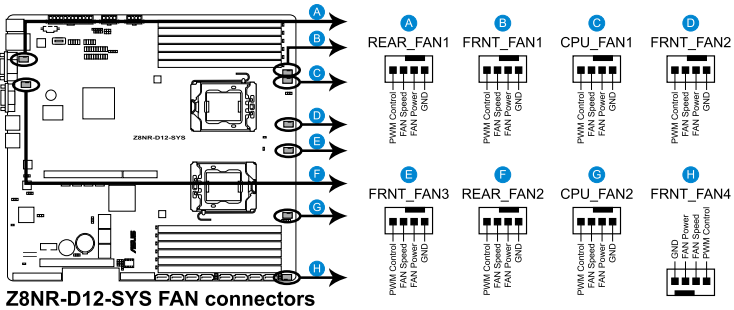
8. Serial port connector (10-1 pin COM2)

This connector is for a serial (COM) port. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.

Z8NR-D12-SYS Serial port connector
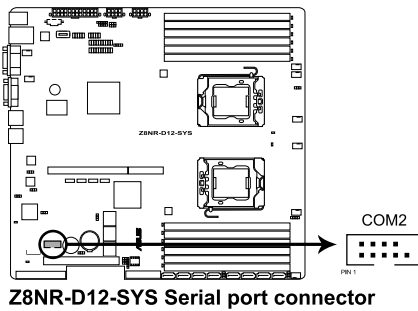
The serial port module is purchased separately.

9. **Power supply SMBus connector (5-pin PSUSMB1)**

This connector is for the power supply SMB cable, if your power supply supports the SMBus function.
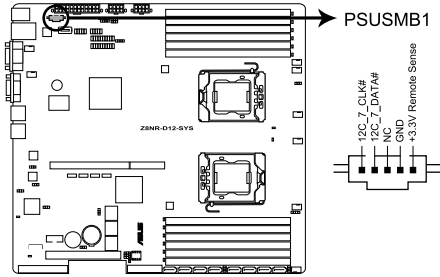
Z8NR-D12-SYS Power supply SMBus connector

10. **Baseboard Management Controller (BMC) connector (14-pin BMC_FW1)**

This is an interface used to plug in an ASMB4-SOL or ASMB4-iKVM management device.
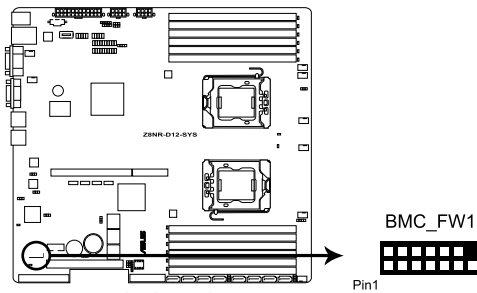
Z8NR-D12-SYS BMC connector

The ASMB4 management device is purchased separately.

11. SSI power connectors (24-pin ATXPWR1, 8-pin ATX12V1/2)

These connectors are for SSI power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

Z8NR-D12-SYS ATX power connectors
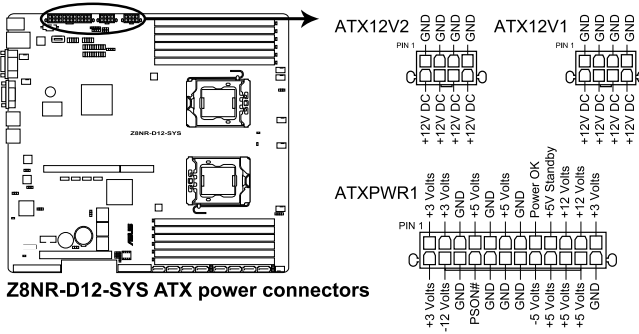
•   For a fully configured system, we recommend that you use an SSI 12 V-compliant power supply unit (PSU) for LGA1366-socket Intel® Xeon processors.

•   DO NOT forget to connect the 24+8+8-pin power plugs; otherwise, the system will not boot up.

•   Use of a PSU with a higher power output is recommended when configuring a system with more power consuming devices. The system may become unstable or may not boot up if the power is inadequate.

•   You must install a PSU with a higher power rating if you intend to install additional devices.

12. System panel connector (20-pin PANEL1 [white])

This connector supports several chassis-mounted functions.
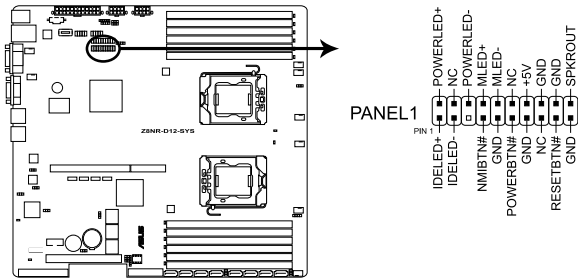
Z8NR-D12-SYS System panel connector

1. **System power LED (3-pin PLED)**
   This 3-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

2. **Message LED (2-pin MLED)**
   This 2-pin connector is for the message LED cable that connects to the front message LED. The message LED is controlled by Hardware monitor to indicate an abnormal event occurance.

3. **System warning speaker (4-pin SPEAKER)**
   This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

4. **Hard disk drive activity LED (2-pin IDE_LED)**
   This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

5. **ATX power button/soft-off button (2-pin PWRSW)**
   This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

6. **Reset button (2-pin RESET)**
   This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

13. Auxiliary panel connector (20-pin AUX_PANEL1 [black])

This connector is for additional front panel features including front panel SMB, locator LED and switch, chassis intrusion, and LAN LEDs.
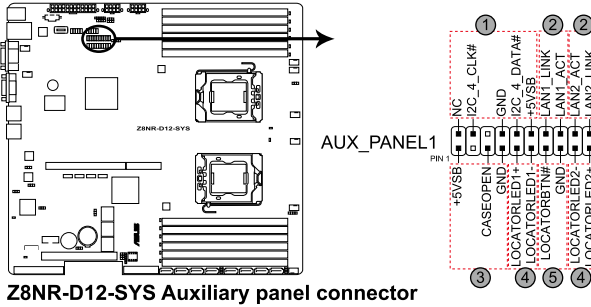
Z8NR-D12-SYS Auxiliary panel connector

1. **Front panel SMB (6-1 pin FPSMB)**
   These leads connect the front panel SMBus cable.

2. **LAN activity LED (2-pin LAN1_LED, LAN2_LED)**
   These leads are for Gigabit LAN activity LEDs on the front panel.

3. **Chassis intrusion (4-1 pin CHASSIS)**
   These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high-level signal to these leads to record a chassis intrusion event. The default setting is short CASEOPEN and GND pin by jumper cap to disable the function.

4. **Locator LED (2-pin LOCATORLED1 and 2-pin LOCATORLED2)**
   These leads are for the locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.

5. **Locator Button/Swich (2-pin LOCATORBTN)**
   These leads are for the locator button on the front panel. This button queries the state of the system locator.

Chapter 5

This chapter tells how to change the system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

BIOS setup

5.1 Managing and updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup:

1. **AFUDOS utility** (Updates the BIOS in DOS mode using a bootable USB flash drive.)

2. **ASUS CrashFree BIOS 3** (To recover the BIOS using a USB flash drive when the BIOS file fails or gets corrupted.)

Refer to the corresponding sections for details on these utilities.

Save a copy of the original motherboard BIOS file to a bootable USB flash drive in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the AFUDOS utility.

5.1.1 AFUDOS utility

The AFUDOS utility allows you to update the BIOS file in DOS environment using a bootable USB flash drive with the updated BIOS file. This utility also allows you to copy the current BIOS file that you can use as backup when the BIOS fails or gets corrupted during the updating process.

Copying the current BIOS

To copy the current BIOS file using the AFUDOS utility:

- Ensure that the USB flash drive is not write-protected and has at least 2048 KB free space to save the file.

- The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be the same as shown.

1. Copy the AFUDOS utility (afudos.exe) from the motherboard support CD to the bootable USB flash drive.

2. Boot the system in DOS mode, and then at the prompt type:

   ```
   afudos /o[filename]
   ```

   where the [filename] is any user-assigned filename not more than eight alphanumeric characters for the main filename and three alphanumeric characters for the extension name.

   ```
   A:\>afudos /oOLDBIOS1.rom
   ```

   Main filename   **Extension name**

3. Press <Enter>. The utility copies the current BIOS file to the USB flash drive.

   ```
   A:\>afudos /oOLDBIOS1.rom
   AMI Firmware Update Utility - Version 1.19(ASUS V2.07(03.11.24BB))
   Copyright (C) 2002 American Megatrends, Inc. All rights reserved.
       Reading flash ..... done
       Write to file...... ok
   A:\>
   ```

   The utility returns to the DOS prompt after copying the current BIOS file.

Updating the BIOS file

To update the BIOS file using the AFUDOS utility:

1. Visit the ASUS website (www.asus.com) and download the latest BIOS file for the motherboard. Save the BIOS file to a bootable USB flash drive.

    Write the BIOS filename on a piece of paper. You need to type the exact BIOS filename at the DOS prompt.

2. Copy the AFUDOS utility (afudos.exe) from the motherboard support CD to the bootable USB flash drive.

3. Boot the system in DOS mode, and then at the prompt type:

    afudos /i[filename]

    where [filename] is the latest or the original BIOS file on the bootable USB flash drive, and then press <Enter>.

    ```
    A:\>afudos /iZ8NRD12.ROM
    ```

    The utility verifies the file, and then starts updating the BIOS file.

    ```
    A:\>afudos /iZ8NRD12.ROM
    AMI Firmware Update Utility - Version 1.19(ASUS V2.07(03.11.24BB))
    Copyright (C) 2002 American Megatrends, Inc. All rights reserved.

        WARNING!! Do not turn off power during flash BIOS
        Reading file ....... done
        Reading flash ...... done

        Advance Check ......
        Erasing flash ...... done
        Writing flash ...... 0x0008CC00 (9%)
    ```

    DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

5. The utility returns to the DOS prompt after the BIOS update process is completed. Reboot the system from the hard disk drive.

    ```
    A:\>afudos /iZ8NRD12.ROM
    AMI Firmware Update Utility - Version 1.19(ASUS V2.07(03.11.24BB))
    Copyright (C) 2002 American Megatrends, Inc. All rights reserved.

        WARNING!! Do not turn off power during flash BIOS
        Reading file ....... done
        Reading flash ...... done

        Advance Check ......
        Erasing flash ...... done
        Writing flash ...... done
        Verifying flash .... done

        Please restart your computer

    A:\>
    ```

5.1.2 ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.

Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

To recover the BIOS using ASUS CrashFree BIOS 3

1. Insert the USB flash disk that contains the BIOS file to the USB port.
2. Turn on the system.
3. The utility will automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and starts flashing the corrupted BIOS file.
4. Restart the system after the utility completes the updating process.

DO NOT shut down or reset the system while recovering the BIOS! Doing so would cause system boot failure!

The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the ASUS website (www.asus.com) to download the latest BIOS file.

5.2   BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in section **5.1 Managing and updating your BIOS**.

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to "Run Setup." This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you can change the configuration of your computer in the future. For example, you can enable the security password feature or change the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the firmware chip.

The firmware chip on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, restart the system by pressing <Ctrl+Alt+Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.

- •   The default BIOS settings for this motherboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the Exit Menu. See section **5.7 Exit Menu**.

- •   The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.

- •   Visit the ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

5.2.1   BIOS menu screen

Menu items   **Menu bar**   **Configuration fields**   **General help**

```
                              BIOS SETUP UTILITY
  Main      Advanced    Server    Boot    Exit

  System Time              [13:44:30]                    Use [ENTER], [TAB]
  System Date              [Tue, 11/04/2008]             or [SHIFT-TAB] to
  Legacy Diskette A        [1.44M, 3.5 in.]              select a field.

 ▶ SATA 1              :   [ST3160812AS]                 Use [+] or [-] to
 ▶ SATA 2              :   [Not Detected]                configure system Date.
 ▶ SATA 3              :   [Not Detected]
 ▶ SATA 4              :   [Not Detected]
 ▶ SATA 5              :   [Not Detected]
 ▶ SATA 6              :   [TSSTcorp CDDVDW TS]

 ▶ IDE Configuration                                     ←→    Select Screen
 ▶ AHCI Configuration                                    ↑↓    Select Item
 ▶ System Information                                    +-    Change Field
                                                         Tab   Select Field
                                                         F1    General Help
                                                         F10   Save and Exit
                                                         ESC   Exit

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```

          Sub-menu items   **Navigation keys**

5.2.2   Menu bar

The menu bar on top of the screen has the following main items:

Main   For changing the basic system configuration

Advanced   For changing the advanced system settings

Server   For changing the advanced server settings

Boot   For changing the system boot configuration

Exit   For selecting the exit options and loading default settings

To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

5.2.3   Navigation keys

At the bottom right corner of a menu screen are the navigation keys for that particular menu. Use the navigation keys to select items in the menu and change the settings.

> Some of the navigation keys differ from one screen to another.

5.2.4　Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting Main shows the Main menu items.

The other items (Advanced, Power, Boot, and Exit) on the menu bar have their respective menu items.

5.2.5　Sub-menu items

A solid triangle before each item on any menu screen means that the item has a sub-menu. To display the sub-menu, select the item and press <Enter>.

5.2.6　Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is enclosed in brackets, and is highlighted when selected. To change the value of a field, select it then press <Enter> to display a list of options. Refer to **5.2.7 Pop-up window**.

5.2.7　Pop-up window

Select a menu item then press <Enter> to display a pop-up window with the configuration options for that item.

5.2.8　Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/ Down arrow keys or <Page Up> /<Page Down> keys to display the other items on the screen.
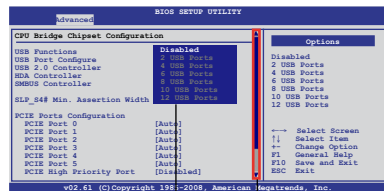
Scroll bar

Pop-up window

5.2.9　General help

At the top right corner of the menu screen is a brief description of the selected item.

5.3   Main menu

When you enter the BIOS Setup program, the Main menu screen appears, giving you an overview of the basic system information.

Refer to section **5.2.1 BIOS menu screen** for information on the menu screen items and how to navigate through them.

```
                              BIOS SETUP UTILITY
   Main    Advanced    Server    Boot    Exit

 System Time             [13:44:30]            Use [ENTER], [TAB]
 System Date             [Tue, 11/04/2008]     or [SHIFT-TAB] to
 Legacy Diskette A       [Disabled]            select a field.

 ▶ SATA 1               :  [ST3160812AS]       Use [+] or [-] to
 ▶ SATA 2               :  [Not Detected]      configure system Date.
 ▶ SATA 3               :  [Not Detected]
 ▶ SATA 4               :  [Not Detected]
 ▶ SATA 5               :  [Not Detected]
 ▶ SATA 6               :  [TSSTcorp CDDVDW TS]
                                                ←→    Select Screen
 ▶ IDE Configuration                            ↑↓    Select Item
 ▶ AHCI Configuration                           Enter Go to Sub Screen
 ▶ System Information                           F1    General Help
                                                F10   Save and Exit
                                                ESC   Exit

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```

5.3.1   System Time [xx:xx:xx]

Allows you to set the system time.

5.3.2   System Date [Day xx/xx/xxxx]

Allows you to set the system date.

5.3.3   Legacy Diskette A [Disabled]

Sets the type of floppy drive installed.
Configuration options: [Disabled] [360 KB, 5.25 in.] [1.2 MB, 5.25 in.]
[720 KB, 3.5 in.] [1.44 MB, 3.5 in] [2.88 MB, 3.5 in]

5.3.4   SATA1–6

The BIOS automatically detects the connected IDE devices. There is a separate sub-menu for each IDE device. Select a device item, then press <Enter> to display the IDE device information.

> ✎ The PATA device is for ODD (optical disk drive) only.

```
                          BIOS SETUP UTILITY
   Main

   SATA 1                                         Select the type
                                                  of device connected
   Device    :Hard Disk                           to the system.
   Vendor    :ST3160812AS
   Size      :160.0GB
   LBA Mode  :Supported
   Block Mode:16Sectors
   PIO Mode  :4
   Async DMA :MultiWord DMA-2
   Ultra DMA :Ultra DMA-6
   S.M.A.R.T.:Supported
                                                  ←→    Select Screen
   LBA/Large Mode            [Auto]               ↑↓    Select Item
   Block(Multi-Sector Transfer)M [Auto]           +-    Change Option
   PIO Mode                  [Auto]               F1    General Help
   DMA Mode                  [Auto]               F10   Save and Exit
   SMART Monitoring          [Auto]               ESC   Exit
   32Bit Data Transfer       [Enabled]

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```

The BIOS automatically detects the values opposite the dimmed items (Device, Vendor, Size, LBA Mode, Block Mode, PIO Mode, Async DMA, Ultra DMA, and S.M.A.R.T. monitoring). These values are not user-configurable. These items show N/A if no IDE device is installed in the system.

Type [Auto]

Selects the type of IDE drive. Setting to [Auto] allows automatic selection of the appropriate IDE device type. Select [CDROM] if you are specifically configuring a CD-ROM drive. Select [ARMD] (ATAPI Removable Media Device) if your device is either a ZIP, LS-120, or MO drive.
Configuration options: [Not Installed] [Auto] [CD/DVD] [ARMD]

LBA/Large Mode [Auto]

Enables or disables the LBA mode. Setting to [Auto] enables the LBA mode if the device supports this mode, and if the device was not previously formatted with LBA mode disabled. Configuration options: [Disabled] [Auto]

Block (Multi-Sector Transfer) M [Auto]

Enables or disables data multi-sectors transfers. When set to [Auto], the data transfer from and to the device occurs multiple sectors at a time if the device supports multi-sector transfer feature. When set to [Disabled], the data transfer from and to the device occurs one sector at a time.
Configuration options: [Disabled] [Auto]

PIO Mode [Auto]

Allows you to select the data transfer mode.
Configuration options: [Auto] [0] [1] [2] [3] [4]

DMA Mode [Auto]

Sets the DMA mode.
Configuration options: [Auto] [SWDMA0] [SWDMA1] [SWDMA2] [MWDMA0]
[MWDMA1] [MWDMA2] [UDMA0] [UDMA1] [UDMA2] [UDMA3] [UDMA4] [UDMA5]

S.M.A.R.T. [Auto]

Sets the Smart Monitoring, Analysis, and Reporting Technology.
Configuration options: [Auto] [Disabled] [Enabled]

32Bit Data Transfer [Enabled]

Enables or disables 32-bit data transfer.
Configuration options: [Disabled] [Enabled]

5.3.5   IDE Configuration

The items in this menu allow you to set or change the configurations for the IDE devices installed in the system. Select an item then press <Enter> if you wish to configure the item.

```
                            BIOS SETUP UTILITY
    Main

  IDE Configuration                                    Options

  SATA Configuration        [Compatible]
    Configure SATA as       [IDE]             Disabled
                                              Compatible
  Hard Disk Write Protect   [Disabled]        Enhanced
  IDE Detect Time Out (Sec) [35]
```
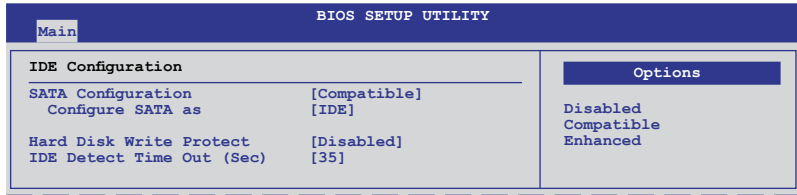
SATA Configuration [Compatible]

Configuration options: [Disabled] [Compatible] [Enhanced]

Configure SATA as [IDE]
Sets the configuration for the Serial ATA connectors supported by the Southbridge chip. Configuration options: [IDE] [RAID] [AHCI]

- If you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices, keep the default setting [IDE].

- If you want the Serial ATA hard disk drives to use the Advanced Host Controller Interface (AHCI), set this item to [AHCI]. The AHCI allows the onboard storage driver to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.

- If you want to create a RAID 0, RAID 1, RAID 5, RAID 10, or the Intel® Matrix Storage Technology configuration from the Serial ATA hard disk drives, set this item to [RAID].

Hard Disk Write Protect [Disabled]

Disables or enables device write protection. This will be effective only if the device is accessed through BIOS. Configuration option: [Disabled] [Enabled]

IDE Detect Time Out (Sec) [35]

Selects the time out value for detecting ATA/ATAPI devices.
Configuration options: [0] [5] [10] [15] [20] [25] [30] [35]

5.3.6   AHCI Configuration

This menu is the section for AHCI configuration.

```
                         BIOS SETUP UTILITY
  Main

  AHCI Settings                                Some SATA CD/DVD in
                                               AHCI mode need to
  AHCI CD/DVD Boot Time out    [35]            wait ready longer.

▶ SATA Port1 [Not Detected]
▶ SATA Port2 [Not Detected]
▶ SATA Port3 [Not Detected]
▶ SATA Port4 [Not Detected]
▶ SATA Port5 [Not Detected]
▶ SATA Port6 [Not Detected]
```
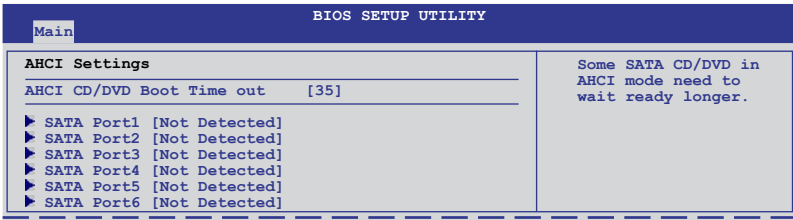
AHCI CD/DVD Boot Time out [35]

Selects the boot time out value for SATA CD/DVD devices in AHCI mode.
Congifuration options: [0] [5] [10] [15] [20] [25] [30] [35]

SATA Port1–6 [XXXX]

Displays the status of auto-detection of SATA devices.

```
                         BIOS SETUP UTILITY
  Main

  SATA Port1                                   Select the type
                                               of device connected
  Device     :Not Detected                     to the system.

  SATA Port0                 [Auto]
  SMART Monitoring           [Enabled]
```
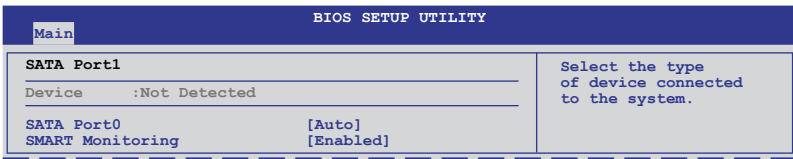
SATA Port0 [Auto]
Allows you to select the type of device connected to the system.
Configuration options: [Auto] [Not Installed]

SMART Monitoring [Enabled]
Allows you to set the Self-Monitoring, Analysis and Reporting Technology.
Configuration options: [Disabled] [Enabled]

5.3.7   System Information

This menu gives you an overview of the general system specifications. The BIOS automatically detects the items in this menu.

```
                        BIOS SETUP UTILITY
   Main

 AMIBIOS
 Version   : 0208
 Build Date: 12/09/08

 Processor
 Speed     : 2666MHz
 Count     : 1

 System Memory
 Usable Size   : 1023MB

 ▶ System Memory Information
```
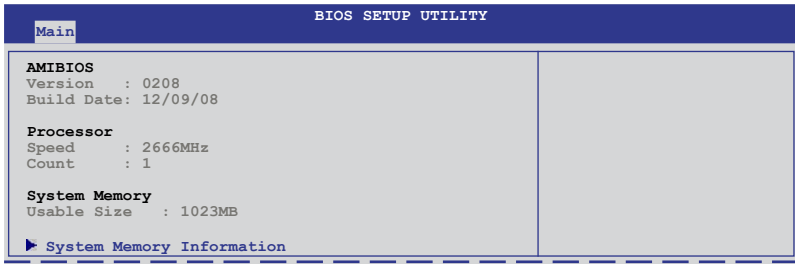
AMIBIOS

Displays the auto-detected BIOS information.

Processor

Displays the auto-detected CPU specification.

System Memory

Displays the auto-detected system memory.

System Memory Information

Displays system memory information.

```
                        BIOS SETUP UTILITY
   Main

 AMIBIOS

 ▶ CPU1 Memory Configuration
 ▶ CPU2 Memory Configuration
```
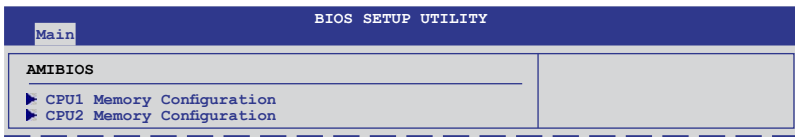
CPU1/2 Memory Configuration
Allows you to check information of installed memory (6 DIMMs per CPU).

5.4 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

⚠ Take caution when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.

```
                         BIOS SETUP UTILITY
   Main    Advanced    Server    Boot    Exit
 ┌──────────────────────────────────────────┬─────────────────────────────┐
 │ ▶  CPU Configuration                      │ Configure CPU.              │
 │ ▶  Chipset Configuration                  │                             │
 │ ▶  Legacy Device Configuration            │                             │
 │ ▶  USB Configuration                      │                             │
 │ ▶  PCIPnP Configuration                   │                             │
 │ ▶  Power On Configuration                 │                             │
 │ ▶  Event Log Configuration                │                             │
 │ ▶  Hardware Monitor                       │                             │
 │ ▶  ACPI Configuration                     │ ←→    Select Screen         │
 │ ▶  PCI Express Configuration              │ ↑↓    Select Item           │
 │                                           │ Enter Go to Sub Screen      │
 │                                           │ F1    General Help          │
 │                                           │ F10   Save and Exit         │
 │                                           │ ESC   Exit                  │
 └──────────────────────────────────────────┴─────────────────────────────┘
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```

5.4.1 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects. Some items may not appear if your CPU does not support the related functions.

```
                         BIOS SETUP UTILITY
        Advanced
 ┌──────────────────────────────────────────┬─────────────────────────────┐
 │ Configure advanced CPU settings          │ Sets the ratio between      │
 │ Module Version:3F.11                      │ CPU Core Clock and the      │
 │                                           │ FSB Frequency.              │
 │ Manufacturer:Intel                        │ Note:If an invalid          │
 │ Brand String:Genuine Intel(R) CPU @ 0000 @ 2.67GHz │ ratio is set in CMOS │
 │ Frequency   :2.66GHz                      │ then actual and             │
 │ BCLK Speed  :133MHz                       │ setpoint values may         │
 │ Cache L1    :128 KB                        │ differ.                     │
 │ Cache L2    :1024 KB                       │                             │
 │ Cache L3    :8192 KB                       │                             │
 │ Ratio Status:Unlocked (Min:12, Max:20)    │                             │
 │ Ratio Actual Value  :20                   │                             │
 │ CPUID       :106A2                         │                             │
 │                                           │ ←→    Select Screen         │
 │   Ratio CMOS Setting:          [Auto]     │ ↑↓    Select Item           │
 │ C1E Support                    [Enabled]  │ F1    General Help          │
 │ Hardware Prefetcher            [Enabled]  │ F10   Save and Exit         │
 │ Adjacent Cache Line Prefetch   [Enabled]  │ ESC   Exit                  │
 │ Intel(R) Virtualization Tech   [Enabled]  │                             │
 │ CPU TM Function                [Enabled]  │                             │
 └──────────────────────────────────────────┴─────────────────────────────┘
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```

Scroll down for more items.

```
 ┌──────────────────────────────────────────┬─────────────────────────────┐
 │ Execute-Disable Bit Capability [Enabled]  │                             │
 │ Intel(R) HT Technology         [Disabled] │                             │
 │ Active Processor Cores         [All]      │                             │
 │ A20M                           [Disabled] │                             │
 │ DCU Mode                       [32KB 8-way without] │                   │
 │ DCA Prefetch Delay             [32]       │                             │
 │ Intel(R) SpeedStep(TM) Tech    [Enabled]  │                             │
 │ Intel(R) TurboMode tech        [Enabled]  │                             │
 │ Intel(R) C-STATE Tech          [Enabled]  │                             │
 │ C3 State                       [ACPI C2]  │                             │
 │ C6 State                       [Enabled]  │                             │
 │ C7 State                       [Enabled]  │                             │
 │ C State package limit setting  [Auto]     │                             │
 │ C1 Auto Demotion               [Enabled]  │                             │
 │ C3 Auto Demotion               [Enabled]  │                             │
 └──────────────────────────────────────────┴─────────────────────────────┘
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```

Ratio CMOS Setting [Auto]
Allows you to adjust the ratio between CPU Core Clock and BCLK Frequency.
Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [12.0] [13.0] [14.0] [15.0] [16.0] [17.0] [18.0] [19.0]
[20.0]

C1E Support [Enabled]

Allows you to enable or disable Enhanced Halt State support.
Configuration options: [Disabled] [Enabled]

Hardware Prefetcher [Enabled]

Allows you to enable or disable the Hardware Prefetcher function.
Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetch [Enabled]

Allows you to enable or disable the Adjacent Cache Line Prefetch function.
Configuration options: [Disabled] [Enabled]

Intel(R) Virtualization Tech [Enabled]

The Intel® Virtualization Technology allows a hardware platform to run multiple
operating systems separately and simultaneously, enabling one system to virtually
function as several systems. Configuration options: [Disabled] [Enabled]

CPU TM Function [Enabled]

This function enables the overheated CPU to throttle the clock speed to cool down.
Configuration options: [Disabled] [Enabled]

Execute-Disable Bit Capability [Enabled]

Allows you to enable or disable the No-Execution Page Protection Technology.
Setting this item to [Disabled] forces the XD feature flag to always return to zero (0).
Configuration options: [Disabled] [Enabled]

Intel(R) HT Technology [Enabled]

Allows you to enable or disable the Intel Hyper-Threading Technology function.
When disabled, only one thread per activated core is enabled.
Configuration options: [Enabled] [Disabled]

Active Processor Cores [All]

Allows you to choose the number of CPU cores to activate in each processor
package. Configuration options: [All] [1] [2]

A20M [Disabled]

Legacy OSes and APs may need A20M enabled.
Configuration options: [Disabled] [Enabled]

DCU Mode [32KB 8-way without ECC]

Select the mode for the Data Cache.
Configuration options: [32KB 8-way without ECC] [16KB 4-way with ECC]

DCA Prefetch Delay [32]

This programs the time delay in bus clocks from snoop to prefetch.
Configuration options: [8] [16] [32] [40] [48] [56] [64] [72] [80] [88] [96] [104] [112] [120]

Intel(R) SpeedStep (TM) Tech [Enabled]

When set to [Disabled], the CPU runs at its default speed. When set to [Enabled], the CPU speed is controlled by the operating system.
Configuration options: [Disabled] [Enabled]

Intel(R) C-STATE Tech [Enabled]

The Intel® C-State Technology allows the CPU to save more power under idle mode. Enable this item only when you install a C-State Technology-supported CPU. Configuration options: [Disabled] [Enabled]

C3 State [ACPI C2]

Allows you to select the CPU action under C3 state.
Configuration options: [Disabled] [ACPI C2] [ACPI C3]

C6/7 State [Enabled]

Allows you to select the CPU action under C6 and C7 state.
Configuration options: [Disabled] [Enabled]

C State package limit setting [Auto]

This item appears only when you set the Intel(R) C-STATE Tech item to [Enabled]. We recommend that you set this item to [Auto] for BIOS to automatically detect the C-State mode supported by your CPU.
Configuration options: [Auto] [C1] [C3] [C6] [C7]

C1 Auto Demotion [Enabled]

When enabled, CPU will conditionally demote C3/C6/C7 requests to C1 based on on-core auto-demote information. Configuration options: [Disabled] [Enabled]

C3 Auto Demotion [Enabled]

When enabled, CPU will conditionally demote C6/C7 requests to C3 based on on-core auto-demote information.
Configuration options: [Disabled] [Enabled]

5.4.2 Chipset Configuration

The Chipset configuration menu allows you to change advanced chipset settings. Select an item then press <Enter> to display the sub-menu.

```
                         BIOS SETUP UTILITY
      Advanced

 Advanced Chipset Settings                          Configure North Bridge
                                                    features.
 WARNING: Setting wrong values in below sections
          may cause system to malfunction.

 ▶  CPU Bridge Configuration
 ▶  North Bridge Configuration
 ▶  South Bridge Configuration
 ▶  Intel VT-d Configuration
                                                    ←→   Select Screen
                                                    ↑↓   Select Item
                                                    Enter Go to Sub Screen
                                                    F1   General Help
                                                    F10  Save and Exit
                                                    ESC  Exit

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```

CPU Bridge Chipset Configuration

```
                         BIOS SETUP UTILITY
      Advanced

 CPU Bridge Chipset Configuration                ▲

 CPU REVISION             :B0                       To transition the CSI
 Current CSI Frequency    :6.400GT                  links to full-speed
 Current Memory Frequency :1066 Mhz                 or leave them in
                                                    slow-mode.
 CSI Links Speed          [Full-Speed]
 CSI Frequency            [Auto]
 CSI Isochronous          [Disabled]
 CSI L0s                  [Disabled]
 CIS L1                   [Disabled]

 Memory Frequency         [Auto]
 Memory Mode              [Independent]
 Memory ECC Function      [Enabled]                 ←→   Select Screen
 Double Rate Refresh      [Auto]                     ↑↓   Select Item
 Demand Scrubbing         [Disabled]                 +-   Change Option
 Patrol Scrubbing         [Disabled]                 F1   General Help
 NUMA Aware               [Auto]                      F10  Save and Exit
 Page Policy              [Closed]        ▼          ESC  Exit

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```

Scroll down for more items.

```
 Adaptive Page            [Disabled]
 Data Scramble            [Enabled]
 Split Below 4GB          [Disabled]
 Channel Interleaving     [6:1]
 Rank Interleaving        [4:1]         ▼

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```

CSI Links Speed [Full-Speed]

Allows you to set the speed of CSI Links.
Configuration options: [Slow-Mode] [Full-Speed]

CSI Frequency [Auto]

Allows you to set the CSI frequency.
Configuration options: [Auto] [4.800GT] [5.866GT] [6.400GT]

CSI Isochronous [Disabled]

Configuration options: [Disabled] [Enabled]

CSI L0s [Disabled]

Configuration options: [Disabled] [Enabled]

CSI L1 [Disabled]

Configuration options: [Disabled] [Enabled]

Memory Frequency [Auto]

You may allow the system to detect DDR3 memory frequency via SPD or designate a specific frequency.
Configuration options: [Auto] [Force DDR-800] [Force DDR-1066]
[Force DDR-1333]

Memory Mode [Independent]

Allows you to set Memory channel mode.
Configuration options: [Independent] [Channel Mirroring] [Lockstep] [Sparing]

Memory ECC Function [Enabled]

Allows you to enable or disable the memory ECC function.
Configuration options: [Disabled] [Enabled]

Double Rate Refresh [Auto]

Configuration options: [Disabled] [Auto]

Demand Scrubbing [Disabled]

Configuration options: [Disabled] [Enabled]

Patrol Scrubbing [Disabled]

Configuration options: [Disabled] [Enabled]

NUMA AWare [Auto]

Configuration options: [Disabled] [Auto]

Page Policy [Closed]

Configuration options: [Closed] [Open]

Adaptive Page [Disabled]

Configuration options: [Disabled] [Enabled]

Data Scramble [Enabled]

Configuration options: [Disabled] [Enabled]

Split Below 4GB [Disabled]

Configuration options: [Disabled] [Auto]

Channel Interleaving [6:1]

Configuration options: [1:1] [2:1] [4:1] [6:1]

Rank Interleaving [4:1]

Configuration options: [1:1] [2:1] [4:1]

North Bridge Chipset Configuration

```
                          BIOS SETUP UTILITY
           Advanced

  NorthBridge Chipset Configuration        Crystal Beach / DMA
                                           configuration
  NB Revision              :B2
  Current CSI Frequency    :6.400GT

  Crystal Beach / DMA         [Disabled]
```

Crystal Beach / DMA [Disabled]

Allows you to enable or disable the Crystal Beach / DMA function.
Configuration options: [Disabled] [Enabled]

South Bridge Chipset Configuration

```
                          BIOS SETUP UTILITY
           Advanced

  CPU Bridge Chipset Configuration                   Options

  USB Functions            [7 USB Ports]
  USB Port Configure       [6+6 USB Ports]   Disabled
  USB 2.0 Controller       [Enabled]         2 USB Ports
  HDA Controller           [Enabled]         4 USB Ports
                                             6 USB Ports
  SLP_S4# Min. Assertion Width  [1 to 2 seconds]  7 USB Ports
```

USB Functions [7 USB Ports]

Allows you to configure the amount of USB ports to be enabled.
Configuration options: [Disabled] [2 USB Ports] [4 USB Ports] [6 USB Ports]
[7 USB Ports]

USB Port Configure [6+6 USB Ports]

Configuration options: [6+6 USB Ports] [8+4 USB Ports]

USB 2.0 Controller [Enabled]

Allows you to enable or disable the USB 2.0 controller. This item cannot be
configurable if you set the **USB Functions** item to [7 USB Ports].
Configuration options: [Enabled] [Disabled]

HDA Controller [Enabled]

Allows you to enable or disable the High Definition Audio controller.
Configuration options: [Enabled] [Disabled]

SLP_S4# Min. Assertion Width [1 to 2 seconds]

Configuration options: [4 to 5 seconds] [3 to 4 seconds] [2 to 3 seconds]
[1 to 2 seconds]

Intel VT-d Configuration

```
                        BIOS SETUP UTILITY
          Advanced

                                              Options
    Intel VT-d              [Disabled]
                                           Disabled
                                           Enabled
```
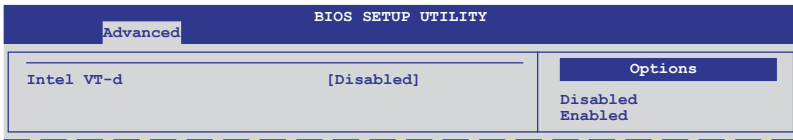
Intel VT-d [Disabled]
Allows you to enable or disable the Intel Virtualization Technology for
Directed I/O.
Configuration options: [Disabled] [Enabled]

5.4.3 Legacy Device Configuration

```
                            BIOS SETUP UTILITY
              Advanced

    Legacy Device Configuration                      Allows BIOS to Enable
                                                     or Disable Floppy
    Onboard Floppy Controller      [Enabled]         Controller.
    Serial Port1 Address           [3F8/IRQ4]
    Serial Port2 Address           [2F8/IRQ3]
```

Onboard Floppy Controller [Enabled]

Allows you to enable or disable the onboard floppy controller.
Configuration options: [Disabled] [Enabled]

Serial Port1 Address [3F8/IRQ4]

Allows you to select the Serial Port1 base address.
Configuration options: [Disabled] [3F8/IRQ4] [3E8/IRQ4] [2E8/IRQ3]

Serial Port2 Address [2F8/IRQ3]

Allows you to select the Serial Port2 base address.
Configuration options: [Disabled] [2F8/IRQ3] [3E8/IRQ4] [2E8/IRQ3]

5.4.4 USB Configuration

```
                            BIOS SETUP UTILITY
              Advanced

    USB Configuration                                Enables support for
                                                     legacy USB. AUTO
    Module Version - 2.24.3-13.4                     option disables
                                                     legacy support if
    USB Devices Enabled :                            no USB devices are
              None                                   connected.

    Legacy USB Support             [Enabled]
    USB 2.0 Controller Mode        [HiSpeed]
    BIOS EHCI Hand-Off             [Enabled]
```

> The following item appears only when you set USB Function to [Enabled].

Legacy USB Support [Enabled]

Allows you to enable or disable support for legacy USB devices. Setting to [Auto] allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled. Configuration options: [Disabled] [Enabled] [Auto]

> The following item appears only when you set USB Function to [Enabled].

USB 2.0 Controller Mode [HiSpeed]

Allows you to set the USB 2.0 controller to HiSpeed (480Mbps) or FullSpeed (12Mbps). Configuration options: [FullSpeed] [HiSpeed]

BIOS EHCI Hand-Off [Enabled]

Enables or disables the BIOS EHCI hand-off support.
Configuration options: [Disabled] [Enabled]

5.4.5 PCIPnP

The PCIPnP menu items allow you to change the advanced settings for PCI/PnP devices.

Take caution when changing the settings of the PCI/PnP Configuration menu items. Incorrect field values can cause the system to malfunction.

```
                        BIOS SETUP UTILITY
       Advanced

  Advanced PCI/PnP Settings                          NO: lets the BIOS
                                                     configure all the
  WARNING: Setting wrong values in below sections    devices in the system.
           may cause system to malfunction.          YES: lets the
                                                     operating system
  Plug And Play O/S              [No]                 configure Plug and
                                                     Play (PnP) devices not
  PCI Option ROM Scan Order     [Bus 0 First]        required for boot if
  Onboard Option ROM Priority   [High]               your system has a Plug
                                                     and Play operating
  Onboard LAN1 Boot             [PXE]                system.
  Onboard LAN2 Boot             [PXE]
```

Plug And Play O/S [No]

When set to [No], BIOS configures all the devices in the system. When set to [Yes] and if you install a Plug and Play operating system, the operating system configures the Plug and Play devices not required for boot.
Configuration options: [No] [Yes]

PCI Option ROM Scan Order [Bus 0 First]

Allows you to configure the scanning order of PCI option ROM.
Configuration: [Bus 0 First] [Bus N First]

Onboard Option ROM Priority [High]

Allows you to configure the priority of onboard option ROM.
Configuration: [Normal] [High]

Onboard LAN1/2 Boot [PXE]

Allows you to configure the onboard LAN1/2 boot mode.
Configuration: [Disabled] [PXE] [iSCSI]

5.4.6 Power On Configuration

```
                          BIOS SETUP UTILITY
         Advanced

APM Configuration                                              Options

Restore on AC Power Loss     [Last State]            Power Off
                                                     Power On
Resume On Ring               [Disabled]              Last State
Resume On PME#(Wake On LAN)  [Disabled]
Resume On RTC Alarm          [Disabled]



                                                 ←→   Select Screen
                                                 ↑↓   Select Item
                                                 +-   Change Option
                                                 F1   General Help
                                                 F10  Save and Exit
                                                 ESC  Exit

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```
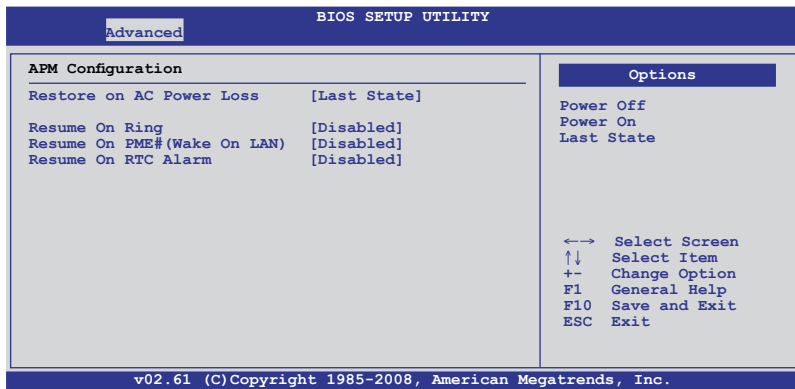
Restore on AC Power Loss [Last State]

When set to [Power Off], the system goes into off state after an AC power loss. When set to [Power On], the system will reboot after an AC power loss. When set to [Last State], the system goes into either off or on state, whatever the system state was before the AC power loss.
Configuration options: [Power Off] [Power On] [Last State]

Resume On Ring [Disabled]

When set to [Enabled], the system will generate a wake event when the external modem receives a call while the computer is in Soft-off mode.
Configuration options: [Disabled] [Enabled]

Resume On PME#(Wake On LAN) [Disabled]

When set to [Enabled], the system enables the LAN devices to generate a wake event while the computer is in Soft-off mode.
Configuration options: [Disabled] [Enabled]

Resume On RTC Alarm [Disabled]

Allows you to enable or disable RTC to generate a wake-up event.
Configuration options: [Disabled] [Enabled]

> The following items appear only when the **Resume On RTC Alarm** item is set to [Enabled].

RTC Alarm Date [15]
To set the alarm date, highlight this item and press the <+> or <-> key to make the selection.

System Time [12:30:30]
Use the <ENTER>, <TAB> or <SHIFT-TAB> key to select a field. Use the <+> or <-> key to configure alarm time.

5.4.7   Event Log Configuration

```
                              BIOS SETUP UTILITY
        Advanced

  Event Logging details                              View all unread events
                                                      on the Event log.
  View Event Log
  Mark all events as read
  Clear Event Log




                                                      ←→    Select Screen
                                                      ↑↓    Select Item
                                                      Enter Go to Sub Screen
                                                      F1    General Help
                                                      F10   Save and Exit
                                                      ESC   Exit

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```
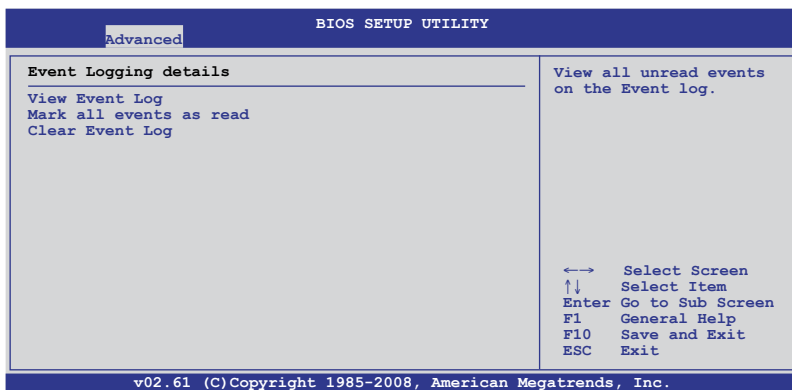
View Event Log

Press the <ENTER> key to view unread system event log.

Make all events as read

Press the <ENTER> key to mark all events as read. Select [Ok] to confirm the change.

Clear Event Log

Press the <ENTER> key to clear all system events. Select [Ok] to confirm the change.

5.4.8 Hardware Monitor

```
                          BIOS SETUP UTILITY
          Advanced

  Hardware Monitor                                        CPU1 Temperature

  CPU1 Temperature          [41.5°C/106.5°F]
  CPU2 Temperature          [0  °C/ 32  °F]
  Front Fan1 Speed          [  N/A   ]
  Front Fan2 Speed          [  N/A   ]
  Front Fan3 Speed          [  N/A   ]
  Front Fan4 Speed          [  N/A   ]
  Front Fan5 Speed          [  N/A   ]
  Front Fan6 Speed          [  N/A   ]
  Rear Fan1 Speed           [  N/A   ]
  Rear Fan2 Speed           [  N/A   ]
  Smart Fan Control         [Generic Mode]
  VCORE1 Voltage            [ 1.052 V]
  VCORE2 Voltage            [  N/A  ]               ←→   Select Screen
  +1.5V_P1DDR3 Voltage      [ 1.508 V]              ↑↓   Select Item
  +1.5V_P2DDR3 Voltage      [  N/A  ]               +-   Change Option
  +1.5V_ICH Voltage         [ 1.520 V]              F1   General Help
  P1VTT Voltage             [ 1.022 V]              F10  Save and Exit
  P2VTT Voltage             [ 1.022 V]              ESC  Exit

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```

Scroll down for more items.

```
  +1.1V_IOH Voltage         [ 0.204 V]
  +12V Voltage              [12.000 V]
  +5V Voltage               [ 5.196 V]
  +3.3V Voltage             [ 3.246 V]
  +5VSB Voltage             [ 5.132 V]
  +3VSB Voltage             [ 3.198 V]
  VBAT Voltage              [ 3.126 V]

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```

CPU1/2 Temperature [xxxºC/xxxºF]

The onboard hardware monitor automatically detects and displays the CPU temperatures. Select [Ignored] if you do not wish to display the detected temperatures.

Front Fan1–6 Speed [xxxxRPM] or [Ignored] / [N/A]
Rear Fan1–2 Speed [xxxxRPM] or [Ignored] / [N/A]

The onboard hardware monitor automatically detects and displays the speed of system fans in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows [N/A].

Smart Fan Control [Generic Mode]

Allows you to configure the ASUS Smart Fan feature that smartly adjusts the fan speeds for more efficient system operation.
Configuration options: [Full Speed Mode] [Whisper Mode] [Generic Mode] [High Density Mode]

VCORE1/2 Voltage, +1.5V_P1/2DDR3 Voltage, +1.5V_ICH Voltage, P1/2VTT Voltage, +1.1V_IOH Voltage, +12V Voltage, +5V Voltage, +3.3V Voltage, +5VSB Voltage, +3VSB Voltage, VBAT Voltage

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select [Ignored] if you do not want to detect this item.

5.4.9   ACPI Configuration

```
                      BIOS SETUP UTILITY
         Advanced
ACPI Settings                               Advanced ACPI
                                            Configuration
  ▶  Advanced ACPI Configuration            settings.
  ▶  Chipset ACPI Configuration
  ▶  General WHEA Configuration             Use this section to
                                            configure additional
                                            ACPI options.
```

Advanced ACPI Configuration

```
                      BIOS SETUP UTILITY
         Advanced
Advanced ACPI Configuration
                                            Add additional tables
ACPI 2.0 Support         [Enabled]          as per ACPI 2.0
ACPI APIC support        [Enabled]          specifications.
BIOS-->AML ACPI table    [Enabled]
Headless mode            [Disabled]
```
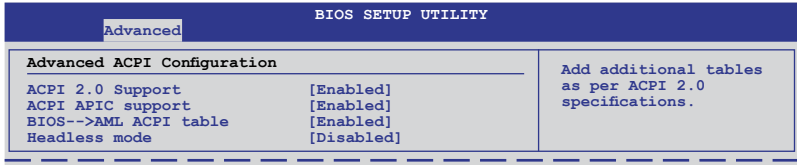
ACPI 2.0 Support [Enabled]

Specifies the Advanced Configuration and Power Interface (ACPI) version supported. Configuration options: [Disabled] [Enabled]

ACPI APIC Support [Enabled]

Allows you to enable or disable the Advanced Configuration and Power Interface (ACPI) support in the Advanced Programmable Interrupt Controller (APIC). When set to Enabled, the ACPI APIC table pointer is included in the RSDT pointer list. Configuration options: [Disabled] [Enabled]

BIOS-->AML ACPI table [Enabled]

Allows you to include the BIOS-->AML exchange table pointer to (X)RSDT pointer list. Configuration options: [Disabled] [Enabled]

Headless mode [Disabled]

Allows you to enable or disable the Headless operation mode through ACPI. Configuration options: [Disabled] [Enabled]

Chipset ACPI Configuration

```
                      BIOS SETUP UTILITY
         Advanced
South Bridge ACPI Configuration
                                                  Options
Energy Lake Feature            [Disabled]
APIC ACPI SCI IRQ              [Disabled]      Enabled
USB Device Wakeup From S3/S4   [Disabled]      Disabled
High Performance Event Timer   [Disabled]
```
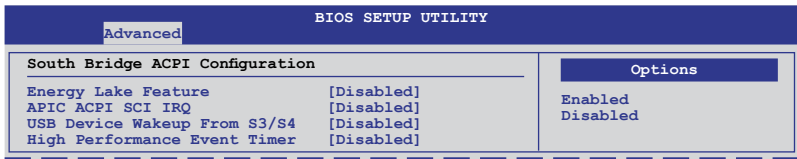
Energy Lake Feature [Disabled]

Allows you to enable or disable the Energy Lake feature.
Configuration options: [Enabled] [Disabled]

APIC ACPI SCI IRQ [Disabled]

Allows you to enable or disable the APIC ACPI SCI IRQ feature.
Configuration options: [Disabled] [Enabled]

USB Device Wakeup From S3/S4 [Disabled]

Allows you to enable or disable the USB device wakeup from S3/S4 feature.
Configuration options: [Disabled] [Enabled]

High Performance Event Timer [Disabled]

Allows you to enable or disable the High Performance Event Timer feature.
Configuration options: [Disabled] [Enabled]

General WHEA Configuration

```
                          BIOS SETUP UTILITY
            Advanced

  General WHEA Configuration                   Enable or disable
                                               Windows Hardware
  WHEA Support              [Enabled]          Error Architecture.
```

WHEA Support [Enabled]

Allows you to enable or disable the Windows Hardware Error Architecture (WHEA)
support. Configuration options: [Disabled] [Enabled]

5.4.10   PCI Express Configuration

```
                          BIOS SETUP UTILITY
            Advanced

  PCI Express Configuration                    Enable/Disable
                                               PCI Express L0s and
  Active State Power-Management  [Disabled]    L1 link power
                                               states.
```

Active State Power-Management [Disabled]

Allows you to enable or disable PCI Express L0s and L1 link power states.
Configuration options: [Disabled] [Enabled]

5.5 Server menu

The Server menu items allow you to customize the server features.

```
                           BIOS SETUP UTILITY
   Main    Advanced    Server    Boot    Exit
 ┌─────────────────────────────────────────────┬───────────────────────────┐
 │ ▶  Remote Access Configuration              │ Configure Remote          │
 │                                             │ Access.                   │
 │                                             │                           │
 │                                             │                           │
 │                                             │                           │
 │                                             │                           │
 │                                             │                           │
 │                                             │ ←→   Select Screen        │
 │                                             │ ↑↓   Select Item          │
 │                                             │ Enter Go to Sub Screen    │
 │                                             │ F1    General Help        │
 │                                             │ F10   Save and Exit       │
 │                                             │ ESC   Exit                │
 └─────────────────────────────────────────────┴───────────────────────────┘
      v02.61 (C)Copyright 1985-2008, American Megatrends, Inc.
```
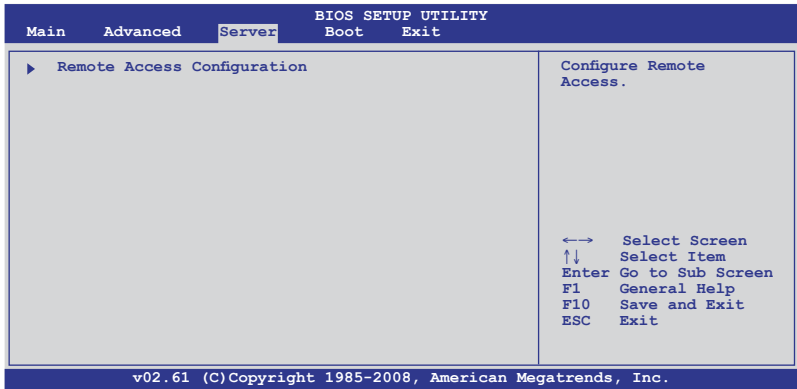
Remote Access Configuration

The items in this menu allows you to configure the Remote Access features. Select an item then press <Enter> to display the configuration options.

```
                           BIOS SETUP UTILITY
                  Server
 ┌─────────────────────────────────────────────┬───────────────────────────┐
 │ Configure Remote Access type and parameters │ Select Remote Access      │
 │                                             │ type.                     │
 │ Remote Access             [Enabled]         │                           │
 │                                             │                           │
 │ Serial port number        [COM2]            │                           │
 │    Base Address, IRQ      [2F8h, 3]         │                           │
 │ Serial Port Mode          [57600 8,n,1]     │                           │
 │ Flow Control              [Hardware]        │                           │
 │ Redirection After BIOS POST [Disabled]      │                           │
 │ Terminal Type             [VT-UTF8]         │                           │
 └─────────────────────────────────────────────┴───────────────────────────┘
```
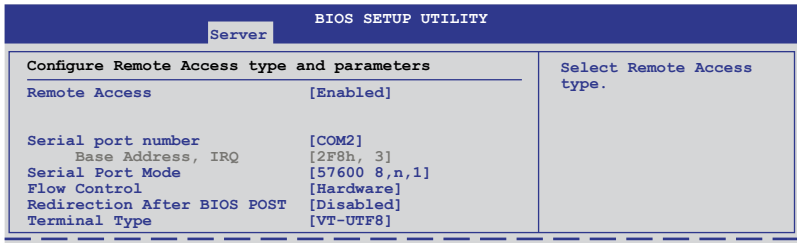
Remote Access [Enabled]
Enables or disables the remote access feature.
Configuration options: [Disabled] [Enabled]

> The following items appear only when **Remote Access** is set to [Enabled].

Serial port number [COM2]
Selects the serial port for console redirection.
Configuration options: [COM1] [COM2]

Base Address. IRQ [2F8h, 3]
This item is not user-configurable and changes with the configuration of Serial port number.

Serial port Mode [57600 8,n,1]
Sets the Serial port mode.
Configuration options: [115200 8,n,1] [57600 8,n,1] [38400 8,n,1] [19200 8,n,1]
[09600 8,n,1]

Flow Control [Hardware]
Allows you to select the flow control for console redirection.
Configuration options: [None] [Hardware] [Software]

Redirection After BIOS POST [Disabled]
Sets the redirection mode after the BIOS Power-On Self-Test (POST). Some
operating system may not work when set to [Always].
Configuration options: [Disabled] [Boot Loader] [Always]

Terminal Type [VT-UTF8]
Allows you to select the target terminal type.
Configuration options: [ANSI] [VT100] [VT-UTF8]

VT-UTF8 Combo Key Support [Enabled]
This item appears only when you set the **Terminal Type** item to [ANSI] or
[VT100] and allows you to enable or disable the VT-UTF8 combo key support
for ANSI or VT100 terminals. Configuration options: [Disabled] [Enabled]

5.6   Boot menu

The Boot menu items allow you to change the system boot options. Select an item then press <Enter> to display the sub-menu.

```
                              BIOS SETUP UTILITY
    Main    Advanced    Server    Boot    Exit

    Boot Settings                                      Specifies the Boot
    ──────────────────────────────────────────        Device Priority
    ▶  Boot Device Priority                            sequence.
    ▶  Boot Settings Configuration                     A virtual floppy disk
    ▶  Security                                        drive (Floppy Drive B:
                                                       ) may appear when you
                                                       set the CD-ROM drive
                                                       as the first boot
                                                       device.


                                                       ←→    Select Screen
                                                       ↑↓    Select Item
                                                       Enter Go to Sub Screen
                                                       F1    General Help
                                                       F10   Save and Exit
                                                       ESC   Exit

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```

5.6.1   Boot Device Priority

```
                              BIOS SETUP UTILITY
                                    Boot

    Boot Device Priority                               Specifies the Boot
    ──────────────────────────────────────────        Device Priority
    1st Boot Device          [Removable Dev.]          sequence.
    2nd Boot Device          [ATAPI CD-ROM]
    3rd Boot Device          [Hard Drive]              A device enclosed
    4th Boot Device          [Network:IBA GE Slo]      in parenthesis has
    5th Boot Device          [Network:IBA GE Slo]      been disabled in the
                                                       corresponding type
                                                       menu.



                                                       ←→    Select Screen
                                                       ↑↓    Select Item
                                                       +-    Change Option
                                                       F1    General Help
                                                       F10   Save and Exit
                                                       ESC   Exit

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```

1st ~ xxth Boot Device [XXXXXXX]

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system. Configuration options: [xxxxx Drive] [Disabled]

5.6.2 Boot Settings Configuration

```
                          BIOS SETUP UTILITY
                    Boot

    Boot Settings Configuration                      Allows BIOS to skip
    ─────────────────────────────                    certain tests while
    Quick Boot                 [Enabled]             booting. This will
    Full Screen Logo           [Enabled]             decrease the time
    AddOn ROM Display Mode      [Force BIOS]          needed to boot the
    Bootup Num-Lock            [On]                   system.
    Wait For 'F1' If Error     [Enabled]
    Hit 'DEL' Message Display  [Enabled]
    Interrupt 19 Capture       [Enabled]

                                                     ←→   Select Screen
                                                     ↑↓   Select Item
                                                     +-   Change Option
                                                     F1   General Help
                                                     F10  Save and Exit
                                                     ESC  Exit

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```

Quick Boot [Enabled]

Enabling this item allows the BIOS to skip some power on self tests (POST) while booting to decrease the time needed to boot the system. When set to [Disabled], BIOS performs all the POST items. Configuration options: [Disabled] [Enabled]

Full Screen Logo [Enabled]

Allows you to enable or disable the full screen logo display feature.
Configuration options: [Disabled] [Enabled]

> Set this item to [Enabled] to use the ASUS MyLogo2™ feature.

AddOn ROM Display Mode [Force BIOS]

Allows you to set the display mode for Options ROM.
Configuration options: [Force BIOS] [Keep Current]

Bootup Num-Lock [On]

Allows you to select the power-on state for the NumLock.
Configuration options: [Off] [On]

Wait For 'F1' If Error [Enabled]

When set to [Enabled], the system waits for the <F1> key to be pressed when error occurs. Configuration options: [Disabled] [Enabled]

Hit 'DEL' Message Display [Enabled]

When set to [Enabled], the system displays the message "Press DEL to run Setup" during POST. Configuration options: [Disabled] [Enabled]

Interrupt 19 Capture [Enabled]

When set to [Enabled], this function allows the option ROMs to trap Interrupt 19.
Configuration options: [Disabled] [Enabled]

5.6.3 Security

The Security menu items allow you to change the system security settings. Select an item then press <Enter> to display the configuration options.

```
                         BIOS SETUP UTILITY
                             Boot

    Security Settings                            <Enter> to change
                                                 password.
    Supervisor Password : Not Installed          <Enter> again to
    User Password       : Not Installed          disable password.


    Change Supervisor Password
    Change User Password

                                                 ←→    Select Screen
                                                 ↑↓    Select Item
                                                 Enter Change
                                                 F1    General Help
                                                 F10   Save and Exit
                                                 ESC   Exit

         v02.61 (C)Copyright 1985-2008, American Megatrends, Inc.
```
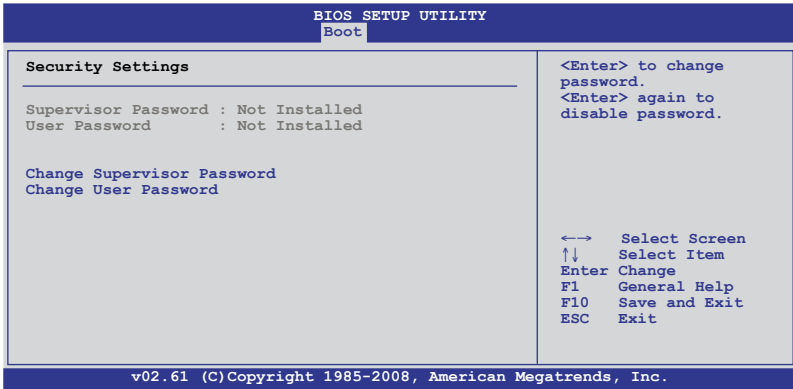
Change Supervisor Password

Select this item to set or change the supervisor password. The **Supervisor Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows **Installed**.

To set a Supervisor Password:

1.   Select the **Change Supervisor Password** item and press <Enter>.

2.   From the password box, type a password composed of at least six letters and/or numbers, then press <Enter>.

3.   Confirm the password when prompted.

The message "Password Installed" appears after you successfully set your password.

To change the supervisor password, follow the same steps as in setting a user password.

To clear the supervisor password, select the **Change Supervisor Password** then press <Enter>. The message "Password Uninstalled" appears.

> If you forget your BIOS password, you can clear it by erasing the CMOS Real Time Clock (RTC) RAM. See section **4.2 Jumpers** for information on how to erase the RTC RAM.

After you have set a supervisor password, the other items appear to allow you to change other security settings.

```
                          BIOS SETUP UTILITY
                               Boot

   Supervisor Password : Installed                    <Enter> to change
   User Password       : Not Installed                password.
                                                       <Enter> again to
   Change Supervisor Password                          disable password.
   User Access Level              [Full Access]
   Change User Password
   Password Check                 [Setup]
```
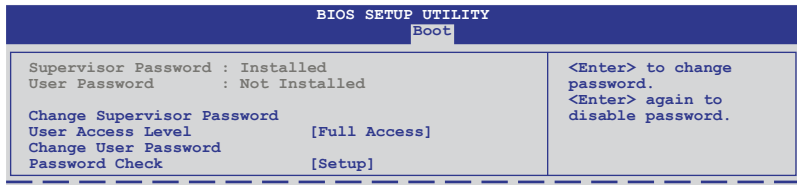
User Access Level [Full Access]

This item allows you to select the access restriction to the Setup items. Configuration options: [No Access] [View Only] [Limited] [Full Access]

No Access prevents user access to the Setup utility.

View Only allows access but does not allow change to any field.

Limited allows changes only to selected fields, such as Date and Time.

Full Access allows viewing and changing all the fields in the Setup utility.

Change User Password

Select this item to set or change the user password. The **User Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows Installed.

To set a User Password:

1.   Select the **Change User Password** item and press <Enter>.
2.   On the password box that appears, type a password composed of at least six letters and/or numbers, then press <Enter>.
3.   Confirm the password when prompted.

The message "Password Installed" appears after you set your password successfully.

To change the user password, follow the same steps as in setting a user password.

Password Check [Setup]

When set to [Setup], BIOS checks for user password when accessing the Setup utility. When set to [Always], BIOS checks for user password both when accessing Setup and booting the system. Configuration options: [Setup] [Always]

5.7   Exit menu

The Exit menu items allow you to load the optimal or failsafe default values for the BIOS items, and save or discard your changes to the BIOS items.

```
                         BIOS SETUP UTILITY
  Main    Advanced    Server    Boot    Exit

  Exit Options                                    Exit system setup
  ─────────────────────────────────────          after saving the
  Exit & Save Changes                             changes.
  Exit & Discard Changes
  Discard Changes                                 F10 key can be used
                                                  for this operation.
  Load Setup Defaults




                                                  ←→    Select Screen
                                                  ↑↓    Select Item
                                                  Enter Go to Sub Screen
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit

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```

> Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.

Exit & Save Changes

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. An onboard backup battery sustains the CMOS RAM so it stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select **YES** to save changes and exit.

> If you attempt to exit the Setup program without saving your changes, the program prompts you with a message asking if you want to save your changes before exiting. Press <Enter> to save the changes while exiting.

Exit & Discard Changes

Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than System Date, System Time, and Password, the BIOS asks for a confirmation before exiting.

Discard Changes

This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select **YES** to discard any changes and load the previously saved values.

Load Setup Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **YES** to load default values. Select **Exit & Save Changes** or make other changes before saving the values to the non-volatile RAM.

Chapter 6

This chapter provides instructions for setting up, creating and configuring RAID sets using the available utilities.

RAID configuration

6.1   Setting up RAID

The motherboard comes with the Intel® ICH10R southbridge controller that supports the following SATA RAID solutions:

- **LSI Software RAID Configuration Utility** (default) with RAID 0, RAID 1, and RAID 10 support (for both Linux and Windows OS).
- **Intel Matrix Storage Manager** with RAID 0, RAID 1, RAID 10, and RAID 5 support (for Windows OS only).

6.1.1   RAID definitions

RAID 0 *(Data striping)* optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 *(Data mirroring)* copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

6.1.2   Installing hard disk drives

The motherboard supports SATA hard disk drives for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

6.1.3   RAID controller selection

You can choose either the LSI Software RAID Configuration Utility or the Intel Matrix Storage Manager as the default utility to create RAID set(s). See **5. RAID configuration utility selection** on page 4-6 for details.

6.1.4   Setting the RAID item in BIOS

You must enable the RAID function in the BIOS Setup before creating RAID set(s) using SATA HDDs. To do this:

1.   Enter the BIOS Setup during POST.

2.   Go to the **Main** menu > **IDE Configuration**, and then press <Enter>.

3.   Set the **Configure SATA as** item to [RAID].

4.   Save your changes, and then exit the BIOS Setup.

Refer to Chapter 5 for details on entering and navigating through the BIOS Setup.

6.2 LSI Software RAID Configuration Utility

The LSI MegaRAID software RAID configuration utility allows you to create RAID 0, RAID 1, or RAID 10 set(s) from SATA hard disk drives connected to the SATA connectors supported by the motherboard southbridge chip.

To enter the LSI MegaRAID software RAID configuration utility

1. Turn on the system after installing all the SATA hard disk drives.

2. During POST, the LSI MegaRAID software RAID configuration utility automatically detects the installed SATA hard disk drives and displays any existing RAID set(s). Press <Ctrl> + <M> to enter the utility.

```
LSI MegaRAID Software RAID BIOS Version A.08 09161344R
LSI SATA RAID Found at PCI Bus No: Dev No:1F
Device present at Port 0      ST3160812AS      152114MB
Device present at Port 1      ST3160812AS      152114MB
Device present at Port 2      ST3160812AS      152114MB
Device present at Port 3      ST3160812AS      152114MB
Press Ctrl-M or Enter to run LSI Software RAID Setup Utility.
```

- • The LSI MegaRAID software RAID configuration utility automatically configures to RAID 1 when the SATA to RAID Mode is enabled.

- • The RAID setup screens shown in this section are for reference only and may not exactly match the items on your screen due to the controller version difference.

- • When you create RAID sets with the LSI MegaRAID software RAID configuration utility, the boot priority of the SATA optical drive has to be manually adjusted. Otherwise, the system will not boot from the connected SATA ODD.

3. The utility main window appears. Use the arrow keys to select an option from the **Management Menu** and then press <Enter>. Refer to the Management Menu descriptions on the next page.

At the bottom of the screen is the legend box. The keys on the legend box allow you to navigate through the setup menu options or execute commands. The keys on the legend box vary according to the menu level.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        BIOS Version   A.08.09161344R


         ┌─Management Menu─┐
         │Configure        │
         │Initialize       │
         │Objects          │
         │Rebuild          │
         │Check Consistency│
         └─────────────────┘




                         ┌Configure VD(s)┐
                         └───────────────┘
    Use Cursor Keys to Navigate Between Items And Press Enter To Select An Option
```

Menu	Description
Configure	Allows you to create RAID 0, RAID 1 or RAID 10 set using the Easy Configuration or the New Configuration command. This menu also allows you to view, add, or clear RAID configurations or select the boot drive
Initialize	Allows you to initialize the virtual drives of a created RAID set
Objects	Allows you to initialize virtual drives or change the virtual drive parameters
Rebuild	Allows you to rebuild failed drives
Check Consistency	Allows you to check the data consistency of the virtual drives of a created RAID set

6.2.1   Creating a RAID set

The LSI Software RAID Configuration Utility allows you to create a RAID 0, RAID 1, or RAID 10 set using two types of configurations: **Easy** and **New**.

In **Easy Configuration**, the virtual drive parameters are set automatically.

In **New Configuration**, you manually set the virtual drive parameters.

Using Easy Configuration

To create a RAID set using the **Easy Configuration** option

1.   From the **Management Menu**, select **Configure > Easy Configuration**, and then press <Enter>.
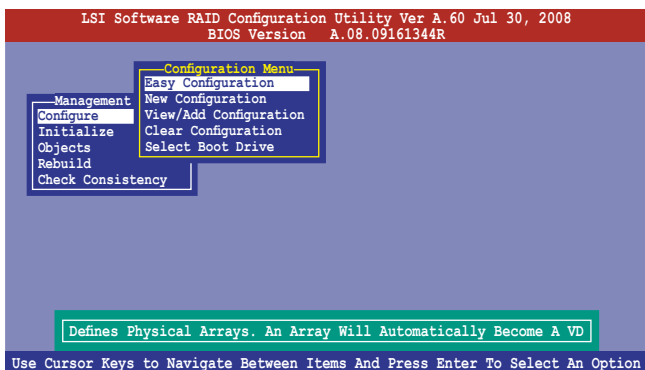
2. The **ARRAY SELECTION MENU** displays the available drives connected to the SATA ports. Use the up/down arrow key to select the drives you want to include in the RAID set, and then press <Space>. When selected, the drive indicator changes from **READY** to **ONLIN A[X]-[Y]**, where X is the array number, and Y is the drive number.
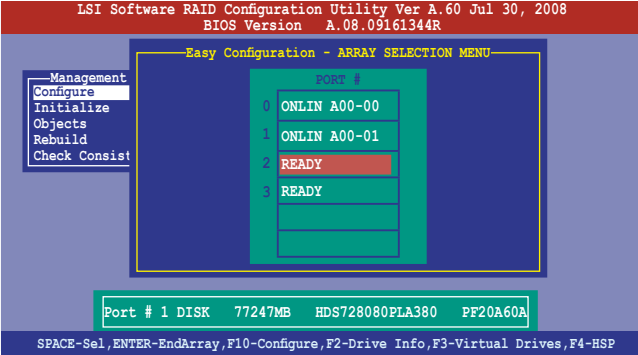
- • The information of the selected hard disk drive displays at the bottom of the screen.

- • You need at least two identical hard disk drives when creating a RAID 1 set.

- • You need at least four identical hard disk drives when creating a RAID 10 set.

3. Select all the drives required for the RAID set, and then press <F10> to configure array setting.

4. Press <Space> to select the configurable array.
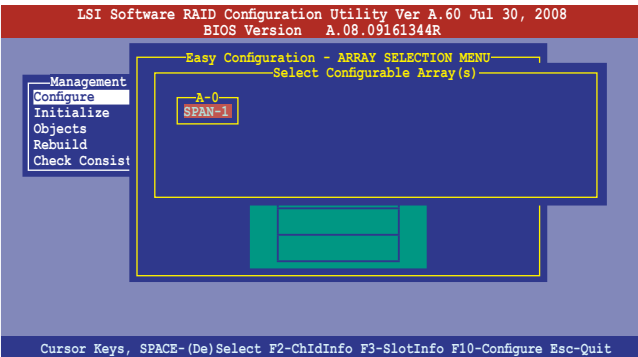
5. Press <F10> again, the virtual drive information appears including a **Virtual Drive** menu that allows you to change the virtual drive parameters.

```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        ──Virtual Drive(s) Configured──
          LD    RAID    Size    #Stripes    StripSz    Status
          0      1     77247MB     2          64 KB    ONLINE
     ──Manager──
     Configure
     Initializ
     Objects
     Rebuild
     Check Cor
                    ──Virgual Drive 0──
               RAID = 1
               Size = 77247MB
               DWC  = Off
               RA   = On
               Accept
               SPAN = NO

                    Choose RAID Level For This VD

        Cursor Keys, SPACE-(De)Select F2-ChIdInfo F3-SlotInfo F10-Configure Esc-Quit
```
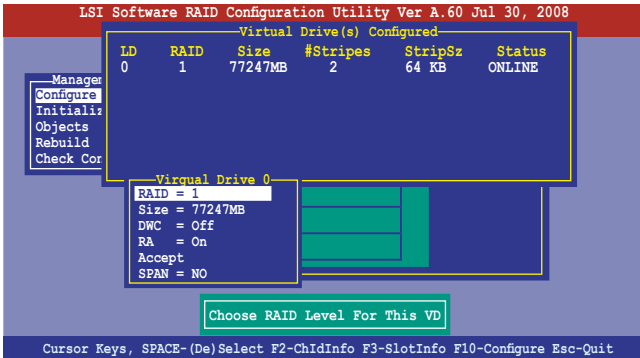
6. Select **RAID** from the **Virtual Drive** sub-menu, and then press <Enter>.
7. Select the **RAID** level from the menu, and then press <Enter>.

```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        ──Virtual Drive(s) Configured──
          LD    RAID    Size    #Stripes    StripSz    Status
          0      1     77247MB     2          64 KB    ONLINE
     ──Manager──
     Configure
     Initializ
     Objects
     Rebuild
     Check Cor
                 ──Virtual Drive 0──    ──RAID Level──
               RAID = 1               RAID 0
               Size = 77247MB         RAID 1
               DWC  = Off
               RA   = On
               Accept
               SPAN = NO

                    Choose RAID Level For This VD

        Cursor Keys, SPACE-(De)Select F2-ChIdInfo F3-SlotInfo F10-Configure Esc-Quit
```

8. When creating a **RAID 1** or a **RAID 10** set, select **DWC** from the **Virtual Drive** menu, and then press <Enter>.

   When creating a **RAID 0** set, proceed to step 10.

9. Select **On** to enable the **Disk Write Cache** setting, and then press <Enter>.

```
      LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                      ─Virtual Drive(s) Configured─
        LD    RAID    Size    #Stripes    StripSz    Status
        0      1     77247MB     2         64 KB     ONLINE
    ─Manager
    Configure
    Initializ
    Objects                          ─Change DWC─
    Rebuild                          Off
    Check Cor                        On
             ─Virtual Drive 0─
             RAID = 1
             Size = 77247MB
             DWC  = Off
             RA   = On
             Accept
             SPAN = NO

             Disk Write Cache Setting Of VD

    Cursor Keys, SPACE-(De)Select F2-ChIdInfo F3-SlotInfo F10-Configure Esc-Quit
```

Enabling DWC can improve the performance, but with the risk of data loss.

10. When finished setting the selected virtual drive configuration, select **Accept** from the menu, and then press <Enter>.

```
      LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                      ─Virtual Drive(s) Configured─
        LD    RAID    Size    #Stripes    StripSz    Status
        0      1     77247MB     2         64 KB     ONLINE
    ─Manager
    Configure
    Initializ
    Objects
    Rebuild
    Check Cor
             ─Virtual Drive 0─
             RAID = 1
             Size = 77247MB
             DWC  = Off
             RA   = On
             Accept
             SPAN = NO

             Accept This VD Configuration And Go To Next VD

    Cursor Keys, SPACE-(De)Select F2-ChIdInfo F3-SlotInfo F10-Configure Esc-Quit
```

11. Follow step 2 to 10 to configure additional virtual drives.

12. Press <Esc> to finish RAID configuration. When prompted to save configuration, select **Yes** from the menu, and then press <Enter>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        BIOS Version   A.08.09161344R
                  ┌─────Configuration Menu─────┐        ┌─Save Configuration?─┐
                  │ Easy Configuration         │        │ Yes                 │
   ┌──Management──┤ New Configuration          │        │ No                  │
   │ Configure    │ View/Add Configuration     │        └─────────────────────┘
   │ Initializ    └──────Virtual Drive(s) Configured──────┐
   │ Objects      │  LD    RAID    Size    #Stripes    StripSz    Status
   │ Rebuild      │  0      1      77247MB    2         64 KB      ONLINE
   │ Check Con    │
   └──────────────┘


                          ┌─────────────────────┐
                          │ Select Yes Or No    │
                          └─────────────────────┘
   Use Cursor Keys to Navigate Between Items And Press Enter To Select An Option
```

Using New Configuration

When a RAID set already exists, using the **New Configuration** command erases the existing RAID configuration data. If you do not want to delete the existing RAID set, use the **View/Add Configuration** command to view or create another RAID configuration.

To create a RAID set using the **New Configuration** option

1. From the **Management Menu**, select **Configure > New Configuration,** and then press <Enter>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        BIOS Version   A.08.09161344R
                  ┌─────Configuration Menu─────┐
                  │ Easy Configuration         │
   ┌──Management──┤ New Configuration          │
   │ Configure    │ View/Add Configuration     │
   │ Initialize   │ Clear Configuration        │
   │ Objects      │ Select Boot Drive          │
   │ Rebuild      └────────────────────────────┘
   │ Check Consistency │
   └───────────────────┘






              ┌──────────────────────────────────────────────────────┐
              │ Clear Existing Configuration And Start A New Configuration │
              └──────────────────────────────────────────────────────┘
   Use Cursor Keys to Navigate Between Items And Press Enter To Select An Option
```

2. Follow step 2 to 7 of the previous section: **Using Easy Configuration**.

3. Select **Size** from the **Virtual Drive** menu, and then press <Enter>.

4. Key-in the desired virtual drive size, and then press <Enter>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                          Virtual Drive(s) Configured
            LD    RAID     Size    #Stripes    StripSz    Status
            0      1     77247MB     2         64 KB      ONLINE
     Manager
    Configure
    Initializ
    Objects
    Rebuild
    Check C  Enter VD Size (MB): 77247

              RAID = 1
              Size = 77247MB
              DWC  = Off
              RA   = On
              Accept
              SPAN = NO

                          Enter VD Size (MB):

     Use Cursor Keys to Navigate Between Items And Press Enter To Select An Option
```

5. Follow step 8 to 12 of the previous section: **Using Easy Configuration** to create the RAID set.

6.2.2 Adding or viewing a RAID configuration

You can add a new RAID configuration or view an existing configuration using the **View/Add Configuration** command.

Adding a new RAID configuration

To add a new RAID configuration:

1. From the **Management Menu**, select **Configure > View/Add Configuration**, and then press <Enter>.
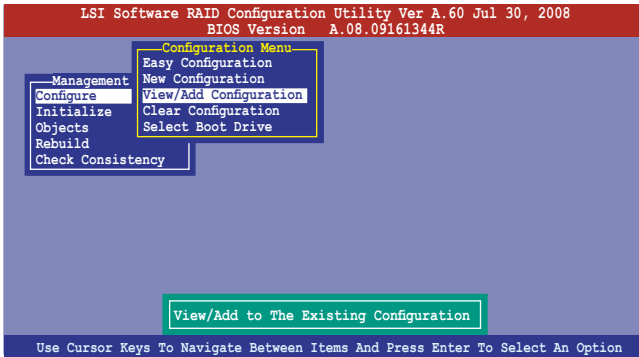
```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                    BIOS Version   A.08.09161344R
                  ┌─Configuration Menu─┐
                  │ Easy Configuration │
        ┌─Management─┐│ New Configuration  │
        │Configure   ││ View/Add Configuration│
        │Initialize  ││ Clear Configuration│
        │Objects     ││ Select Boot Drive  │
        │Rebuild     │└────────────────────┘
        │Check Consistency│




                  ┌──────────────────────────────────────┐
                  │ View/Add to The Existing Configuration │
                  └──────────────────────────────────────┘
        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

2. The **ARRAY SELECTION MENU** displays the available drives connected to the SATA ports. Select the drive(s) you want to include in the RAID set, then press <Space>. When selected, the drive indicator changes from **READY** to **ONLIN A[X]-[Y]**, where X is the array number, and Y is the drive number.

```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                    BIOS Version   A.08.09161344R
                  ┌─View/Add Configuration - ARRAY SELECTION MENU─┐
        ┌─Management─┐│              PORT #                        │
        │Configure   ││      0  ONLIN A00-00                       │
        │Initialize  ││      1  ONLIN A00-01                       │
        │Objects     ││      2  READY                              │
        │Rebuild     ││      3  READY                              │
        │Check Consist│                                            │
                     │                                            │
                     │                                            │
                     └────────────────────────────────────────────┘
                  ┌──────────────────────────────────────────────┐
                  │ Port # 2 DISK   77247MB  HDS728080PLA380  PF20A60A│
                  └──────────────────────────────────────────────┘
        SPACE-Sel,ENTER-EndArray,F10-Configure,F2-Drive Info,F3-Virtual Drives,F4-HSP
```
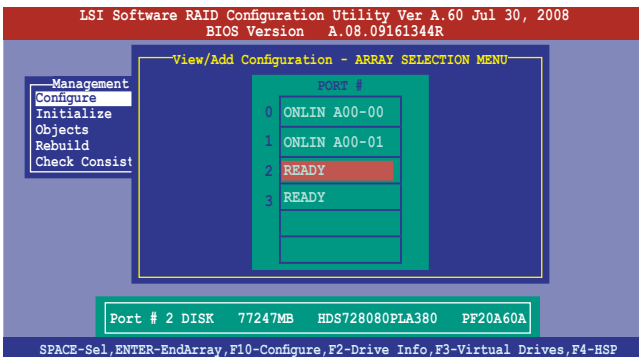
> The information of the selected hard disk drive displays at the bottom of the screen.

3. Follow step 3 to 12 of section **6.2.1 Creating a RAID set: Using Easy Configuration** to add a new RAID set.

6.2.3   Initializing the virtual drives

After creating the RAID set(s), you must initialize the virtual drives. You may initialize the virtual drives of a RAID set(s) using the **Initialize** or **Objects** command on the **Management Menu**.

Using the Initialize command

To initialize the virtual drive using the Initialize command

1.   From the **Management Menu**, select **Initialize**, and then press <Enter>.
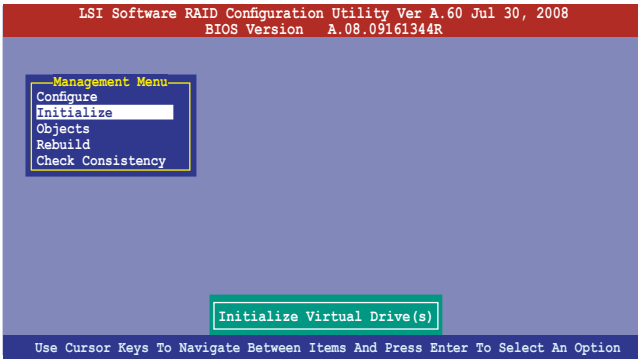
```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        BIOS Version   A.08.09161344R


        ┌─Management Menu─┐
        │ Configure       │
        │ Initialize      │
        │ Objects         │
        │ Rebuild         │
        │ Check Consistency│
        └─────────────────┘




                          │ Initialize Virtual Drive(s) │

        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

2.   The screen displays the available RAID set(s) and prompts you to select the virtual drive to initialize. Use the arrow keys to select the virtual drive from the **Virtual Drive** selection, and then press <Space>.

```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                        BIOS Version   A.08.09161344R

                            ┌──────Virtual Drive(s) Configured──────┐
  ┌─Management Menu─┐       │ LD    RAID    Size    #Stripes   StripSz   Status │
  │ Configure       │       │                                                   │
  │ Initialize      │       │ 0      1    151634MB     2        64 KB    ONLINE │
  │ Objects         │       │                                                   │
  │ Rebuild         │       │                                                   │
  │ Check Consistency│      │                                                   │
                            │                                                   │
                            │                                                   │
  ┌─Virtual Drives─┐        │                                                   │
  │ Virtual Drive 0 │       └───────────────────────────────────────────────────┘
  └─────────────────┘


                            │ Select VD │

                SPACE-(De)Select,  F10-Initialize
```
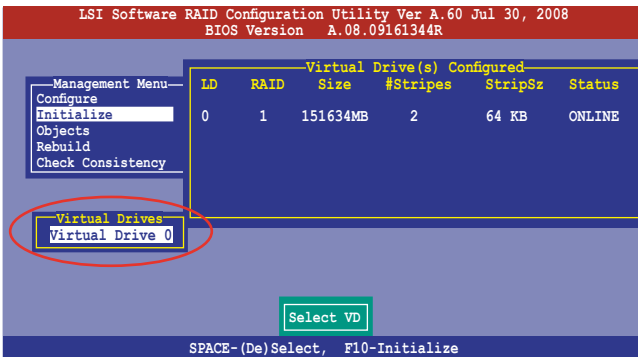
3.   Press <F10> to start initialization. When prompted, select **Yes** from the
      Initialize? dialog box, and then press <Enter>.

```
      LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                   BIOS Version   A.08.09161344R

                             ─Virtual Drive(s) Configured─
     ─Management Menu─  LD    RAID   Size    #Stripes   StripSz   Status
     Configure          0     10   154494MB     4        64 KB    ONLINE
     Initialize
     Objects
     Rebuild
     Check Consistency            ─Initialize?─
                                   Yes
                                   No
      ─Virtual Drives─
      Virtual Drive 0


              ┌────────────────────────────────────────────┐
              │  Init Will Destroy Data On Selected VD(s)   │
              └────────────────────────────────────────────┘
                  SPACE-(De)Select,  F10-Initialize
```

⚠   Initializing a virtual drive erases all data on the drive.

4.   A progress bar appears on screen. If desired, press <Esc> to abort
      initialization. When initialization is completed, press <Esc>.

```
      LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                   BIOS Version   A.08.09161344R

                             ─Virtual Drive(s) Configured─
     ─Management Menu─  LD    RAID   Size    #Stripes   StripSz   Status
     Configure          0     10   154494MB     4        64 KB    ONLINE
     Initiali─Init Of VD Is In Process─
     Objects
     Rebuild     VD 0 Initialization Complete. Press Esc..
     Check Co
                ┌──────────────────────────────────────┐
                └──────────────────────────────────────┘
      ─Virtua           ┊ 100% Completed
      Virtual Drive 0


                  SPACE-(De)Select,  F10-Initialize
```

Using the Objects command

To initialize the virtual drives using the **Objects** command

1. From the **Management Menu**, select **Objects > Virtual Drive**, and then press <Enter>.
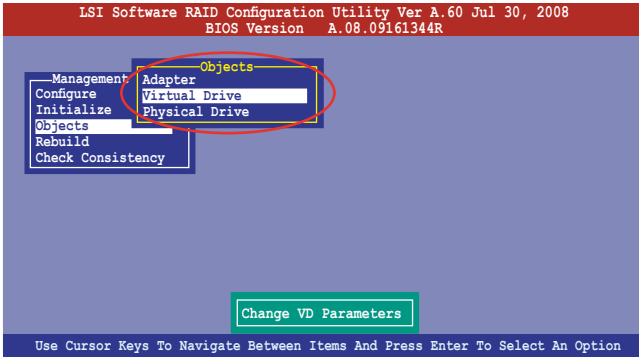
2. Select the virtual drive to initialize from the **Virtual Drives** sub-menu, and then press <Enter>.
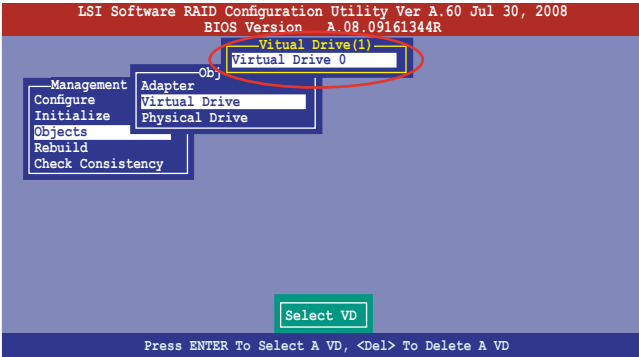
3. Select **Initialize** from the pop-up menu, and then press <Enter> to start initialization.


```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                       BIOS Version   A.08.09161344R
                            ┌────Vitual Drive(1)────┐
                            │ Virtual Drive 0        │
                    ┌──Obj  └────────────────────────┘
      ┌─Management─┐┌─Adapter──────┐
      │ Configure  ││ Virtual Drive │
      │ Initialize ││ Physical Drive│
      │ Objects    │└──────────────┘
      │ Rebuild    │         ┌────Vitual Drive(0)────┐
      │ Check Consistency    │ Initialze             │
      └────────────┘         │ Check Consistency     │
                             │ View/Update Parameters │
                             └────────────────────────┘




                        ┌─────────────────┐
                        │  Initilize VD   │
                        └─────────────────┘
        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

4. When prompted, press the <Space> to select **Yes** from the **Initialize?** dialog box, and then press <Enter>.


```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                       BIOS Version   A.08.09161344R
                            ┌────Vitual Drive(1)────┐
                            │ Virtual Drive 0        │
                    ┌──Obj  └────────────────────────┘
      ┌─Management─┐┌─Adapter──────┐
      │ Configure  ││ Virtual Drive │
      │ Initialize ││ Physical Drive│
      │ Objects    │└──────────────┘
      │ Rebuild    │         ┌────Vitual Drive(0)────┐
      │ Check Consistency    │ Initialze             │
      └────────────┘         │ Check Con ┌─Initialize?─┐
                             │ View/Upda │ Yes         │
                             └───────────│ No          │
                                         └─────────────┘

                 ┌───────────────────────────────────────────┐
                 │ Initilize Will Destroy Data On Selected VD(s) │
                 └───────────────────────────────────────────┘
        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

5. A progress bar appears on screen. If desired, press <Esc> to abort initialization. When initialization is completed, press <Esc>.

6.2.4   Rebuilding failed drives

You can manually rebuild failed hard disk drives using the **Rebuild** command in the **Management Menu**.

To rebuild a failed hard disk drive

1.   From the **Management Menu**, select **Rebuild**, and then press <Enter>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                      BIOS Version   A.08.09161344R

      ──Management Menu──
      Configure
      Initialize
      Objects
      Rebuild
      Check Consistency




                            ┌──────────────┐
                            │ Rebuild PD(s)│
                            └──────────────┘
      ─────────────────────────────────────────────────────────────────────
        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```
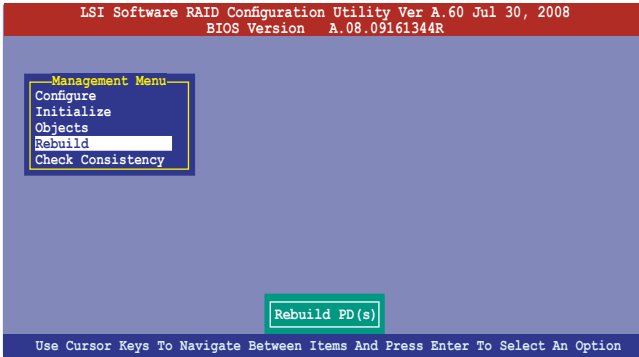
2.   The **PHYSICAL DRIVES SELECTION MENU** displays the available drives connected to the SATA ports. Select the drive you want to rebuild, and then press <Space>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                      BIOS Version   A.08.09161344R
                   ──REBUILD - PHYSICAL DRIVES SELECTION MENU──
      ──Management──              PORT #
      Configure
      Initialize           0   ONLIN A00-00
      Objects
      Rebuild              1   FAIL  A00-01
      Check Consist



      ──────────────────────────────────────────────────────────
        Port # 1 DISK   77247MB   HDS728080PLA380   PF20A60A
      ─────────────────────────────────────────────────────────────────────
        SPACE-(De)Select,F10-Start Rebuild,F2-Drive Information,F3-View Virtual Drives
```
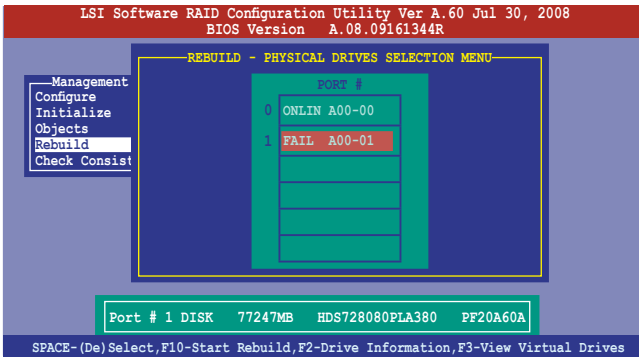
3. After selecting the drive to rebuild, press <F10>. When prompted, press <Y> to rebuild the drive.
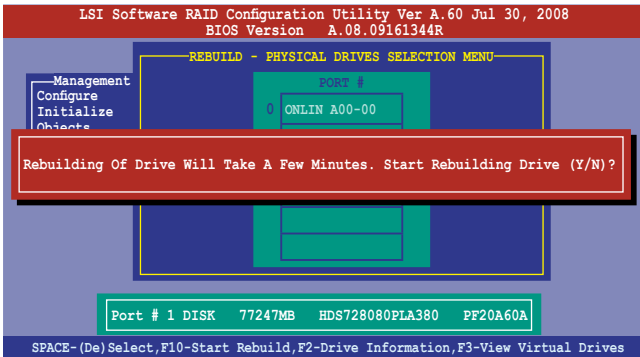
4. When rebuild is complete, press any key to continue.

6.2.5 Checking the drives for data consistency

You can check and verify the accuracy of data redundancy in the selected virtual drive. The utility can automatically detect and/or detect and correct any differences in data redundancy depending on the selected option in the **Objects > Adapter** menu.

> The **Check Consistency** command is available only for virtual drives included in a RAID 1 or RAID 10 set.

Using the Check Consistency Command

To check data consistency using the **Check Consistency** command

1. From the **Management Menu**, select **Check Consistency**, and then press <Enter>.
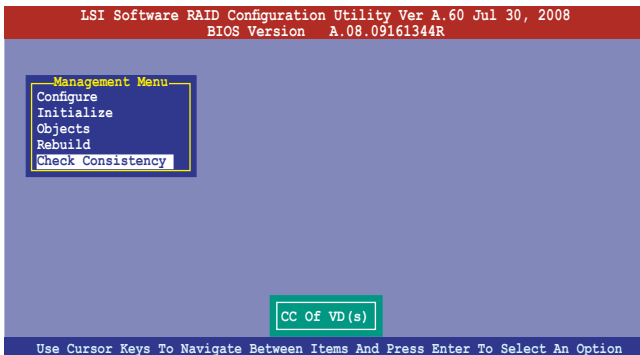
2.   The screen displays the available RAID set(s) and prompts you to select
      the virtual drive to check. Press <Space> to select the virtual drive from the
      Virtual Drive sub-menu, and then press <F10>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                         BIOS Version   A.08.09161344R

                            ┌─Virtual Drive(s) Configured─┐
   ┌─Management Menu─┐      │ LD    RAID    Size   #Stripes   StripSz   Status │
   │Configure        │      │ 0      10   154494MB    4        64 KB    ONLINE │
   │Initialize       │      │                                                 │
   │Objects          │      │                                                 │
   │Rebuild          │      │                                                 │
   │Check Consistency│      │                                                 │
   └─────────────────┘      │                                                 │
                            │                                                 │
   ┌─Virtual Drives─┐       │                                                 │
   │Virtual Drive 0 │       └─────────────────────────────────────────────────┘
   └────────────────┘

                              ┌──────────┐
                              │ Select VD│
                              └──────────┘
                SPACE-(De)Select,   F10-Check Consistency
```
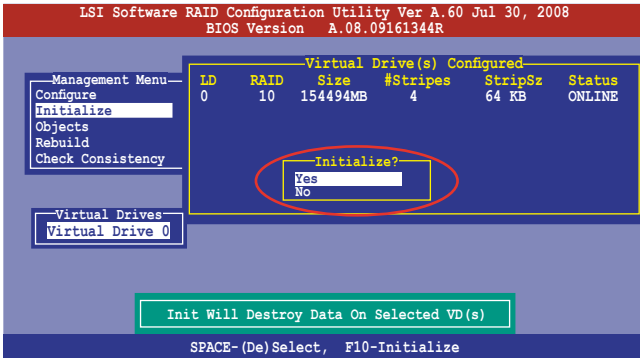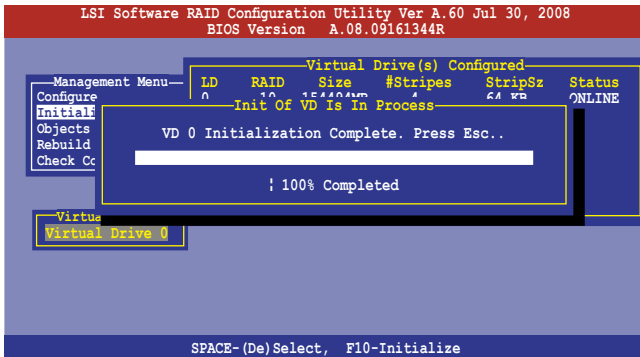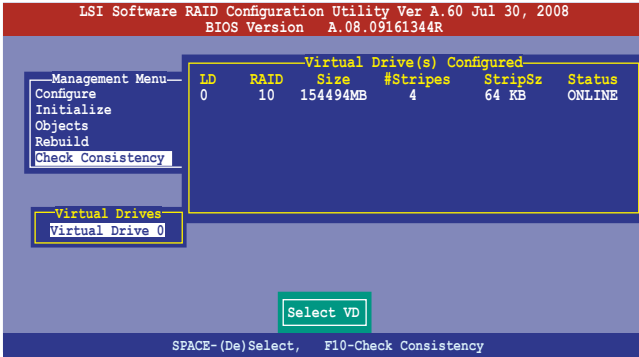
3.   When prompted, use the arrow keys to select **Yes** from the **Consistency
      Check?** dialog box, and then press <Enter>.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                         BIOS Version   A.08.09161344R

                            ┌─Virtual Drive(s) Configured─┐
   ┌─Management Menu─┐      │ LD    RAID    Size   #Stripes   StripSz   Status │
   │Configure        │      │ 0      10   154494MB    4        64 KB    ONLINE │
   │Initialize       │      │                                                 │
   │Objects          │      │                                                 │
   │Rebuild          │      │       ┌─Consistency Check?─┐                     │
   │Check Consistency│      │       │Yes            │                          │
   └─────────────────┘      │       │No             │                          │
                            │       └────────────────────┘                     │
   ┌─Virtual Drives─┐       │                                                 │
   │Virtual Drive 0 │       └─────────────────────────────────────────────────┘
   └────────────────┘

                              ┌──────────┐
                              │ Select VD│
                              └──────────┘
                SPACE-(De)Select,   F10-Check Consistency
```

A progress bar appears on screen.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                         BIOS Version   A.08.09161344R

                            ┌─Virtual Drive(s) Configured─┐
   ┌─Management Menu─┐      │ LD    RAID    Size   #Stripes   StripSz   Status │
   │Configure        │      │ 0      10   154494MB    4        64 KB    ONLINE │
   │Initiali┌─CC Under Process─────────────────────────┐                       │
   │Objects │                                          │                       │
   │Rebuild │  VD 0 Consistency Check. Press Esc to Abort.                     │
   │Check Co│                                          │                       │
   └────────│  ┌────────────────────────────────┐      │                       │
            │  │                                │      │                       │
   ┌─Virtua │           ¦ 85 % Completed               │                       │
   │Virtual Drive 0 │   └──────────────────────────────┘                       │
   └────────────────┘

                 ┌───────────────────────────────────────────────────┐
                 │The Data On The Drives Is Inconsistency. Repair Done!│
                 └───────────────────────────────────────────────────┘
                SPACE-(De)Select,   F10-Check Consistency
```

4.   While checking the disk consistency, press <Esc> to display the following options.

- **Stop** - Stops the consistency check. The utility stores the percentage of disk checked, and when you restart checking, it continues from the last percentage completed rather than from zero percent.

- **Continue** - Continues the consistency check.

- **Abort** - Aborts the consistency check. When you restart checking, it continues from zero percent.

5.   When checking is complete, press any key to continue.

Using the Objects command

To check data consistency using the **Objects** command

1.   From the **Management Menu**, select **Objects**, and then select **Virtual Drive** from the sub-menu.

2.   Use the arrow keys to select the virtual drive you want to check, and then press <Enter>.

3.   Select **Check Consistency** from the pop-up menu, and then press <Enter>.

4.   When prompted, use the arrow keys to select **Yes** from the dialog box to check the drive.

5.   When checking is complete, press any key to continue.

6.2.6   Deleting a RAID configuration

To delete a RAID configuration

1.   From the **Management Menu**, select **Configure** > **Clear Configuration**, and
      then press <Enter>.

```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                         BIOS Version   A.08.09161344R
                    ┌─────Configuration Menu─────┐
                    │ Easy Configuration         │
        ┌─Management┤ New Configuration          │
        │ Configure │ View/Add Configuration     │
        │ Initialize│ Clear Configuration        │
        │ Objects   │ Select Boot Drive          │
        │ Rebuild   └────────────────────────────┘
        │ Check Consistency│
        └──────────────────┘




                    ┌────────────────────────────┐
                    │  Clear Existing Configuration│
                    └────────────────────────────┘
        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```
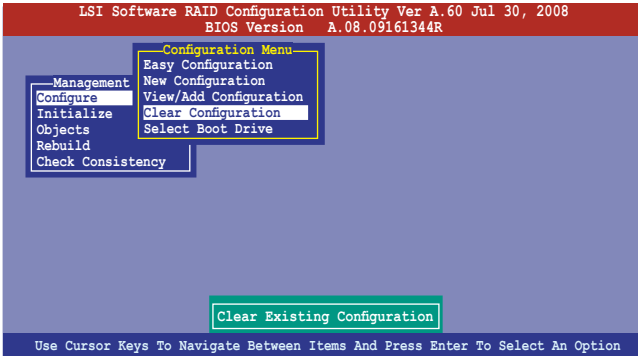
2.   When prompted, use the arrow keys to select **Yes** from the **Clear
      Configuration?** dialog box, and then press <Enter>.

```
        LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                         BIOS Version   A.08.09161344R
                    ┌─────Configuration Menu─────┐
                    │ Easy Configuration         │
        ┌─Management┤ New Configuration          │
        │ Configure │ View/A┌─Clear Configuration?─┐
        │ Initialize│ Clear │ Yes                  │
        │ Objects   │ Select│ No                   │
        │ Rebuild   └───────┴──────────────────────┘
        │ Check Consistency│
        └──────────────────┘




                    ┌────────────────────────────┐
                    │  Clear Existing Configuration│
                    └────────────────────────────┘
        Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

      The utility clears all the current array(s).

3.   Press any key to continue.

6.2.7   Selecting the boot drive from a RAID set

You must have created a new RAID configuration before you can select the boot drive from a RAID set. See section **6.2.1 Creating a RAID set: Using New Configuration** for details.

To select the boot drive from a RAID set

1.   From the **Management Menu**, select **Configure** > **Select Boot Drive**, and then press <Enter>.

```
     LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                   BIOS Version   A.08.09161344R
                 ┌─────Configuration Menu─────┐
                 │ Easy Configuration         │
       ┌─Management─┐ New Configuration       │
       │Configure   │ View/Add Configuration  │
       │Initialize  │ Clear Configuration     │
       │Objects     │ Select Boot Drive       │
       │Rebuild     │                         │
       │Check Consistency                     │
       └──────────┘


                        ┌─Select A Boot VD─┐
                        │                  │
     Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

2.   When prompted, use the arrow keys to select the bootable virtual drive from the list, then press <Enter>.

```
     LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                   BIOS Version   A.08.09161344R
              ┌──────Bootable VDs(1):Current Boot VD(0)──────┐
            ┌─Config│ Boot Drive 0                           │
            │ Easy Con└────────────────────────────────────┘
       ┌─Management─┐ New Configuration
       │Configure   │ View/Add Configuration
       │Initialize  │ Clear Configuration
       │Objects     │ Select Boot Drive
       │Rebuild     │
       │Check Consistency
       └──────────┘


                        ┌─Select A Boot VD─┐
                        │                  │
     Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```
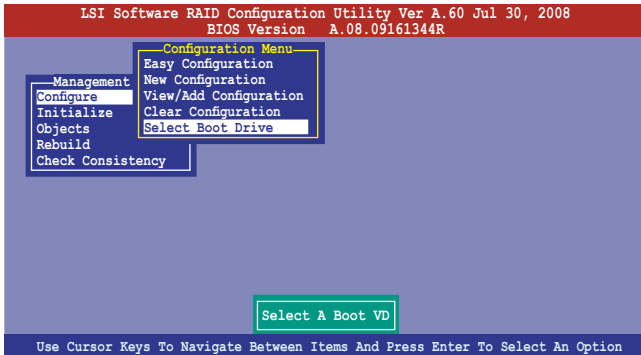
3.   The virtual drive is selected as boot drive. Press any key to continue.

6.2.8 Enabling WriteCache

You may manually enable the RAID controller's WriteCache option after creating a RAID set to improve the data transmission performance.
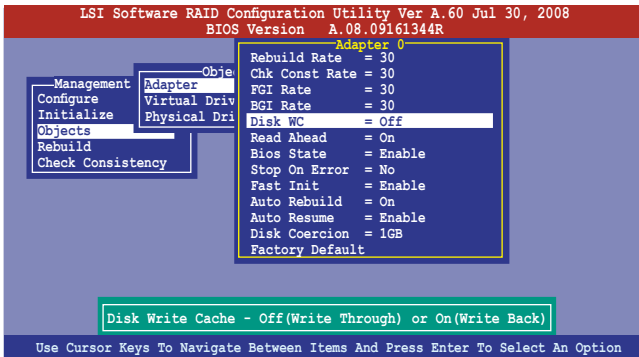
⚠️ When you enable WriteCache, you may lose data when a power interruption occurs while transmitting or exchanging data among the drives.

✎ The WriteCache function is recommended for RAID 1 and RAID 10 sets.

To enable WriteCache

1. From the **Management Menu**, select **Objects** > **Adapter**, and then press <Enter> to display the adapter properties.

2. Select **Disk WC**, and then press <Enter> to turn on the option.

```
         LSI Software RAID Configuration Utility Ver A.60 Jul 30, 2008
                    BIOS Version   A.08.09161344R
                                     ┌─Adapter 0──────────┐
                                     │ Rebuild Rate   = 30 │
                         ┌─Obje      │ Chk Const Rate = 30 │
        ┌─Management─┐ │ Adapter     │ FGI Rate       = 30 │
        │ Configure  │ │ Virtual Driv│ BGI Rate       = 30 │
        │ Initialize │ │ Physical Dri│ Disk WC        = Off │
        │ Objects    │ └─────────────│ Read Ahead     = On  │
        │ Rebuild    │               │ Bios State     = Enable │
        │ Check Consistency │        │ Stop On Error  = No  │
        └────────────┘               │ Fast Init      = Enable │
                                     │ Auto Rebuild   = On  │
                                     │ Auto Resume    = Enable │
                                     │ Disk Coercion  = 1GB │
                                     │ Factory Default      │
                                     └──────────────────────┘

              ┌──────────────────────────────────────────────────────┐
              │ Disk Write Cache - Off(Write Through) or On(Write Back) │
              └──────────────────────────────────────────────────────┘
         Use Cursor Keys To Navigate Between Items And Press Enter To Select An Option
```

3. When finished, press any key to continue.

6.3 Intel® Matrix Storage Manager Option ROM Utility

The Intel® Matrix Storage Manager Option ROM utility allows you to create RAID 0, RAID 1, RAID 10 (RAID 0+1), and RAID 5 set(s) from Serial ATA hard disk drives that are connected to the Serial ATA connectors supported by the Southbridge.

To enter the Intel® Matrix Storage Manager option ROM utility:

1. Install all the Serial ATA hard disk drives.
2. Turn on the system.
3. During POST, press <Ctrl+I> to display the utility main menu.

```
    Intel(R) Matrix Storage Manager option ROM v8.5.0.1030 ICH10R/DO wRAID5
           Copyright(C) 2003-08 Intel Corporation.  All Rights Reserved.

    ===============================[ MAIN MENU ]===============================
           1. Create RAID Volume              3. Reset Disks to Non-RAID
           2. Delete RAID Volume              4. Recovery Volume Options
                                5. Exit

    =======================[ DISK/VOLUME INFORMATION ]=======================
       RAID Volumes:                              * = Data is Encrypted
       None defined.

       Physical Disks:
       Port Drive Model    Serial #           Size       Type/Status(Vol ID)
       0    ST3160812AS    9LS0HJA4           149.0GB    Non-RAID Disk
       1    ST3160812AS    9LS0F4HL           149.0GB    Non-RAID Disk
       2    ST3160812AS    3LS0JYL8           149.0GB    Non-RAID Disk
       3    ST3160812AS    9LS0BJ5H           149.0GB    Non-RAID Disk



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

The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.

The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.
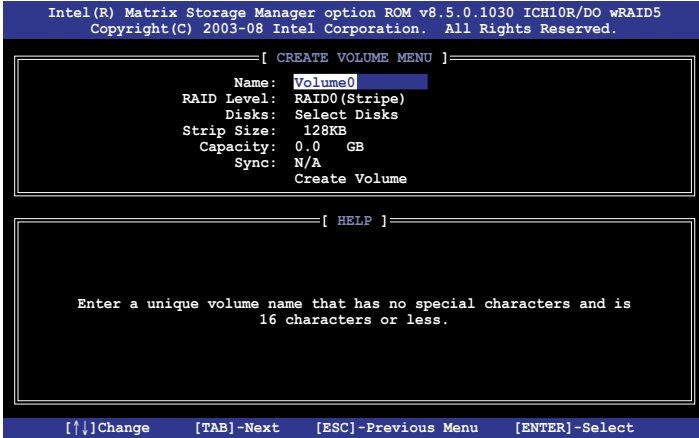
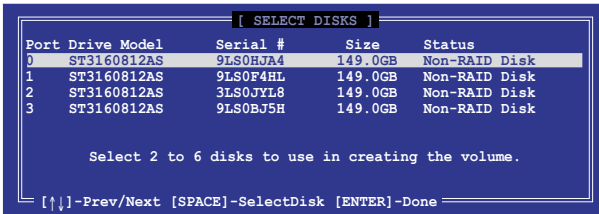The utility supports maximum four hard disk drives for RAID configuration.

6.3.1   Creating a RAID set

To create a RAID set

1. From the utility main menu, select **1. Create RAID Volume** and press <Enter>. The following screen appears.

```
       Intel(R) Matrix Storage Manager option ROM v8.5.0.1030 ICH10R/DO wRAID5
              Copyright(C) 2003-08 Intel Corporation.  All Rights Reserved.
    ══════════════════════[ CREATE VOLUME MENU ]══════════════════════

                        Name:  Volume0
                  RAID Level:  RAID0(Stripe)
                       Disks:  Select Disks
                  Strip Size:   128KB
                    Capacity:  0.0   GB
                        Sync:  N/A
                               Create Volume


    ══════════════════════════[ HELP ]══════════════════════════



          Enter a unique volume name that has no special characters and is
                             16 characters or less.




       [↑↓]Change      [TAB]-Next     [ESC]-Previous Menu     [ENTER]-Select
```

2. Enter a name for the RAID set and press <Enter>.

3. When the **RAID Level** item is selected, press the up/down arrow key to select a RAID level to create, and then press <Enter>.

4. When the **Disks** item is selected, press <Enter> to select the hard disk drives you want to include in the RAID set. The **SELECT DISKS** screen appears.

```
                         ══════[ SELECT DISKS ]══════
    Port Drive Model      Serial #       Size       Status
    0    ST3160812AS      9LS0HJA4       149.0GB    Non-RAID Disk
    1    ST3160812AS      9LS0F4HL       149.0GB    Non-RAID Disk
    2    ST3160812AS      3LS0JYL8       149.0GB    Non-RAID Disk
    3    ST3160812AS      9LS0BJ5H       149.0GB    Non-RAID Disk

            Select 2 to 6 disks to use in creating the volume.

     └─ [↑↓]-Prev/Next [SPACE]-SelectDisk [ENTER]-Done ═══════
```

5. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.

6.	Use the up/down arrow key to select the stripe size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available stripe size values range from 4 KB to 128 KB. The following are typical values:
RAID 0: 128KB
RAID 10: 64KB
RAID 5: 64KB

> We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

7.	When the **Capacity** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.

8.	When the **Create Volume** item is selected, press <Enter>. The following warning message appears.

```
WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
Are you sure you want to create this volume? (Y/N):
```

9.	Press <Y> to create the RAID volume and return to the main menu, or <N> to go back to the **CREATE VOLUME** menu.

## 6.3.2	Creating a Recovery set

To create a recovery set

1.	From the utility main menu, select **1. Create RAID Volume** and press <Enter>. The following screen appears.

```
Intel(R) Matrix Storage Manager option ROM v8.5.0.1030 ICH10R/DO wRAID5
Copyright(C) 2003-08 Intel Corporation.  All Rights Reserved.

===========================[ CREATE VOLUME MENU ]===========================

                    Name:  Volume0
              RAID Level:  RAID0(Stripe)
                   Disks:  Select Disks
              Strip Size:   128KB
                Capacity:  0.0    GB
                    Sync:  N/A
                          Create Volume

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




         Enter a unique volume name that has no special characters and is
                          16 characters or less.




============================================================================
   [↑↓]Change      [TAB]-Next     [ESC]-Previous Menu    [ENTER]-Select
```
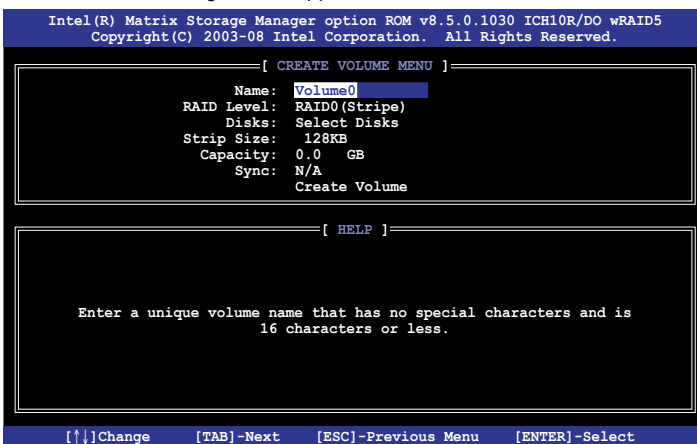
2.   Enter a name for the recovery set and press <Enter>.

3.   When the **RAID Level** item is selected, press the up/down arrow key to select **Recovery**, and then press <Enter>.

4.   When the **Disks** item is selected, press <Enter> to select the hard disk drives you want to include in the recovery set. The **SELECT DISKS** screen appears.

```
                        [ SELECT DISKS ]
Port Drive Model      Serial #      Size        Status
0    ST3160812AS      9LS0HJA4      149.0GB     Non-RAID Disk
1    ST3160812AS      9LS0F4HL      149.0GB     Non-RAID Disk
2    ST3160812AS      3LS0JYL8      149.0GB     Non-RAID Disk
3    ST3160812AS      9LS0BJ5H      149.0GB     Non-RAID Disk


     Select 1 Master and 1 Recovery disk to create volume.


 [↑↓]-Prev/Next [TAB]-(M)aster [SPACE]-(R)ecovery [ENTER]-Done
```

5.   Use the up/down arrow key to select a drive, press <TAB> to select a Master disk, and then press <SPACE> to select a Recovery disk. A small triangle marks the selected drive. Press <Enter> after completing your selection.

6.   When the **Sync** item is selected, use the up/down arrow key to select a sync option that you want and press <Enter>.

7.   When the **Create Volume** item is selected, press <Enter>. The following warning message appears.

```
         WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
     Are you sure you want to create this volume? (Y/N):
```

8.   Press <Y> to create the recovery set and return to the main menu, or <N> to go back to the **CREATE VOLUME** menu.

If a recovery set is created, you cannot add more RAID sets even when you have more non-RAID disks installed in your system.

6.3.3 Deleting a RAID set

> ⚠ Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set

1. From the utility main menu, select **2. Delete RAID Volume** and press <Enter>. The following screen appears.

```
    Intel(R) Matrix Storage Manager option ROM v8.5.0.1030 ICH10R/DO wRAID5
         Copyright(C) 2003-08 Intel Corporation.  All Rights Reserved.
    ==================[ DELETE VOLUME MENU ]==================
    Name         Level          Drives    Capacity    Status     Bootable
    Volume0      RAID0(Stripe)     2        298.0GB    Normal        Yes




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

           Deleting a volume will reset the disks to non-RAID.

                   WARNING: ALL DISK DATA WILL BE DELETED.
                   (This does not apply to Recovery volumes)




    [↑↓]-Select         [ESC]-Previous Menu     [DEL]-Delete Volume
```
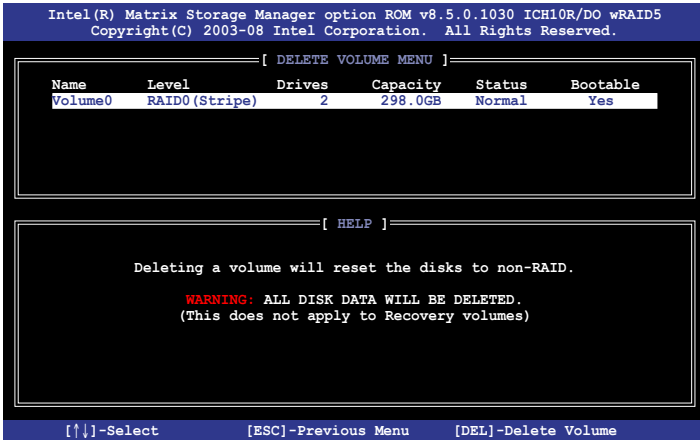
2. Use the up/down arrow key to select the RAID set you want to delete, and then press <Del>. The following warning message appears.

```
    ============[ DELETE VOLUME VERIFICATION ]============

               ALL DATA IN THE VOLUME WILL BE LOST!
             (This does not apply to Recovery volumes)

        Are you sure you want to delete volume "Volume0"? (Y/N):
```
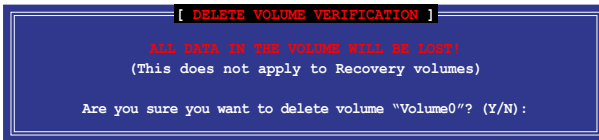
3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the **DELETE VOLUME** menu.

6.3.4 Resetting disks to Non-RAID

Take caution before you reset a RAID volume hard disk drive to non-RAID. Resetting a RAID volume hard disk drive deletes all internal RAID structure on the drive.

To reset a RAID set hard disk drive

1. From the utility main menu, select **3. Reset Disks to Non-RAID** and press <Enter>. The following screen appears.

```
┌──────────────────[ RESET RAID DATA ]──────────────────┐
│      Resetting RAID disk will remove its RAID structures │
│      and revert it to a non-RAID disk.                   │
│                                                          │
│ WARNING: Resetting a disk causes all data on the disk to be lost. │
│ (This does not apply to Recovery volumes)                │
│                                                          │
│ Port Drive Model      Serial #        Size      Status   │
│ 0     ST3160812AS     9LS0HJA4        149.0GB   Member Disk │
│ 1     ST3160812AS     9LS0F4HL        149.0GB   Member Disk │
│                                                          │
│           Select the disks that should be reset.         │
│                                                          │
└─[↑↓]-Previous/Next  [SPACE]-Selects [ENTER]-Selection Complete─┘
```

2. Use the up/down arrow key to select the RAID set drive(s) you want to reset, and then press <Space> to select.

3. Press <Enter> to reset the RAID set drive(s). A confirmation message appears.

4. Press <Y> to reset the drive(s) or press <N> to return to the utility main menu.

6.3.5 Recovery Volume Options

If you have created a recovery set, you can configure more recovery set options following the descriptions in the section.

> See section **6.3.2 Creating a Recovery set** to create a recovery set before continue.

To configure a recovery set

1. From the utility main menu, select **4. Recovery Volume Options** and press <Enter>. The following screen appears.

```
    Intel(R) Matrix Storage Manager option ROM v8.5.0.1030 ICH10R/DO wRAID5
         Copyright(C) 2003-08 Intel Corporation.  All Rights Reserved.

                          ═══[ RECOVERY VOLUME OPTIONS ]═══
                          1.  Enable Only Recovery Disk
                          2.  Enable Only Master Disk




                                 ═══[ HELP ]═══

            Enable Only Recovery Disk - enables recovery disk if available and
                              disables master disk.
             Enable Only Master Disk - enables master disk if available and
                              disables recovery disk.
            Actions will result in change from Continuous Update mode to On-Request.




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

2. Use the up/down arrow key to select the option you want, and then press <ENTER>. The **SELECT RECOVERY VOLUME** screeen appears.

```
                        ═══[ SELECT RECOVERY VOLUME ]═══
        Name       Level          Capacity    Status       Bootable
        Volume0       Recovery(Cont.)   149.0GB    Normal          Yes



             Select a Recovery volume to do the operation.

                [↑↓]-Up/Down [SPACE]-Selects [ENTER]-Done
```
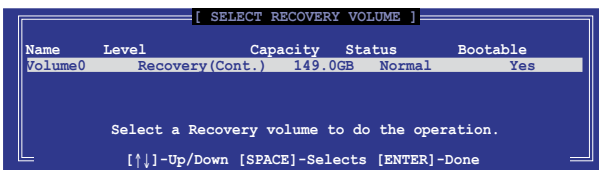
3. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection and return to the utility main menu.

6.3.6 Exiting the Intel® Matrix Storage Manager

To exit the utility

1. From the utility main menu, select **5. Exit**, and then press <Enter>. The following warning message appears.

```
╔══════════════════[ CONFIRM EXIT ]═══════════════════╗
║                                                      ║
║          Are you sure you want to exit? (Y/N):       ║
║                                                      ║
╚══════════════════════════════════════════════════════╝
```

2. Press <Y> to exit or press <N> to return to the utility main menu.

6.3.7 Rebuilding the RAID

This option is only for the RAID 1, RAID 5 and RAID 10 sets.

Rebuilding the RAID with other non-RAID disk

If any of the SATA hard disk drives included in the RAID 1 array failed, the system displays the status of the RAID volume as "**Degraded**" during POST. You can rebuild the RAID array with other installed non-RAID disks.

To rebuild the RAID with other non-RAID disk:

1. At the prompt, press <Ctrl> + <I> to enter the Intel Matrix Storage Manager option ROM utility.
2. If there is a non-RAID SATA Hard Disk available, the utility will prompt to rebuild the RAID. Press <Enter>, and then use up/down arrow keys to select the destination disk or press <ESC> to exit.

```
╔══════════════[ DEGRADED VOLUME DETECTED ]═══════════════╗
║                                                          ║
║   "Degraded" volume and disk available for rebuilding detected. Selecting
║   a disk initiates a rebuild. Rebuild completes in the operating system.  ║
║                                                          ║
║   Select the port of destination disk for rebuilding (ESC to exit):  ║
║   Port Drive Model     Serial #        Size              ║
║   X    XXXXXXXXXXX      XXXXXXXX        XX.XGB            ║
║                                                          ║
║                                                          ║
║                                                          ║
║          [↑↓]-Previous/Next  [ENTER]-Select  [ESC]-Exit  ║
╚══════════════════════════════════════════════════════════╝
```

Select a destination disk with the same size as the original hard disk.

3.   The utility immediately starts rebuilding after the disk is selected. The status
      of the degraded RAID volume is changed to **"Rebuild"**.

```
    Intel(R) Matrix Storage Manager option ROM v8.5.0.1030 ICH10R/DO wRAID5
         Copyright(C) 2003-08 Intel Corporation.  All Rights Reserved.

  ===========================[ MAIN MENU ]===========================
          1. Create RAID Volume              3. Reset Disks to Non-RAID
          2. Delete RAID Volume              4. Recovery Volume Options
                              5. Exit

  ====================[ DISK/VOLUME INFORMATION ]====================
     RAID Volumes:                               * = Data is Encrypted
     ID   Name          Level        Strip  Size       Status      Bootable
     0    Volume0       RAID1(Mirror) N/A   149.0GB    Rebuild     Yes


     Physical Disks:
     Port Drive Model    Serial #           Size       Type/Status(Vol ID)
     1    ST3160812AS    9LS0F4HL           149.0GB    Member Disk(0)
     2    ST3160812AS    3LS0JYL8           149.0GB    Member Disk(0)



   Volumes with "Rebuild" status will be rebuilt within the operating system.

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

4.   Exit Intel Matrix Storage Manager and reboot the system.

5.   Select **Start > Programs > Intel Matrix Storage > Intel Matrix Storage
      Console** or click the **Intel Matrix Storage Manager** tray icon to load the Intel
      Matrix Stroage Manager utility.

6.   From the **View** menu, select **Advanced Mode** to display the details of the
      Intel Matrix Storage Console.

7.   From the **Volumes view** option, select **RAID volume** to view the rebuilding
      status. When finished, the status is changed to "**Normal**".

Rebuilding the RAID with a new hard disk

If any of the SATA hard disk drives included in the RAID array failed, the system
displays the status of the RAID volume as "**Degraded**" during POST. You may
replace the disk drive and rebuild the RAID array.

To rebuild the RAID with a new hard disk:

1.   Remove the failed SATA hard disk and install a new SATA hard disk of the
      same specification into the same SATA Port.

      Select a destination disk with the same size as the original hard disk.

2.   Reboot the system and then follow the steps in section **Rebuilding the RAID
      with other non-RAID disk** on page 6-31.

6.3.8 Setting the Boot array in the BIOS Setup Utility

You can set the boot priority sequence in the BIOS for your RAID arrays when creating multi-RAID using the Intel® Matrix Storage Manager.

To set the boot array in the BIOS:

Set at least one of the arrays bootable to boot from the hard disk.

1.   Reboot the system and press <Del> to enter the BIOS setup utility during POST.

2.   Go to the **Boot** menu and select the option **Boot Device Priority**.

3.   Use up/down arrow keys to select the boot priority and press <Enter>. See section **5.6.1 Boot Device Priority** for details.

4.   From the **Exit** menu, select **Exit & Save Changes**, then press <Enter>.

5.   When the confirmation window appears, select **OK**, then press <Enter>.

Chapter 7

This chapter provides instructions for installing the necessary drivers for different system components.

Driver installation

7.1 RAID driver installation

After creating the RAID sets for your server system, you are now ready to install an operating system to the independent hard disk drive or bootable array. This part provides instructions on how to install the RAID controller drivers during OS installation.

7.1.1 Creating a RAID driver disk

> You may have to use another system to create the RAID driver disk from the system/motherboard support DVD or from the Internet.

> If you have created RAID sets with the LSI Software RAID configuration utility, the boot priority of the SATA optical disk drive has to be manually adjusted. Otherwise, the system will not boot from the connected SATA ODD.

A floppy disk with the RAID driver is required when installing Windows® or Red Hat® Enterprise operating system on a hard disk drive that is included in a RAID set. You can create a RAID driver disk in DOS (using the Makedisk application in the support DVD).

To create a RAID driver disk in DOS environment

1. Place the motherboard support DVD in the optical drive.
2. Restart the computer, and then enter the BIOS Setup.
3. Select the optical drive as the first boot priority to boot from the support DVD. Save your changes, and then exit the BIOS Setup.
4. Restart the computer. The Makedisk menu appears.

```
Create Driver Diskette Menu
ICH10R INTEL RAID Driver
ICH10R LSI RAID Driver
Write DMI
FreeDOS command prompt
```

5. Use the arrow keys to select the type of RAID driver disk you want to create and press <Enter> to enter the sub-menu.

ICH10R INTEL RAID Driver

```
ICH10R INTEL RAID Driver
Windows 32 bit
Windows 64 bit
Back
Exit
```

ICH10R LSI RAID Driver

```
           ICH10R LSI RAID Driver
Windows XP / Windows Server 2003 32 bit
Windows XP / Windows Server 2003 64 bit
Windows Vista / Windows Server 2008 32 bit
Windows Vista / Windows Server 2008 64 bit
RHEL AS4 UP6 32/64 bit
RHEL AS4 UP7 32/64 bit
RHEL 5 UP1 32/64 bit
RHEL 5 UP2 32/64 bit
SLES 9 SP3 32 bit
SLES 9 SP3 64 bit
SLES 9 SP4 32 bit
SLES 9 SP4 64 bit
SLES 10 SP1 32 bit
SLES 10 SP1 64 bit
SLES 10 SP2 32 bit
SLES 10 SP2 64 bit
Back
Exit
```

Write DMI

```
          Write DMI
RS700-E6-RS4 system
RS500-E6-PS4 system
Back
Exit
```

6.   Locate the RAID driver and place a blank, high-density floppy disk to the
      floppy disk drive.

7.   Press <Enter>.

8.   Follow screen instructions to create the driver disk.

To create a RAID driver disk in Windows® environment

1. Start Windows®.

2. Place the motherboard support DVD into the optical drive.

3. Go to the **Make Disk** menu, and then select the type of RAID driver disk you want to create.

4. Insert a floppy disk into the floppy disk drive.

5. Follow succeeding screen instructions to complete the process.

> Write-protect the floppy disk to avoid computer virus infection.

To create a RAID driver disk in Red Hat® Enterprise Linux server environment:

1. Insert a blank formatted high-density floppy disk to the floppy disk drive.

2. Decompress the file into the floppy disk from the following path in the support DVD:

    For LSI Logic Embedded SATA RAID Driver:

    \Drivers\ICH10R LSI RAID\Driver\makedisk\Linux

3. Eject the floppy disk.

7.1.2   Installing the RAID controller driver

Windows® Server OS

During Windows® Server OS installation

To install the RAID controller driver when installing Windows® Server OS:

1.   Boot the computer using the Windows® Server installation DVD. The Windows® Server OS Setup starts.

```
Windows Setup




















Press F6 if you need to install a third party SCSI or RAID driver...
```
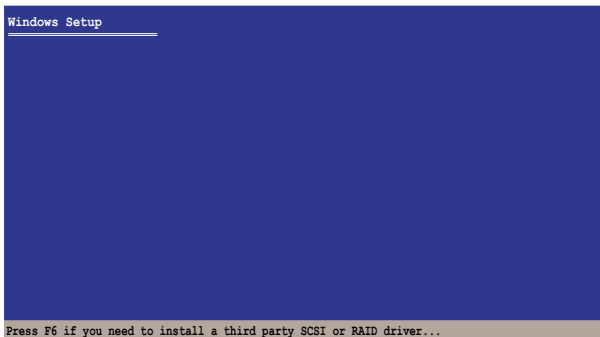
2.   Press <F6> when the message "Press F6 if you need to install a third party SCSI or RAID driver..." appears at the bottom of the screen.

3.   When prompted, press <S> to specify an additional device.

```
Windows Setup


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(s):

    <none>

  * To specify additional SCSI adapters, DVD-ROM drives, or special
    disk controllers for use with Windows, including those for
    which you have a device support disk from a mass storage device
    manufacturer, press S.

  * If you do not have any device support disks from a mass storage
    device manufacturer, or do not want to specify additional
    mass storage devices for use with Windows, press ENTER.


  S=Specify Additional Device    ENTER=Continue    F3=Exit
```

4. Insert the RAID driver disk you created earlier to the floppy disk drive, then press <Enter>.

```
Windows Setup



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







ENTER=Continue      ESC=Cancel     F3=Exit
```
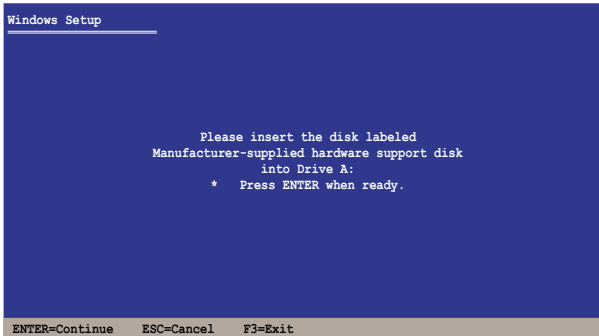
5. Select the RAID controller driver you need from the list, then press <Enter>.

6. The Windows® Setup loads the RAID controller drivers from the RAID driver disk. When prompted, press <Enter> to continue installation.

7. Setup then proceeds with the OS installation. Follow screen instructions to continue.

To an existing Windows® Server OS

To install the RAID controller driver on an existing Windows® Server OS

1. Restart the computer, and then log in with **Administrator** privileges.

2. Windows® automatically detects the RAID controller and displays a **New Hardware Found** window. Click **Cancel**.

3. Right-click the **My Computer** icon on the Windows® desktop, and then select **Properties** from the menu.

4. Click the **Hardware** tab, and then click the **Device Manager** button to display the list of devices installed in the system.

5. Right-click the **RAID controller** item, then select **Properties**.

6. Click the **Driver** tab, and then click the **Update Driver** button.

7. The **Upgrade Device Driver Wizard** window appears. Click **Next**.

8. Insert the RAID driver disk you created earlier to the floppy disk drive.

9. Select the option **Install the software automatically (Recommended)**, and then click **Next**.

10. The wizard searches the RAID controller drivers. When found, click **Next** to install the drivers.

11. Click **Finish** after the driver installation is done.

To verify the RAID controller driver installation:

1. Right-click the **My Computer** icon on the Windows® desktop, and then select **Properties** from the menu.

2. Click the **Hardware** tab, and then click the **Device Manager** button.

3. Click the "+" sign before the item **SCSI and RAID controllers**, and then the **Intel(R) ICH8R/ICH9R/ICH10R/DO SATA RAID Controller** item should appear.
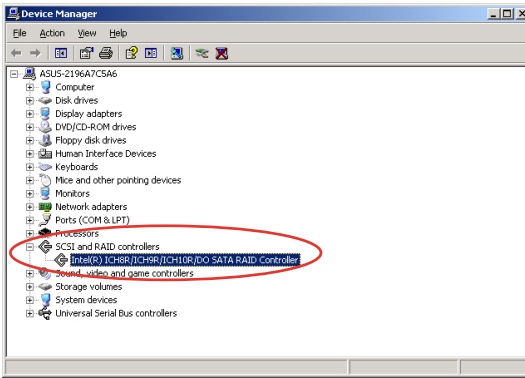
The screen differs based on the controller.

4. Right-click the **RAID controller** driver item, and then select **Properties** from the menu.

5. Click the **Driver** tab, and then click the **Driver Details** button to display the RAID controller drivers.

6. Click **OK** when finished.

Red Hat® Enterprise

To install the RAID controller driver when installing Red Hat® Enterprise OS

1. Boot the system from the Red Hat® Installation DVD.

2. At the **boot:**, type **linux dd** , then press <Enter>.

```
- To install or upgrade in graphical mode, press the <ENTER> key.
- To install or upgrade in text mode, type: linux text <ENTER>.
- Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: linux dd
```

3. Select **Yes** using the <Tab> key when asked if you have the driver disk, then press <Enter>.

```
                ┤ Main Menu ├

        Do you have a driver disk?




            Yes              No

```
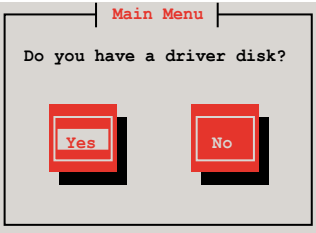
4. Select **fd0** using the <Tab> key when asked to select the driver disk source. Press <Tab> to move the cursor to **OK**, then press <Enter>.

```
            ┤ Driver Disk Source ├

        You have multiple devices which could
        serve as sources for a driver disk.
        Which would you like to use?


                   fd0
                  sDVD0


            OK              Cancel

```
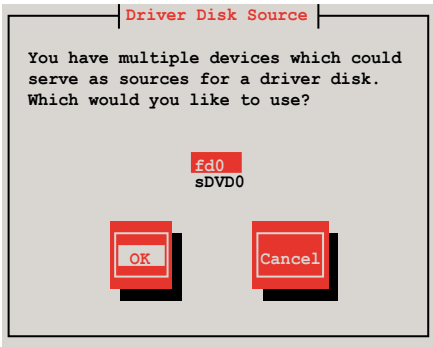
5.   Insert the Red Hat® Enterprise RAID driver disk to the floppy disk drive, select
      OK, then press <Enter>.

```
                    ┤ Insert Driver Disk ├

      Insert your driver disk into /dev/fd0
      and press "OK" to continue.



              OK                Back


```
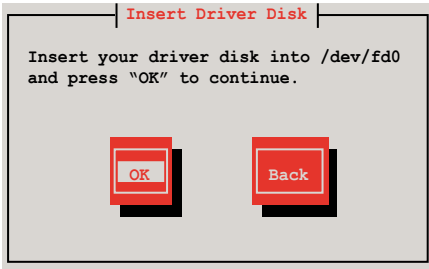
The drivers for the RAID card are installed to the system.

6.   When asked if you will load additional RAID controller drivers, select **No**, then
      press <Enter>.

```
                 ┤ More Driver Disks? ├

      Do you wish to load any more
      driver disks?



            Yes              No


```
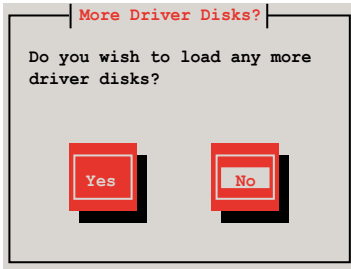
7.   Follow the screen instructions to continue the OS installation.

SUSE Linux OS

To install the RAID controller driver when installing SUSE Linux Enterprise Server OS

1. Boot the system from the SUSE OS installation DVD.

2. Use the arrow keys to select **Installation** from the **Boot Options** menu.

```
                    Boot from Hard Disk
                    Installation
                    Installation--ACPI Disabled
                    Installation--Local APIC Disabled
                    Installation--Safe Settings
                    Rescue System
                    Memory Test



              Boot Options |

 F1 Help  F2 Language  F3 1280 x 1024  F4 DVD  F5 Driver
```
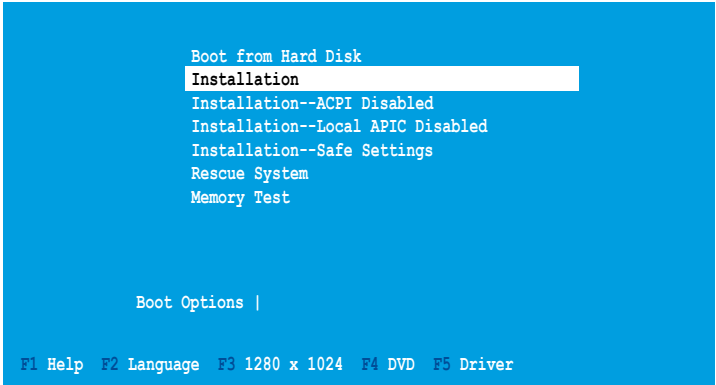
3. Press <F5>, then select **Yes** from the menu. Press <Enter>.

```
                    Boot from Hard Disk
                    Installation
                    Installation--ACPI Disabled
                    Installation--Local APIC Disabled
                    Installation--Safe Settings
                    Rescue System
                    Memory Test



                                        Yes
                                        No
              Boot Options |            File

 F1 Help  F2 Language  F3 1280 x 1024  F4 DVD  F5 Driver
```
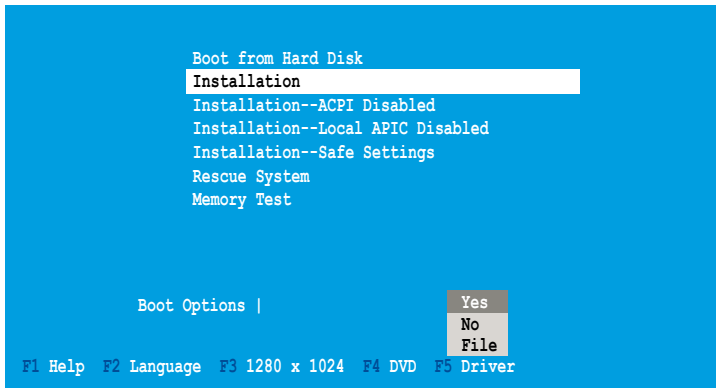
4. Insert the RAID driver disk to the floppy disk drive. Make sure that **Installation** from the **Boot Options** menu is selected, then press <Enter>.

```
                    Boot from Hard Disk
                    Installation
                    Installation--ACPI Disabled
                    Installation--Local APIC Disabled
                    Installation--Safe Settings
                    Rescue System
                    Memory Test



              Boot Options |


 F1 Help  F2 Language  F3 1280 x 1024  F4 DVD  F5 Driver
```
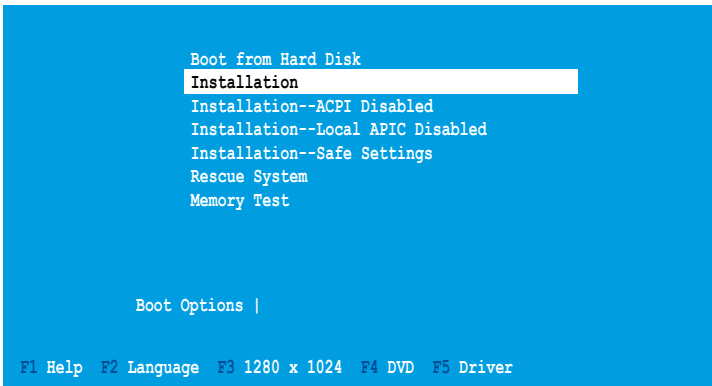
5. When below screen appears, select the floppy disk drive (fd0) as the driver update medium. Select **OK**, then press <Enter>.

```
  Please choose the Driver Update medium.

   fd0: Floppy
   sr0: DVD-ROM, TEAC DV-516E
   sda: Disk, SEAGATE ST336754SS
   sdb: Disk, SEAGATE ST336754SS
   Other device



        OK              Back
```
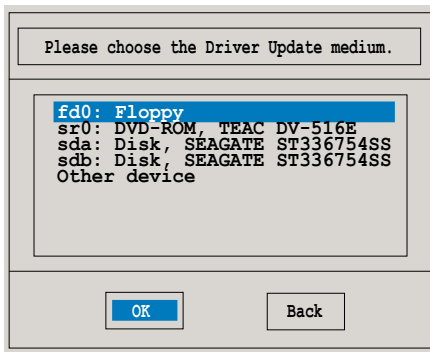
The drivers for the RAID controller are installed to the system.

7.2 Intel® chipset device installation

This section provides instructions on how to install the Plug and Play components for the Intel® chipset on the system.

You need to manually install the Intel® chipset software on a Windows Server operating system. To install the Intel® chipset device software:

1. Restart the computer, then log on with **Administrator** privileges.

2. Insert the motherboard/system support DVD to the optical drive. The support DVD automatically displays the **Drivers** menu if Autorun is enabled in your computer.

3. Click the item **Intel Chipset Device Software** from the menu.

4. The **Intel(R) Chipset Device Software** window appears. Click **Next** to start installation.

5.   Select **Yes** to accept the terms of the **License Agreement** and continue the process.

6.   Read the **Readme File Information** and press **Next** to continue the installation.
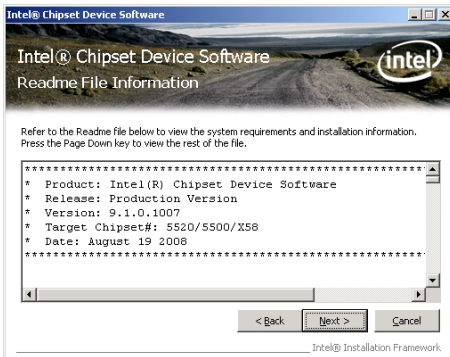
7.   After completing the installation, click **Finish** to complete the setup process.

7.3 LAN driver installation

This section provides instructions on how to install the Intel® Gigabit LAN controller drivers on a Windows® Server OS.

To install the LAN controller drivers

1. Restart the computer, and then log on with Administrator privileges.

2. Insert the motherboard/system support DVD to the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer.

> • Windows® automatically detects the LAN controllers and displays a New Hardware Found window. Click **Cancel** to close this window.
>
> • If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

3. Click the **Intel Network Connections Software** to begin installation.
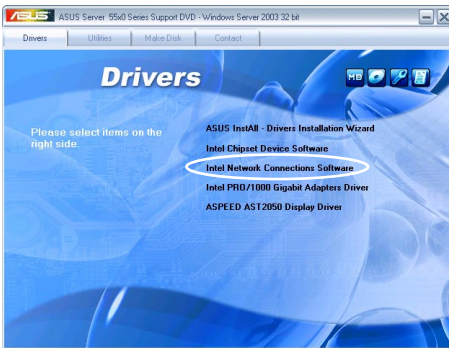
4. Click **Install Drivers and Software** option to begin installation.
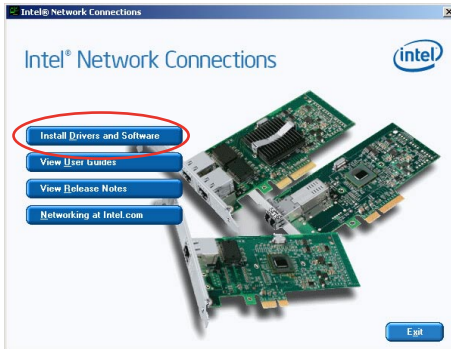
5. Click **Next** when the **Intel(R) Network Connections–InstallShield Wizard** window appears.
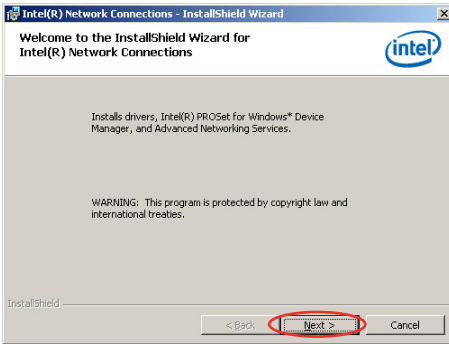
6. Toggle **I accept the terms in the license agreement** and click **Next** to continue.
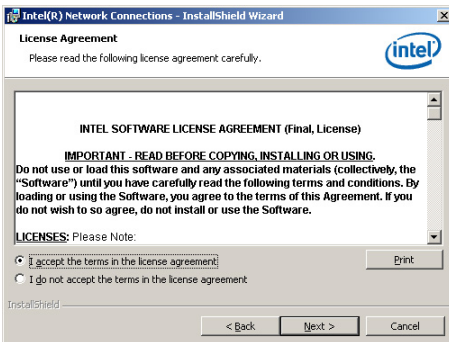
7. Click the **Intel(R) PROSet for Windows Device Manager** box, and then click **Next** to start the installation.
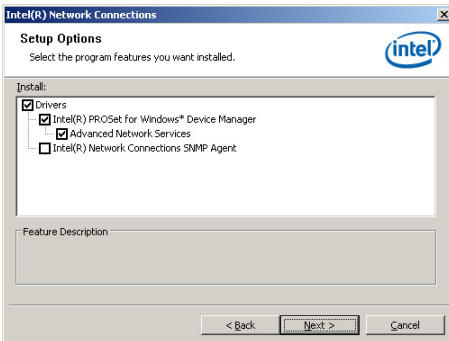
8. Follow the screen instructions to complete installation.
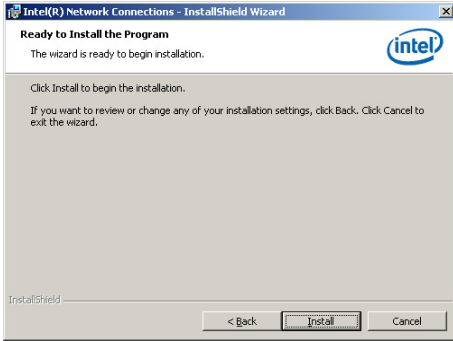
9. When finished, press **Finish** to continue.
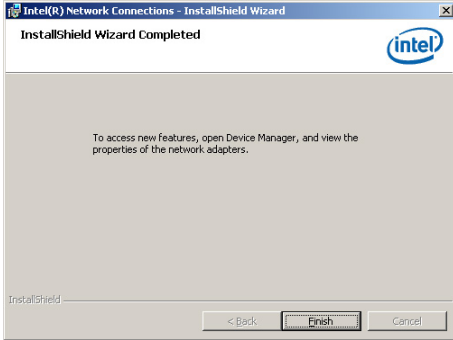
7.4   VGA driver installation

This section provides instructions on how to install the Aspeed® AST2050 Video Graphics Adapter (VGA) driver.

You need to manually install the Aspeed® AST2050 VGA driver on a Windows® Server operating system.

To install the Aspeed® AST2050 VGA driver

1.   Restart the computer, then log on with Administrator privileges.
2.   Insert the motherboard/system support DVD to the optical drive. The support DVD automatically displays the Drivers menu if Autorun is enabled in your computer.

     The **Drivers** menu if Autorun is enabled in your computer.

3.   Click **Next** to start the installation.
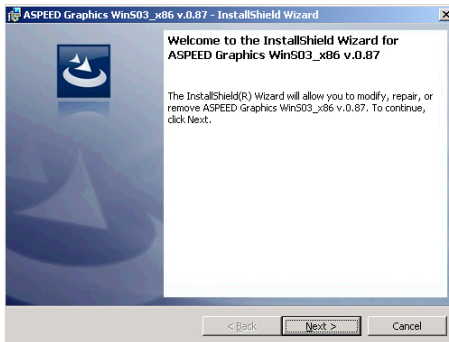
4. Click **Install** to update the VGA driver.
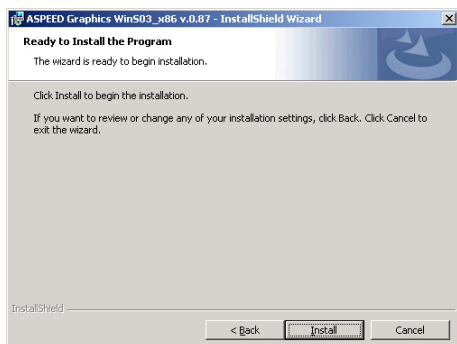
5. When the installation completes, click **Finish** to restart your computer before using the program.
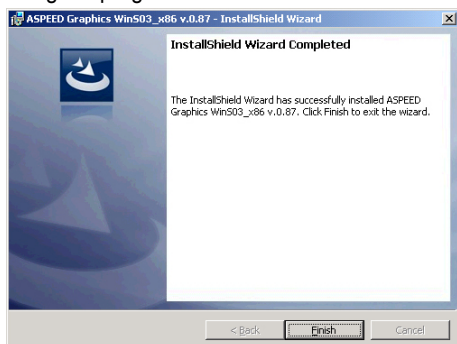
7.5 Management applications and utilities installation

The support DVD that came with the motherboard package contains the drivers, management applications, and utilities that you can install to avail all motherboard features.

> The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website (www.asus.com) for updates.

7.5.1 Running the support DVD

Place the support DVD to the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer.

> If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

7.5.2 Drivers menu

The Drivers menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to activate the devices.
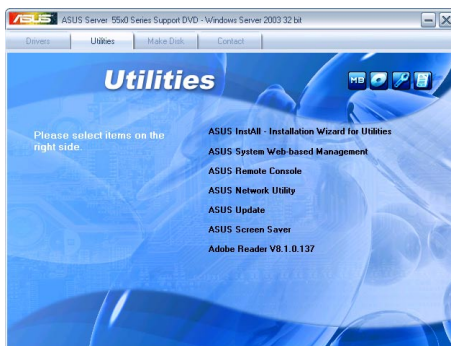
> The screen display and driver options vary under different operating system versions.
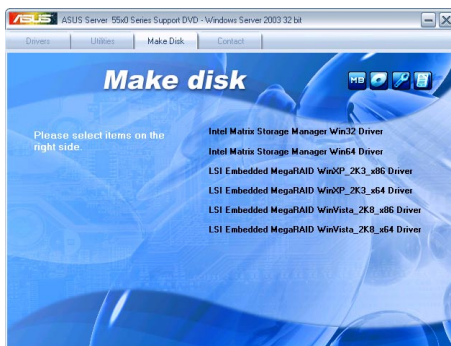
7.5.3 Utilities menu

The Utilities menu displays the software applications and utilities that the motherboard supports. Click an item to install.

7.5.4 Make disk menu

The Make disk menu contains items to create the Intel ICH10R and LSI MegaRAID driver disks.

7.5.5 Contact information

Click the Contact tab to display the ASUS contact information. You can also find this information on the inside front cover of this user guide.