HPC-2820-ISSE

2U DP Xeon HPC system w/12*FBD,
8*SAS, Dual GbE

E3078
First Edition V1.00
February 2007

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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.

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, make sure 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 barebone server, including sections on the 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 prepare the barebone server for rack mounting.

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 setup**

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

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.

8. **Appendix: References**

   This appendix includes additional information that you may refer to when configuring your barebone server.

Conventions

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

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 information to aid in completing a task.

CHAPTER 1

Product Introduction

1.1 System package contents

Check your system package for the following items.

Chassis	2U rackmount chassis
Motherboard	HPC-2820-ISSE motherboard
Components	1 x 750W redundant power supply module, 115V~230V
	1 x power supply bay cover
	Slim optical drivel
	Slim floppy disk drive
	Chassis fan
	HDD fan
	Hot-swap SAS HDD trays
	SAS backplanes
	1 x Dummy CPU heatsink
Cables	AC power cable
	System cables
Accessories	Rackmount rail kit
	HPC-2820-ISSE user guide
	HPC-2820-ISSE support CD (includes ASWM*)
	Chassis ears (left, right)
	One bag of screws
Optional items	CPU heatsink
	LAN adapter
	Front bezel
	SAS ZCR package
	Second redundant power supply module

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

1.2 System specifications

The HPC-2820-ISSE is a 2U barebone server system. The server supports dual Intel® 5100 series CPU with EM64T technology, plus other latest technologies through the chipsets onboard.

Chassis	2U rackmount chassis
Motherboard	HPC-2820-ISSE
Chipset	MCH : Intel® 5000P ICH : Intel® 6321ESB I/O Bridge : Intel 6702 PXH (on the riser card cage)
CPU	Dual LGA771 sockets for Intel® Xeon™ Dual Core processors 5000/5100/5300 Series Supports Intel® Extended Memory 64Technology (EM64T)
Front Side Bus	1333/1066/667 MHz
Memory	Quadri-channel memory architecture 12 x 240-pin FB-DIMM sockets support registered ECC fully buffered DDR2-533/DDR2-667 memory modules with Advanced Memory Buffer (AMB chip) Supports 256 MB up to 48 GB system memory
LAN	Intel® 82563 Gigabit Network Connection (Dual-port) - Supports Intel® I/O Acceleration Technology (IOAT)
Discrete graphics	ATI® ES1000 PCI display controller - Supports 32 MB display memory
Expansion slots	1 x PCI Express™ x8 slot (on the riser card cage) 2 x PCI-X 133/100 MHz slot (on the riser card cage; only 1 PCI-X available if you install an optional ZCR.) 1 x DDR2 SO-DIMM socket for server management board 3 series
Storage	LSI1068 PCI-X SAS controller supports: - 2 x Serial Attached SCSI (SAS) channels (each channel supports 4 HDDs, total 8 HDDs) with RAID 0, RAID 1, and RAID 1E configuration - Zero-Channel RAID (optional)

(continued on the next page)

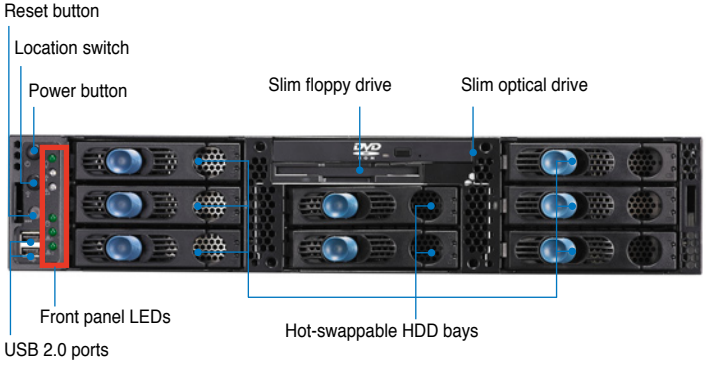
Front panel	8 x 3.5-inch hot-swappable HDD bays 1 x slim optical drive 1 x slim 1.44MB floppy drive) 2 x USB 2.0 ports Power switch Reset switch Location switch Power, HDD access, location, message, LAN 1/2 LED HDD LEDs: Status, activity
Rear panel	1 x PS/2 keyboard port 1 x PS/2 mouse port 1 x Serial port 1 x VGA port 2 x USB 2.0 ports 2 x RJ-45 ports (with LEDs) 1 x Location switch 1 x Location LED
Management	Server Web-based Management
Hardware monitors	Voltage, temperature, and fan speed monitoring Automatic System Restart (ASR) feature
Power supply	1 + 1 750W redundant power supply, 115V~230V, 50Hz~60Hz
Dimensions	732.5mm (l) x 448mm (w) x 87.7mm (h)

The standard server system ships with one redundant power supply module. Contact your retailer if you need a second one.

Refer to “Chapter 4 Motherboard information” for details on the internal connectors.

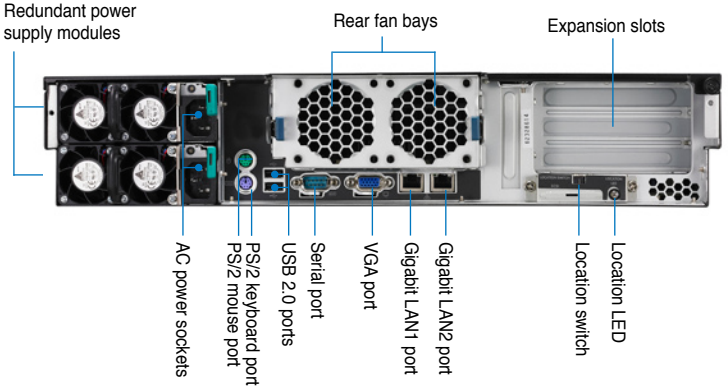
1.3 Front panel features

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



1.4 Rear panel features

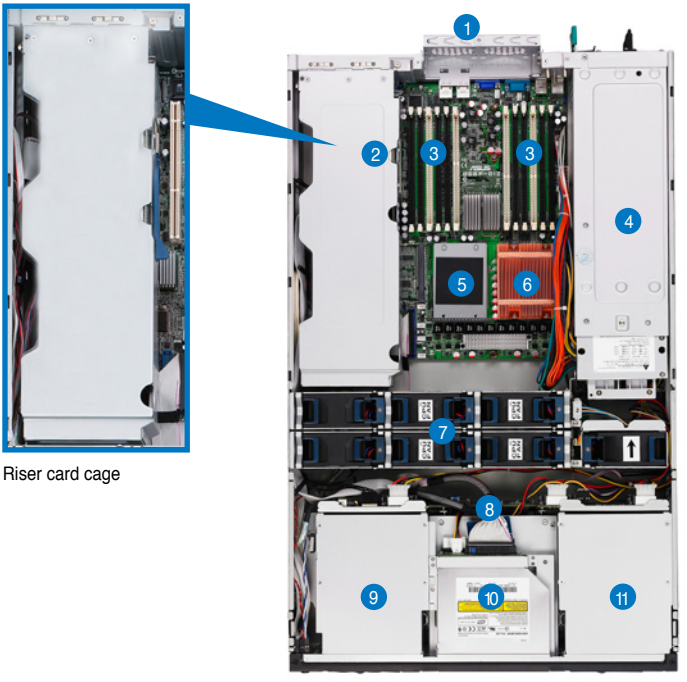
The rear panel includes the expansion slots, LAN, VGA, and I/O ports, fans, and the system power sockets.



When disconnecting LAN cables, you need to remove the rear fan cage. Refer to section “2.7 Removable components” for instructions on removing the fan cage.

1.5 Internal features

The barebone system includes the basic components as shown.



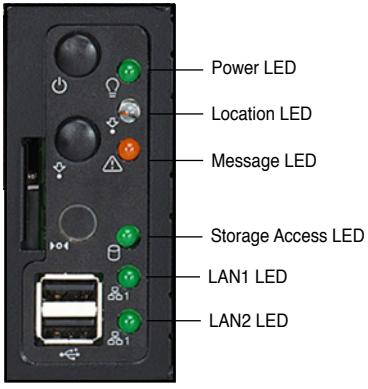
Riser card cage

1. 2 x rear fan bays (for future upgrade)
2. PCI-E slots (underneath the riser card cage)
3. 12 x FB-DIMM sockets
4. Power supply module
5. CPU2 socket
6. CPU1 socket
7. 7 x system fans
8. SAS backplane
9. 3 x HDD
10. Top: Slim optical drive
    Mid: Slim floppy drive
    Bottom: 2 x HDD
11. 3 x HDD

The air duct lies on top of the motherboard components. Remove the air duct to access the components. Refer to section "2.1.4 Removing and installing the air duct" for instructions.

1.6 LED information

1.6.1 Front panel LEDs



LED	Icon	Display status	Description
Power LED		ON	System power ON
Storage 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)
LAN1/2 LEDs		OFF Blinking ON	No LAN connection LAN is transmitting or receiving data LAN connection is present

The location switch and LED are for service purposes. When the system fails or is shut down, the server administrator can press either the front or the rear location switch to identify the location of the specific 2U system in a rack cabinet.

1.6.2 System fan LED

Each system fan has an LED to indicate the fan status.

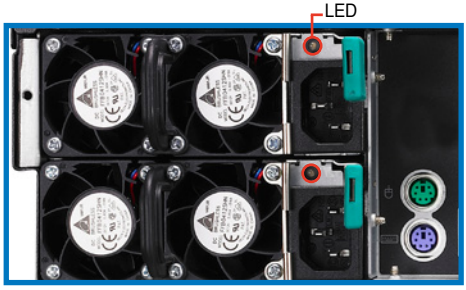
LED

LED	Color	Description
LED	Green	Fan is in normal operation
	Orange	Fan is faulty

This function only works under OS and the system has installed ASWM Software.

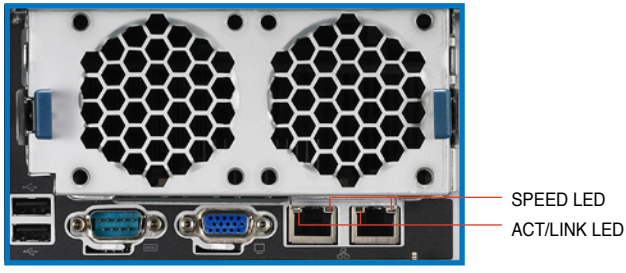
1.6.3 Power supply LED

Each system fan has an LED to indicate the fan status.



LED color	Display status	Description
Green	Blinking	Power off and in standby mode
Green	On	The power supply module is in normal operation
Orange	On	One of the two power modules is disconnected from the power outlet or is defective
Off	Off	Both power supply modules are disconnected from the power outlet or are defective

1.6.4 LAN port LEDs



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

CHAPTER 2

Hardware Setup

2.1 Chassis cover

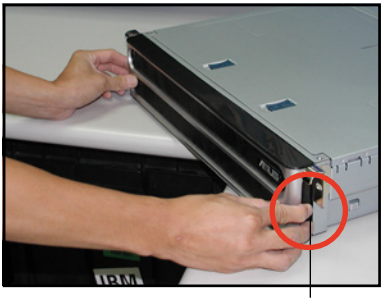
The chassis features a “screwless design” that allows convenient assembly and disassembly.

- Remove the front bezel to access the hot-swap HDDs, optical drive, and floppy drive.
- Remove the chassis cover to access the internal components or if you want to install system devices.

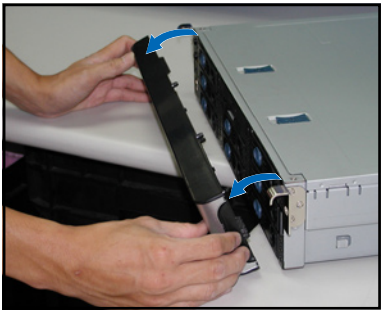
2.1.1 Removing the front bezel

To remove the front bezel:

1. Hold the sides of the front bezel, then slightly press the middle part to disengage it from the front panel.



2. Pull the bezel from the front panel.



The front bezel is purchased separately.

2.1.2 Removing the top cover

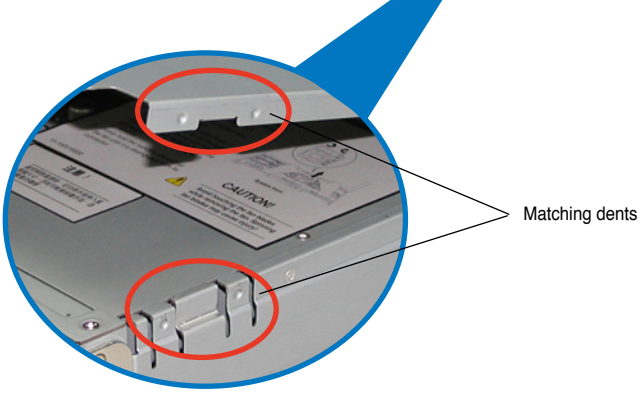
Front half

To remove the front half of the top cover:

1. Push the two sliding locks on the top cover to release.

2. With both hands, flip up the front corners of the top cover, then lift.

   The front corners of the cover have dents that match those on the chassis. These dents provide a holding mechanism and keeps the cover in place even when the sliding locks are released.



If you wish to access the hot-swappable system fans, backplanes, optical drive, and floppy disk drive, just remove the front half of the top cover.

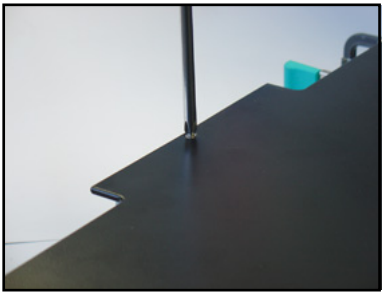
Rear half

You need to remove the front half of the top cover before you can remove the rear half of the top cover. Refer to section “2.1.2 Removing the top cover (front half)” for instructions.

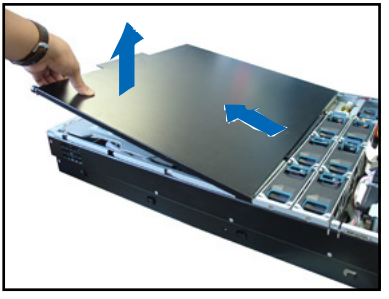
To remove the rear half of the top cover:

1. Loosen the thumbscrew that secures the top cover on the rear part of the chassis.

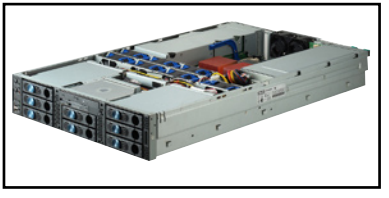
2. Remove the screw on the rear half of the cover.



3. Firmly hold the rear half of the top cover, then remove it from the chassis.



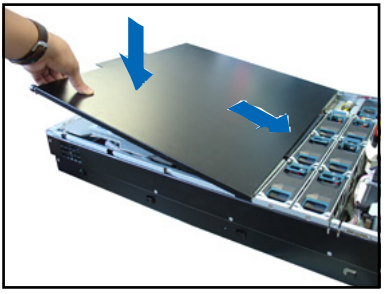
The barebone server without the top cover is shown on the right.



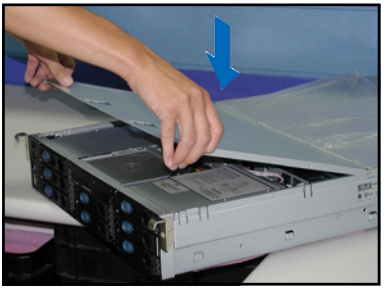
2.1.3 Installing the top cover

To install the top cover:

1. Place the rear half of the top cover over the chassis as shown, and align the mid-hooks with the notches on the sides.
2. Slide the cover toward the front panel until the mid-hooks are locked into the notches.

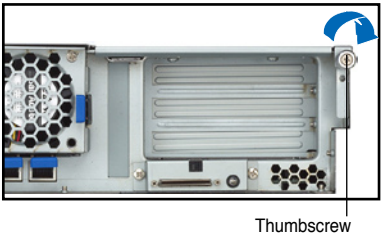


3. Flip down the front half part of the top cover.

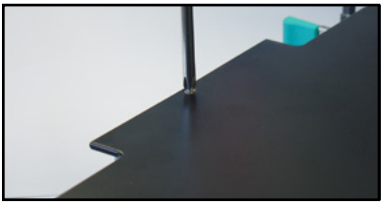


4. Push the sliding locks toward the front edge to secure the front half of the top cover in place.

5. Tighten the thumbscrew on the rear corner of the cover to completely secure the top cover.



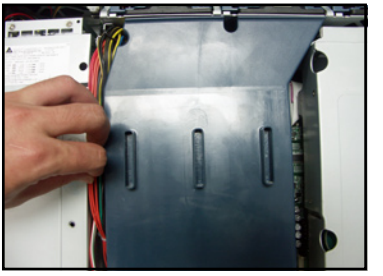
6. Replace the screw on the rear half of the cover.



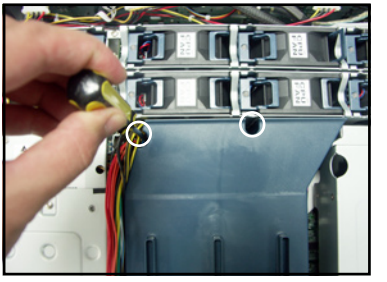
2.1.4 Removing the air duct

To remove the air duct:

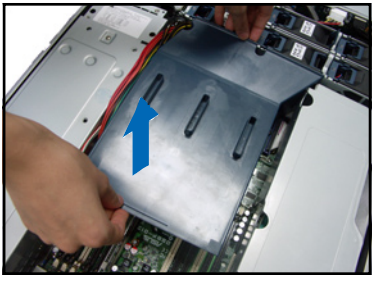
1. Carefully route the cables that may interfere when removing the air duct.



2. Loosen the two screws that fasten the air duct.



3. Hold the rear part of the air duct and press it for about a fraction of an inch, just enough to tilt the front end. When tilted, carefully pull the air duct upward to release it from the chassis.

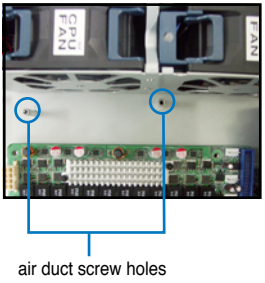


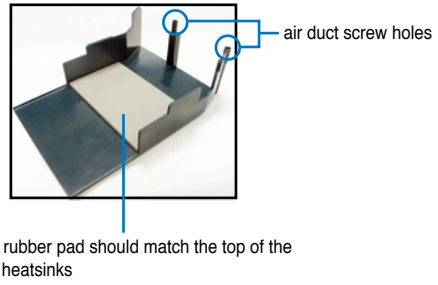
Be careful not to pull off or break any cables while removing the air duct.

2.1.5 Installing the air duct

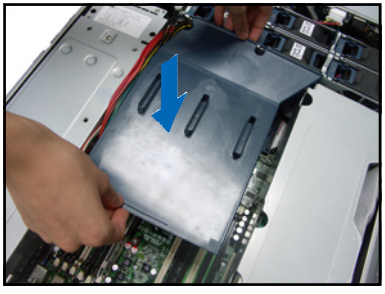
To install the air duct:

1. Take note of the parts of the air duct that should match specific locations inside the chassis.



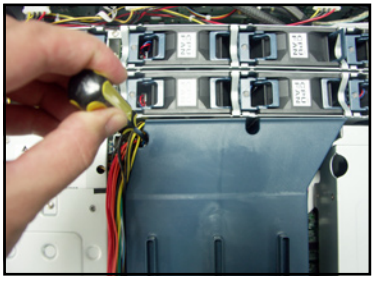


2. Position the air duct inside the chassis aligning with the two air duct screw holes.
3. Check the rubber pads underneath the air duct and ensure that they are in place; otherwise, the air duct will not fit properly.
4. Fit the other end of the air duct making sure that no power cable is strayed under it.



Be careful not to pull off or break any cables while installing the air duct.

5. Fasten the air duct with screws.

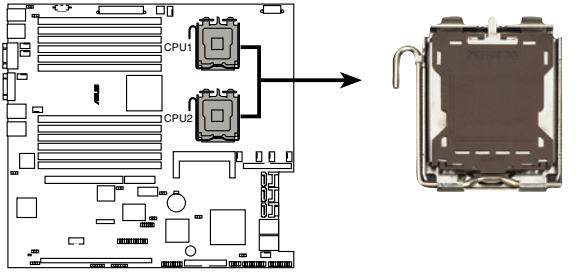


6. When the air duct is in place, arrange the power cable cluster to fit the space beside the air duct.

2.2 Central Processing Unit (CPU)

The motherboard comes with two surface mount 771-pin socket and designed for the Intel® Xeon™ processors.

Note in the illustration that the CPU has a gold triangular mark on one corner. This mark indicates the processor Pin 1 that should match a specific corner of the CPU socket.



CPU LGA771

2.2.1 Installing a CPU

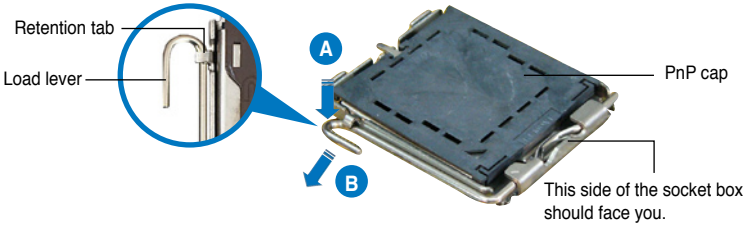
- The motherboard supports either one or two CPUs. If you are installing only one CPU, you MUST install it in CPU socket 1.
- Remove the dummy heatsink if you want to install the second CPU.

To install a CPU:

1. Locate the CPU socket on the motherboard.

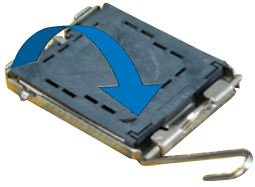
Incorrect installation of the CPU into the socket may bend the pins and severely damage the CPU!

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

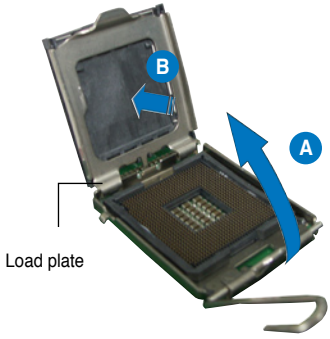


To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

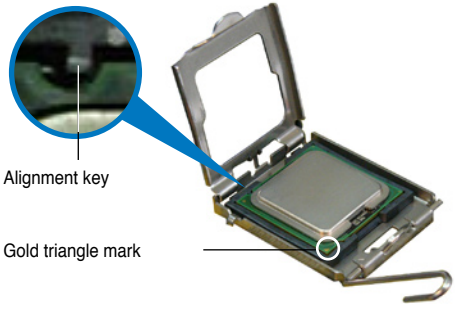
3. Lift the load lever in the direction of the arrow to a 135º angle.



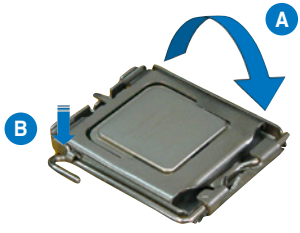
4. Lift the load plate with your thumb and forefinger to a 100º angle (A), then push the PnP cap from the load plate window to remove (B).



5. Position the CPU over the socket, making sure that the gold triangle is on the bottom-left corner of the socket. The socket alignment key should fit into the CPU notch.



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



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!

2.2.2 Installing the CPU heatsink

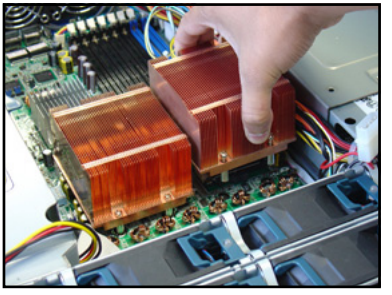
According to your purchase, the sever system may ship with different CPU and heatsink combination:

Two CPUs	One CPU	No CPU
Two heatsinks	One heatsink One dummy heatsink (on the CPU 2 socket)	One dummy heatsink (on the CPU 2 socket)

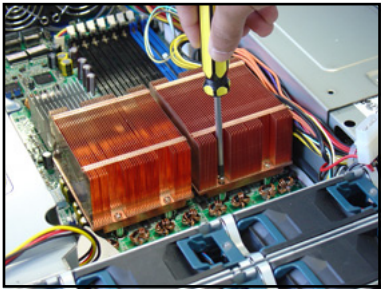
You must install the CPU heatsink(s) after installing the CPU(s). If your model is not included heatsinks, you can either purchase heatsink separately from retailer or purchase an Intel 2U box CPU.

To install the CPU heatsink:

1. Carefully align the heatsink screws to the screw holes on the motherboard.



2. Use a Phillips (cross) screwdriver to fasten screws, two at a time in a diagonal sequence.



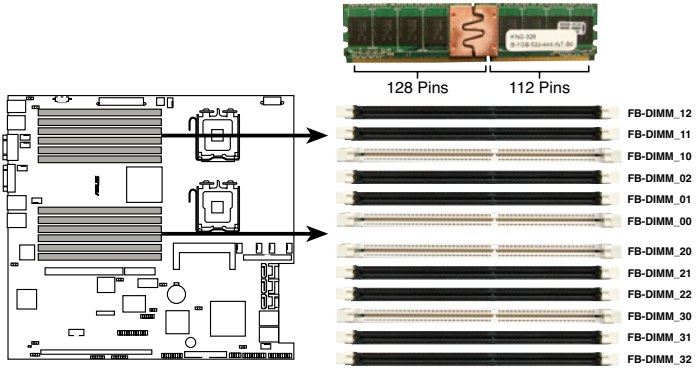
3. For the second CPU heatsink installation, repeat the previous steps.

- If there is a dummy heatsink, unscrew and remove it first before installing the second real heatsink.
- DO NOT remove the dummy heatsink if there is only one CPU installed. The CPU 1 may be overheated and damaged with the removal of the dummy heatsink.

2.3 System memory

The motherboard comes with 12 fully-buffered DIMM (FB-DIMM) sockets to support 240-pin FB-DIMM modules. An FB-DIMM module has a different pin-out from DDR2 DIMMs so you cannot install DDR2 DIMMs on an FB-DIMM socket. Note that an FB-DIMM socket has an Advanced Memory Buffer (AMB) chip that allows memory-to-CPU connection at gigabit speed.

The figure illustrates the location of the FB-DIMM sockets:



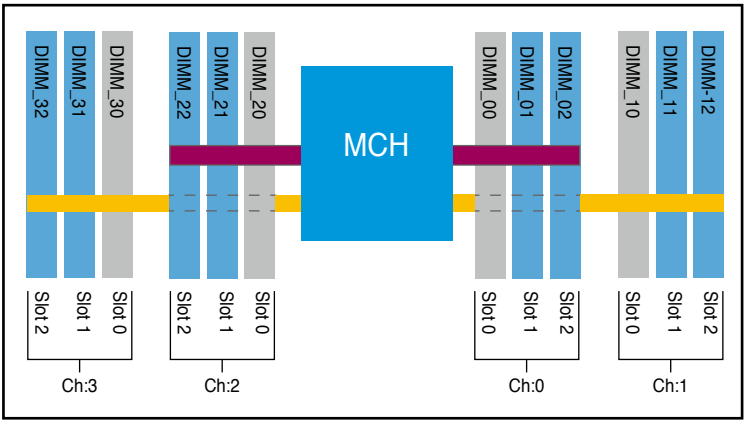
240-pin FB-DIMM sockets

2.3.1 Memory configurations

You may install 512 MB, 1 GB, 2 GB, and 4 GB registered ECC FB-DIMMs into the DIMM sockets.

- For optimum compatibility, we recommend that you obtain memory modules from the same vendor.
- This motherboard does not support memory modules made up of 128 Mb chips or double-rank x16 memory modules.
- If you are installing only one memory module, install into the white socket labeled DIMM_00. Installing into any other socket will not work.

Rank population



DIMM installation reference table

No. of DIMMs	Slot/s to use	Memory architecture
1	DIMM_00	Single channel
2	DIMM_00, DIMM_10	Dual channel
4	DIMM_00, DIMM_10, DIMM_20, DIMM_30	Quadri channel
8	DIMM_00, DIMM_10, DIMM_20, DIMM_30 DIMM_01, DIMM_11, DIMM_21, DIMM_31	
12	DIMM_00, DIMM_01, DIMM_02 DIMM_10, DIMM_11, DIMM_12 DIMM_20, DIMM_21, DIMM_22 DIMM_30, DIMM_31, DIMM_32	

DIMMs in pair means two DIMMs with the same configuration.

2.3.2 Memory mirroring and sparing technology

The Intel® 5000P chipset supports the memory mirroring and sparing technology. Refer to the below sections:

Memory Mirroring

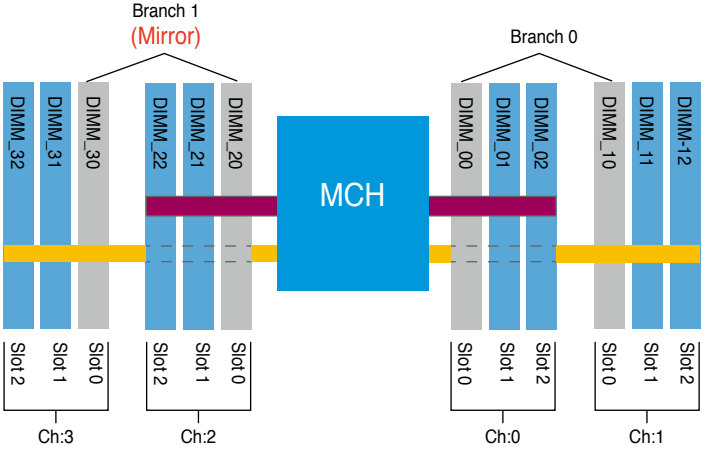
When enabling memory mirroring function in the BIOS setting (refer to section **"5.4.2 Chipset Configuration" and configure the option "Memory Branch Mode" as Mirror)**, Branch 1 contains a replicate copy of the data in Branch 0. The DIMMs must cover the same slot position on both branches. DIMMs that cover a slot position must be identical with respect to size, speed, and organization. DIMMs within a slot position must match each other, but are not required to match adjacent slot positions.

The total memories size will be the half of all installed memories.

The below memory configurations were required to operate in mirrored mode.

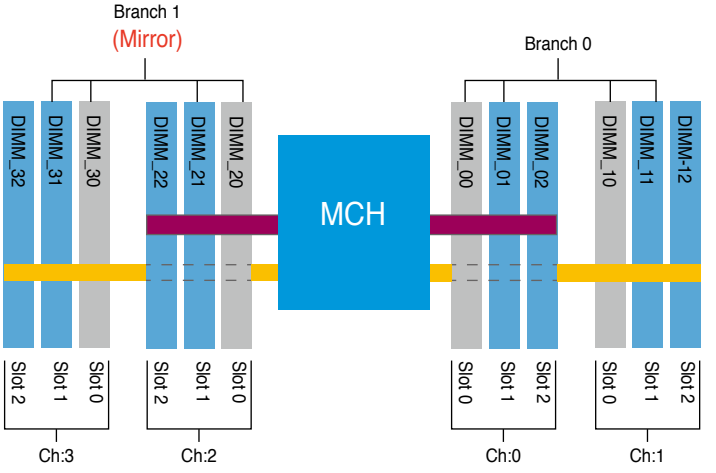
Configuration 1 (Mirroring): Four memories population

DIMMs are installed in the following slots: DIMM_00, DIMM_10, DIMM_20, and DIMM_30.



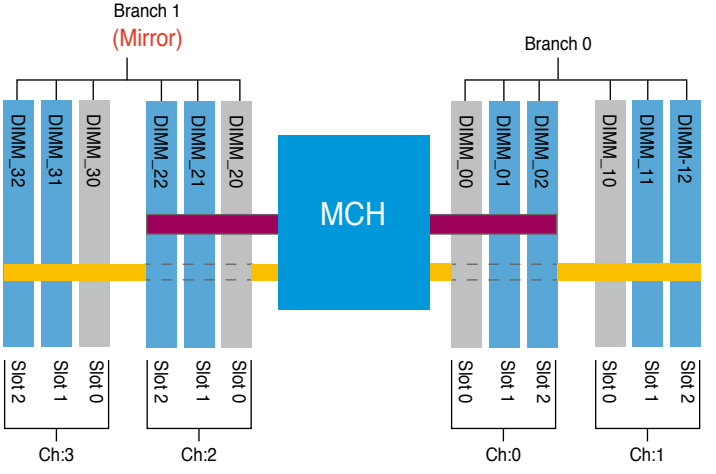
Configuration 2 (Mirroring) : Eight memories population

DIMMs are installed in the following slots: DIMM_00, DIMM_01, DIMM_10, DIMM_11, DIMM_20, DIMM_21, DIMM_30, and DIMM_31.



Configuration 3 (Mirroring) : Twelve memories population

DIMMs are installed in all slots: DIMM_00, DIMM_01, DIMM_02, DIMM_10, DIMM_11, DIMM_12, DIMM_20, DIMM_21, DIMM_22, DIMM_30, DIMM_31, and DIMM_32.



Memory Sparing

At configuration time, a DIMM rank is set aside to replace a defective DIMM rank. When the error rate for a failing DIMM rank reaches a pre-determined threshold, the memory sparing function will issue an interrupt and initiate a spare copy. At the completion of the copy, the failing DIMM rank is disabled and the “spared” DIMM rank will be used in its place. Refer to section “5.4.2 Chipset Configuration and configure the options of “Branch 0 Rank Sparing” or “Branch 1 Rank Sparing” to enable the memory sparing functions. The default BIOS setting is disabled.

- Each branch contains its own sparing engine and can be enabled or disabled separately.
- This motherboard does not support rank sparing across branches.
- This motherboard does not support rank sparing when in mirror mode.
- The DIMM rank with the largest size will be assigned as spare rank. Data can only be copied from a smaller sized rank to a larger sized one.
- A DIMM can contain only one or two ranks. To support sparing function, a DIMM channel should contain at least two ranks.
- When sparing function is enabled, the usable memory size will reduce the size of the spare ranks.

The following tables show memory configurations with Memory Sparing function in Branch 0.

One DIMM per channel (two ranks)

		Channel 0		Channel 1	
		DIMM_00 (1024MB*2 Ranks)		DIMM_10 (1024MB*2 Ranks)	
Branch0		Rank 0 (1024 MB)	Rank 1 (1024 MB)	Rank 0 (1024 MB)	Rank 1 (1024 MB)
	Sparing		•		•
	Memory space	1024 MB		1024 MB	
	Total Memory	2048 MB			

Two DIMMs per channel

		Channel 0		Channel 1	
		DIMM_00 (512MB*2 Ranks)		DIMM_10 (512MB*2 Ranks)	
		Rank 0 (512 MB)	Rank 1 (512 MB)	Rank 0 (512 MB)	Rank 1 (512 MB)
Branch0	Sparing				
	Memory space	1024 MB		1024 MB	
		DIMM_01 (1024MB*2 Ranks)		DIMM_11 (1024MB*2 Ranks)	
		Rank 0 (1024 MB)	Rank 1 (1024 MB)	Rank 0 (1024 MB)	Rank 1 (1024 MB)
	Sparing		•		•
	Memory space	1024 MB		1024 MB	
	Total Memory	4096 MB			

Three DIMMs per channel

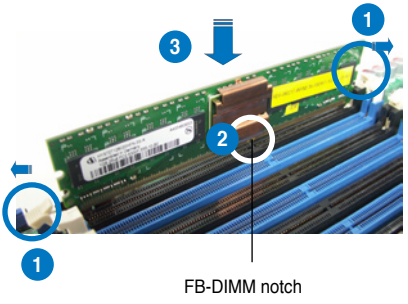
		Channel 0		Channel 1	
		DIMM_00 (512MB*2 Ranks)		DIMM_10 (512MB*2 Ranks)	
		Rank 0 (512 MB)	Rank 1 (512 MB)	Rank 0 (512 MB)	Rank 1 (512 MB)
Branch0	Sparing				
	Memory space	1024 MB		1024 MB	
		DIMM_01 (1024MB*2 Ranks)		DIMM_11 (1024MB*2 Ranks)	
		Rank 0 (1024 MB)	Rank 1 (1024 MB)	Rank 0 (1024 MB)	Rank 1 (1024 MB)
	Sparing				
	Memory space	1024 MB		1024 MB	
		DIMM_02 (2048MB*2 Ranks)		DIMM_12 (2048MB*2 Ranks)	
		Rank 0 (2048 MB)	Rank 1 (2048 MB)	Rank 0 (2048 MB)	Rank 1 (2048 MB)
	Sparing		•		•
	Memory space	2048 MB		2048 MB	
	Total Memory	10240 MB			

2.3.3 Installing a DIMM

Make sure 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.

To install a DIMM:

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

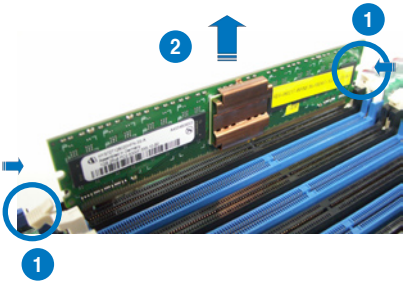


- A FB-DIMM is keyed with a notch so that it fits in only one direction. Do not force a DIMM into a socket to avoid damaging the DIMM.
- Thesockets do not support DDR/DDR2 DIMMs. DO NOT install DDR/DDR2 DIMMs to the FB-DIMM sockets.

2.3.4 Removing a DIMM

To remove a DIMM:

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



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

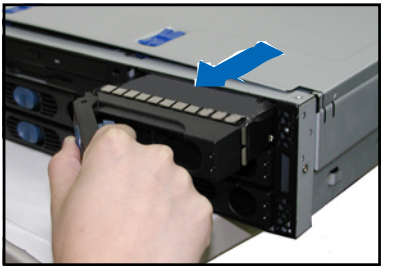
2. Remove the DIMM from the socket.

2.4 Hard disk drives

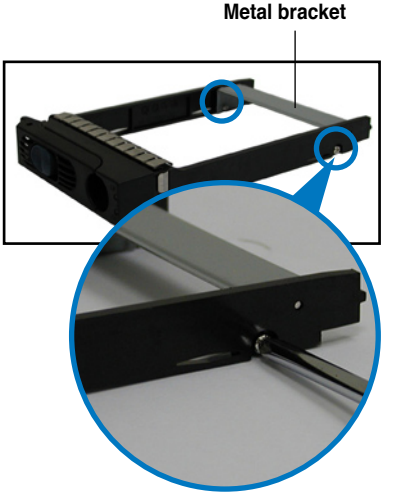
To install a hard disk drive:

1. Open the front bezel to access the hot-swap drive trays.
2. 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.

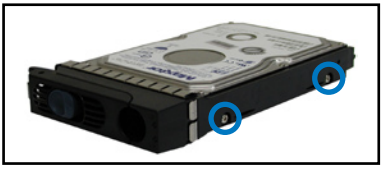
3. Firmly hold the tray lever and pull the drive tray out of the bay.



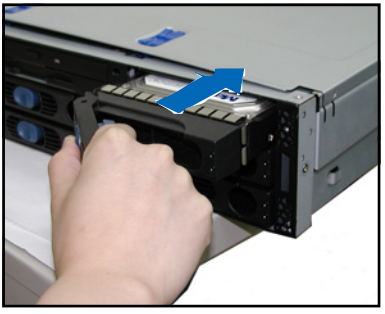
4. An empty drive tray includes a metal bracket for support. Use a Phillips (cross) screwdriver to remove the bracket if you wish to install a hard disk in the drive tray.



5. Place a hard disk drive into the drive tray, and secure it with four screws (two on each side).



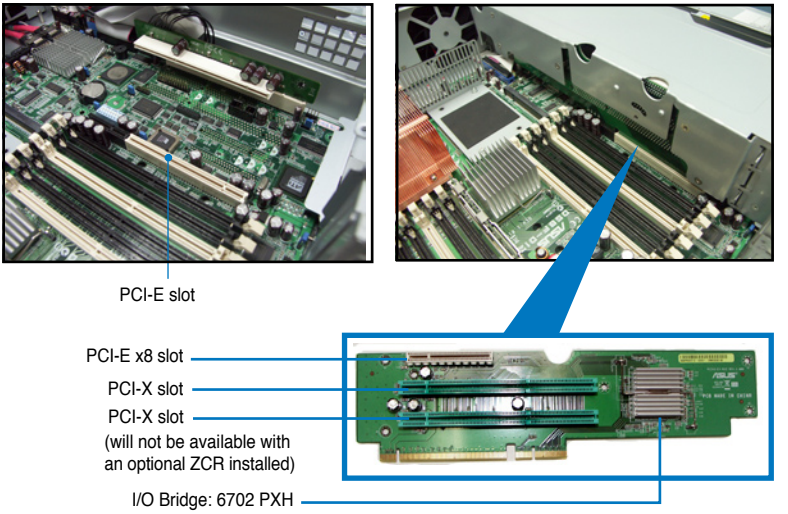
6. Carefully insert drive tray and push it all the way to the depth of the bay until just a small fraction of the tray edge protrudes.



7. 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.

2.5 Expansion cards

The system motherboard comes with one PCI-E expansion slots installed with the Riser cage to support three expansion cards. A ZCR slot is also available for installation of a Zero Channel RAID card.

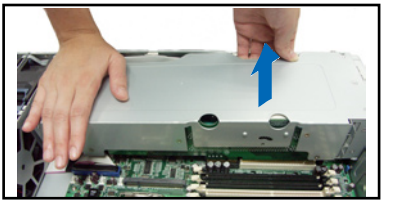


2.5.1 Installing a full-length expansion card

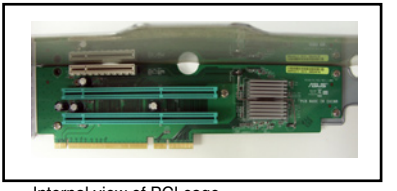
The full-length expansion cards are inside the PCI cage. If you wish to install full-length expansion cards, you need to remove the PCI cage from the chassis.

To install a full-length expansion card:

1. Firmly hold and lift the cage as shown to completely detach it from the chassis.

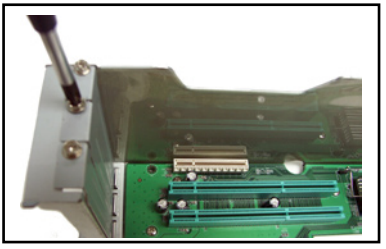


2. Place the cage on a flat stable surface with the slot facing up, and prepare the card that you want to install.

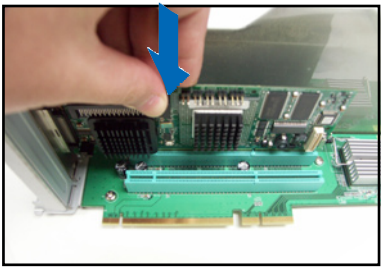


Internal view of PCI cage

3. Unscrew the metal cover opposite the PCI-X slot that you want to use.



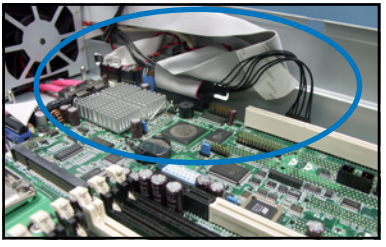
4. The card golden connectors should match the notches on the slot. Then, firmly push down the card until it is completely seated on the slot.
5. Secure the card bracket with a screw.
6. Connect power or signal cable(s) to the card, if applicable.



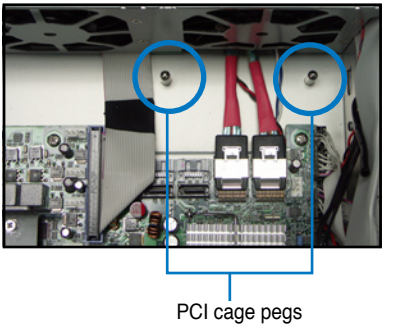
Repeat steps 3 to 6 if you wish to install other PCI-X cards.

7. Before re-installing the PCI cage into the chassis, check that all cables on the PCI cage bay are properly connected and routed.

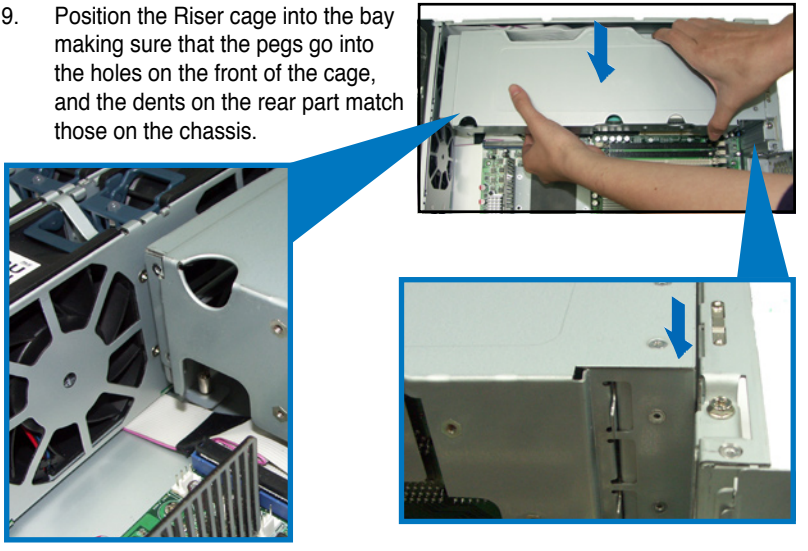
Cables on the PCI cage bay



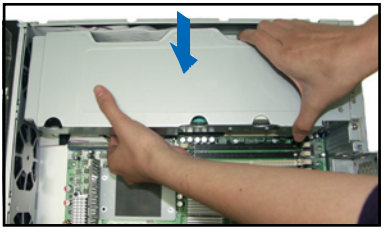
8. Take note of the two pegs on the Riser cage bay. These pegs should match the holes on the cage to make sure it fits in place.



9. Position the Riser cage into the bay making sure that the pegs go into the holes on the front of the cage, and the dents on the rear part match those on the chassis.



10. Match and push the cage card connector into the PCI-E slot until the PCI cage fits in place.



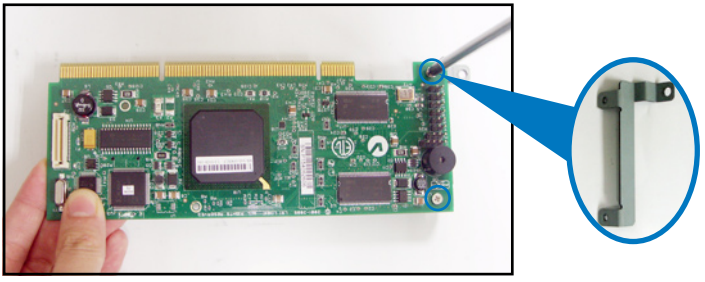
11. Ensure that the golden connectors of the riser cage card completely fit the slot. If properly installed, the top of the PCI cage aligns with the top edge of the rear panel.

2.5.2 Installing a ZCR card (optional)

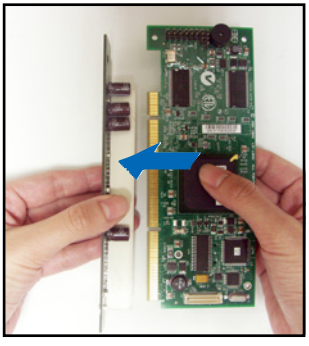
After installing a riser card, you can install a ZCR card to your motherboard that supports RAID 0, RAID 1, RAID 1-E and RAID 5 configuration. The optional ZCR package includes one LSI8300XCP ZCR card, two support brackets, and one riser card.

To install a ZCR card:

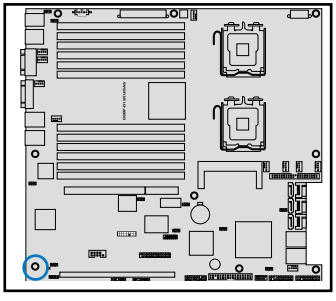
1. Screw the support bracket to the ZCR card.

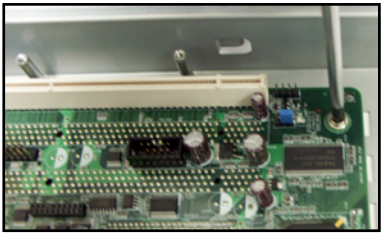


2. Install the ZCR card to the riser card.

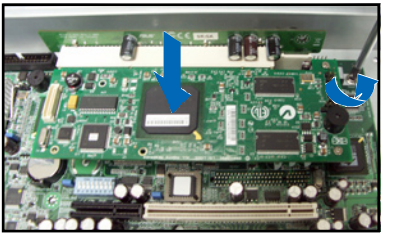


3. Remove one screw that fasten the motherboard to the chassis.



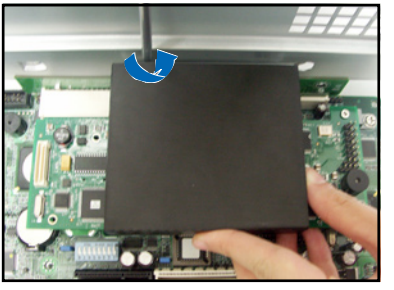


4. After installing the riser card with a ZCR card, fasten the screw back..



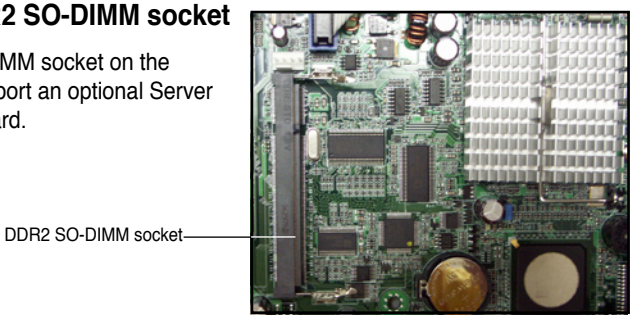
5. Align the other support bracket for the ZCR card to the screw holes on the chassis.

6. Secure the support bracket for the ZCR card with screws.



2.5.3 DDR2 SO-DIMM socket

The DDR2 SO-DIMM socket on the motherboard support an optional Server Management Board.



2.5.4 Configuring an expansion card

After installing the expansion card, configure 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 tables below.
3. Install the software drivers for the expansion card.

When using PCI cards on shared slots, ensure that the drivers support “Share IRQ” or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

2.5.5 Interrupt assignments

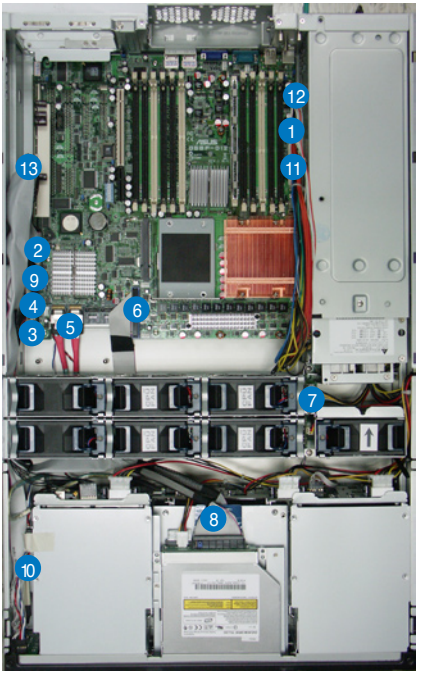
IRQ	Priority	Standard function
0	1	System timer
1	2	Keyboard Controller
2	—	Re-direct to IRQ#9
3	11	Communications Port (COM2)*
4	12	Communications Port (COM1)*
5	13	IRQ holder for PCI steering*
6	14	Floppy Disk Controller
7	15	Printer Port (LPT1)*
8	3	System CMOS/Real Time Clock
9	4	IRQ holder for PCI steering*
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 this section when reconnecting cables to ensure correct cable connections.

Rear panel

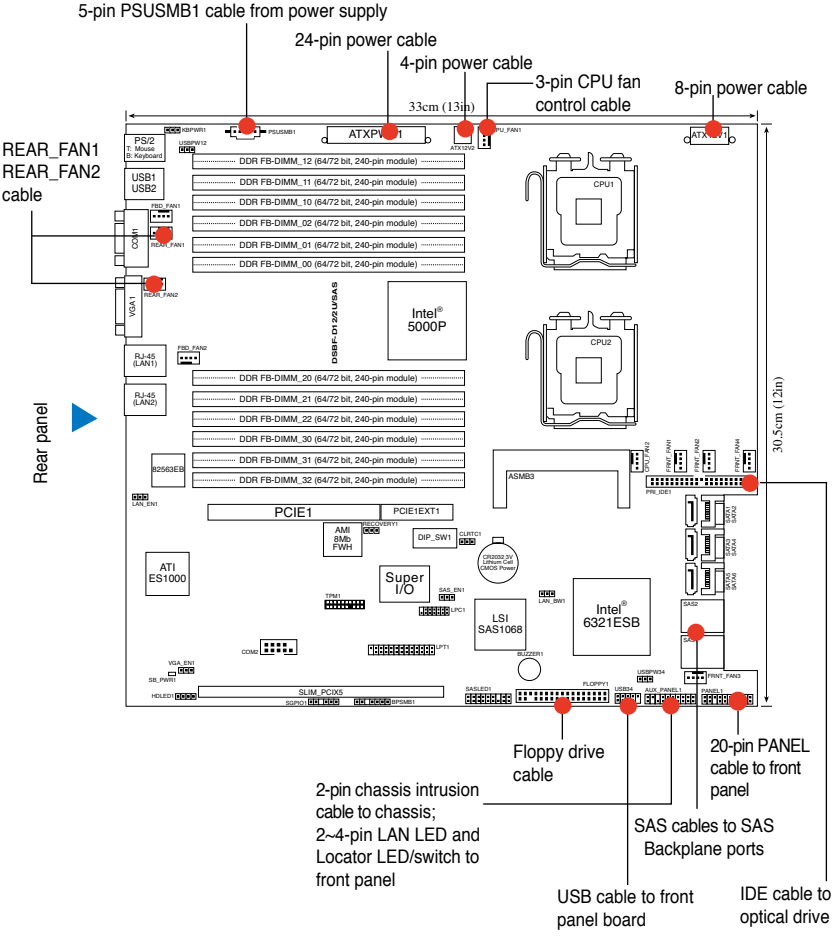


Front panel

Pre-connected system cables

1. 24-pin/8-pin/4pin power connectors (from power supply to MB)
2. Floppy drive connector (from MB to floppy drive)
3. PANEL connectors (from MB to front panel)
4. Chassis intrusion connector (from MB to chassis)
   LAN LED connector and Locator LED connector/switch (from MB to front panel)
5. 2 x SAS connectors (from MB to SAS backplane)
6. Primary IDE (from MB to optical drive)
7. Mid-fan power connector (from power supply to mid-fan board)
8. SAS board connectors (from the SAS backplane to MB and power supply; one from the Mid-fan board to SAS backplane)
9. Front USB connectors (from MB to front panel)
10. Locator LED connector/switch (from front panel to rear panel Locator LED/switch)
11. CPU_FAN1 connector (from MB to mid-fan board)
12. Power supply SMBus connector
13. Backplane SMBus connector

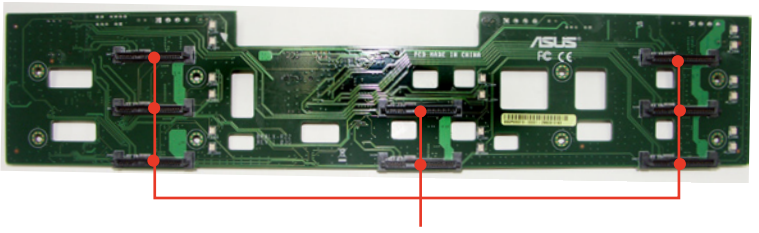
2.6.1 Motherboard



Connect the CPU fan control cable to the Mid-fan board, otherwise the CPU fans will always run at full speed.

2.6.2 SAS backplane

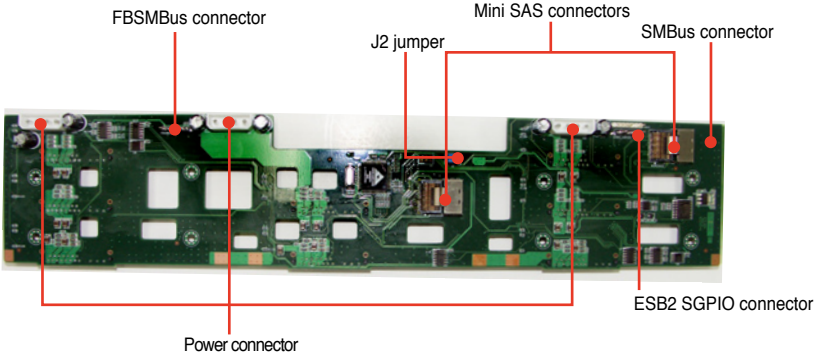
View from front panel



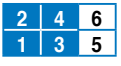
SAS HDD connectors disposition

ID0		ID5
ID1	ID3	ID6
ID2	ID4	ID7

View from rear panel

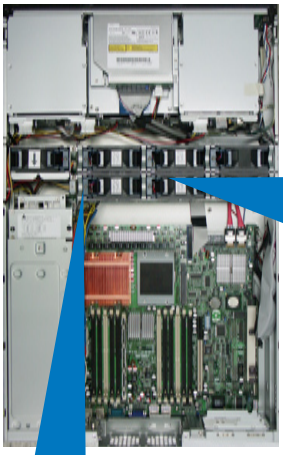


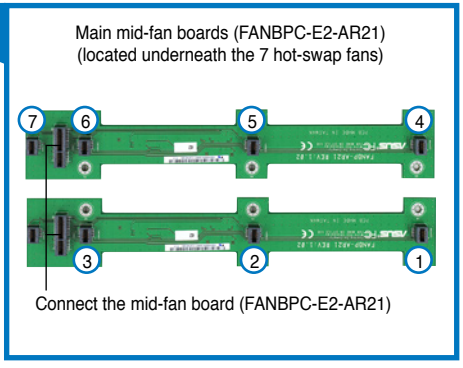
J2 jumper configuration

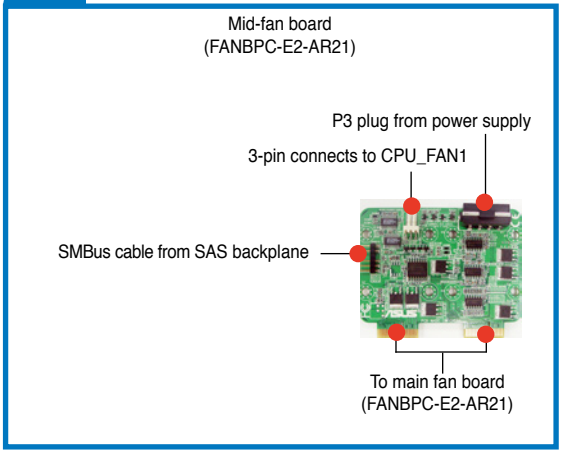


Onboard SAS SGPIO
(Default)

2.6.3 Fan boards







2.7 Removable components

You may need to remove previously installed system components when installing or removing system devices, or when you need to replace defective components. This section tells how to remove the following components:

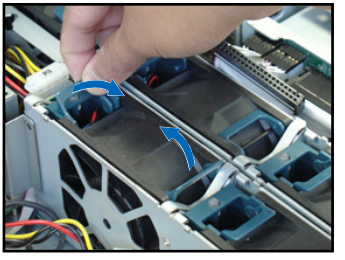
1. Hot-swap mid-fans
2. Power supply modules
3. Optical drive/floppy drive
4. Front panel LED/switch board
5. SAS backplane
6. System fan board
7. Power supply cage
8. LAN adaper (Optional)
9. LAN cable

2.7.1 Hot-swap mid-fans (80mm)

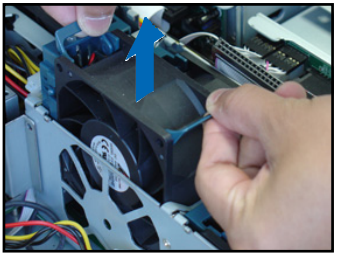
The fan LED lights up green in normal operation. If the LED color turns orange, the fan is faulty and should be replaced.

To remove an 80mm hot-swap fan:

1. Stand in front of the system and open the top cover.
2. Use the thumb and index finger of your right hand to flip up the right handle, and the thumb and index finger of your left hand to flip up the left handle of the fan that you want to remove.



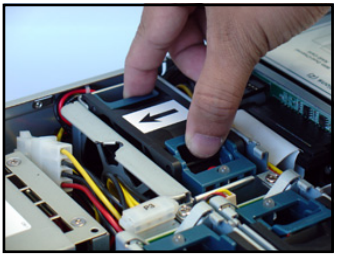
3. Firmly hold the handles and pull up the fan until it is disengaged from its connector.



Avoid touching the fan blades while removing the fan. Spinning fan blades may cause injury!

Note on the power supply mid-fan

When you re-install the mid-fan for the power supply module(s) make sure that the arrow points to the direction of the rear panel. Installing the fan otherwise will cause CPU overheating.



Note on the power supply mid-fan

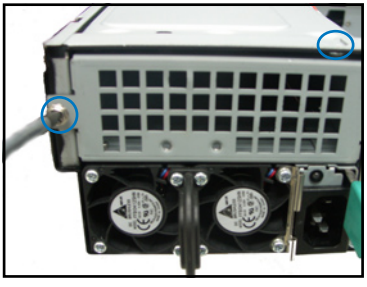
When you re-install the mid-fan for the CPU(s), make sure that the four fans designed for the CPUs cooling (labeled CPU) are installed in the correct place. Installing the lower-speed fans for CPU will cause CPU overheating.

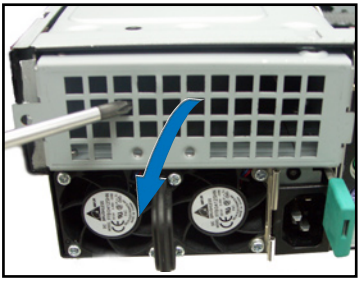
2.7.2 Power supply modules

According to your needs, the barebone system ships with one power supply module or two. The one-power-supply model will ship with a metal bracket cover for the empty bay.

To install a second power supply module:

1. Locate the empty power supply bay on the rear panel covered with a metal bracket.
2. Loosen the screws that fasten the cover, one on the top and the other on the rear.
3. Use the screw driver to remove the cover.



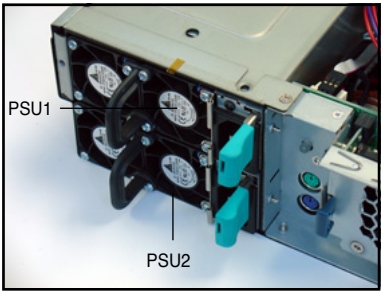


4. Insert the second power supply module

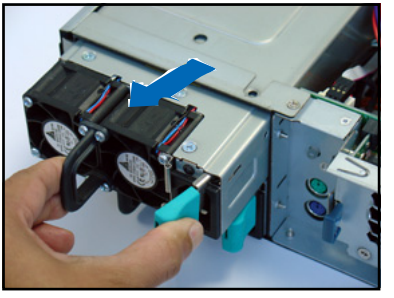
Remove the AC power cord, first pressing the latch.

To uninstall a power supply module:

1. Locate the power supply modules on the rear panel, and select the module that you want to remove.
2. Hold the module lever and press the latch on the inner side to release the module.



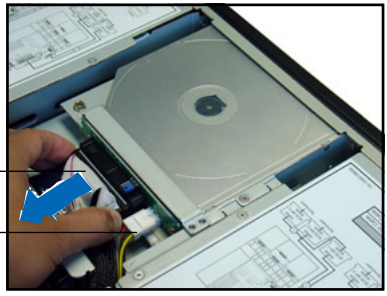
3. Firmly pull the lever to slide the power supply module out of the chassis.
4. Repeat steps 2 to 3 to remove the other module.



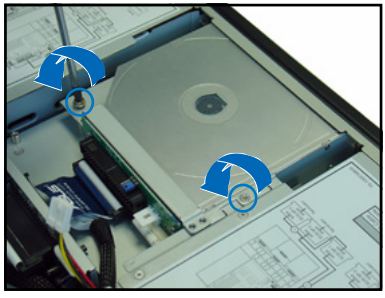
2.7.3 Slim optical and floppy drives

To uninstall the optical and floppy disk drives:

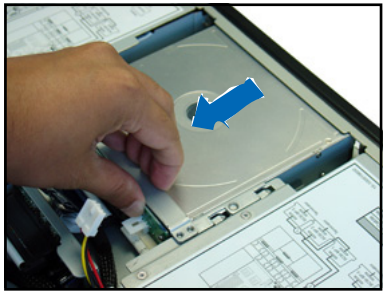
1. Disconnect the power and signal cables connected to the rear of the drives.



2. Loosen the two screws that secure the drive bracket to the chassis. The optical drive is attached to the top of the bracket, and the floppy drive to bottom.



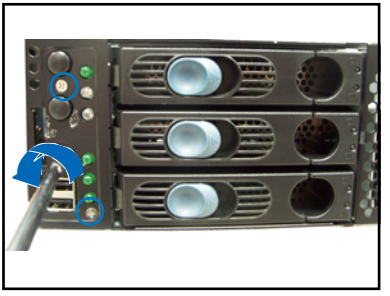
3. Slide the drive bracket toward the SCSI backplanes to release it from the chassis, then carefully pull it out of the drive bay.



2.7.4 Front panel LED and switch board

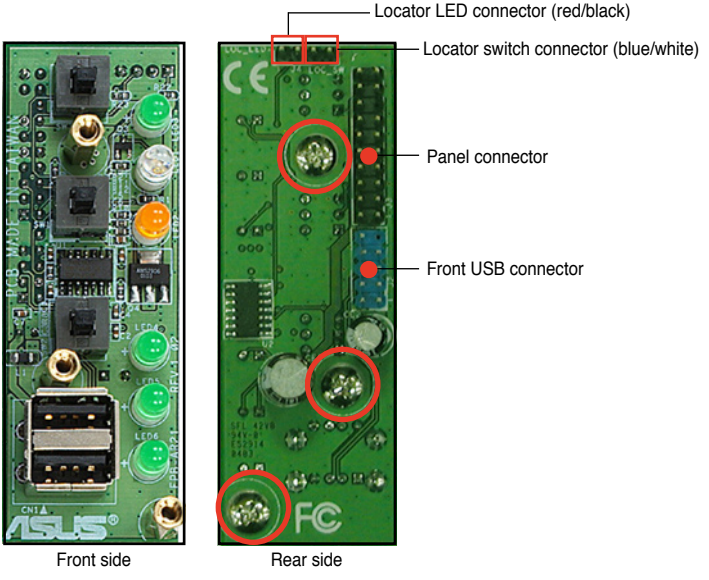
To uninstall the front panel and swtich board:

1. Disconnect all cables connected to the rear of the board.
2. Remove sticker on the front panel and unscrew the board to the chassis.



3. Carefully remove the board out of the chassis.

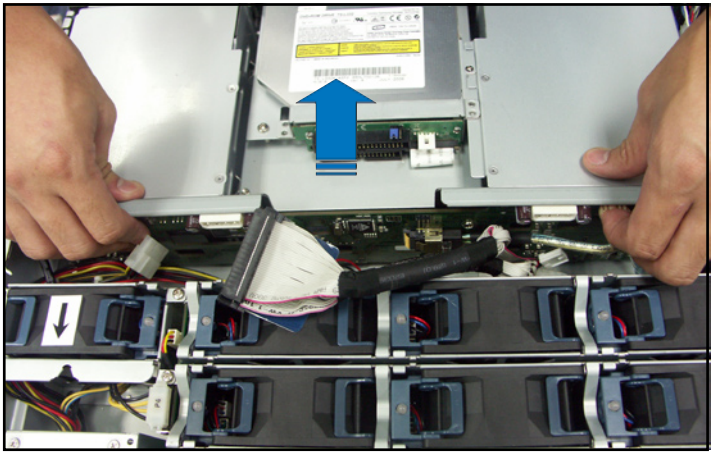
When removed, the LED and switch board appears as shown. The LEDs and switches on the board correspond to the LEDs and buttons on the system front panel.



2.7.5 SAS backplane

To uninstall a SAS backplane:

1. Disconnect all cables connected to the rear of the SAS backplane.
2. Carefully lift the backplane upward to remove it from the chassis.

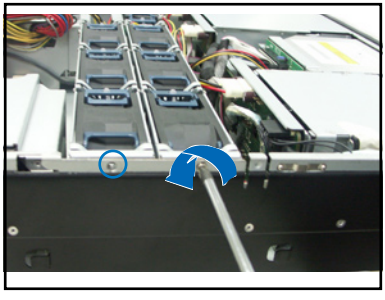


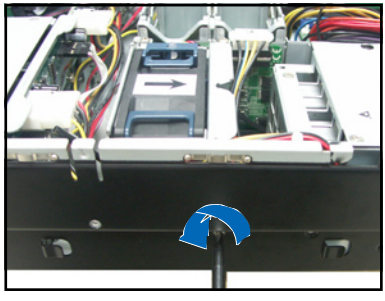
3. Loosen all the screws on the SAS backplane.

2.7.6 System fan board

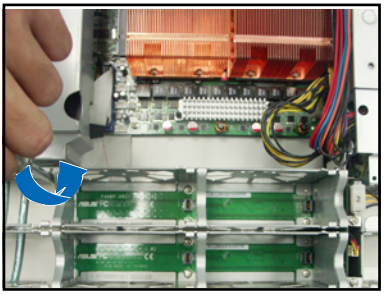
To uninstall the system-fan boards:

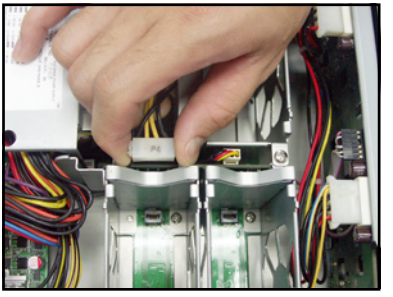
1. Remove the three screws that fasten the rack fan, one on the right side, two on the left.



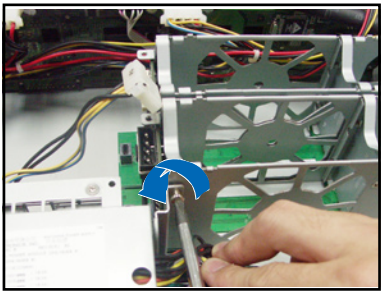


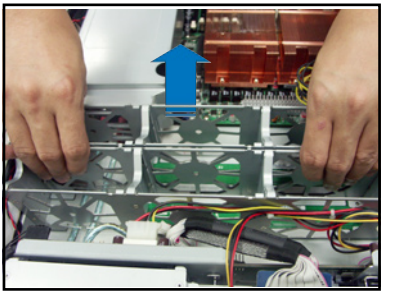
2. Remove all the fans and unscrew the fan rack.
3. Unplug the cables connected to the mid-fan board.



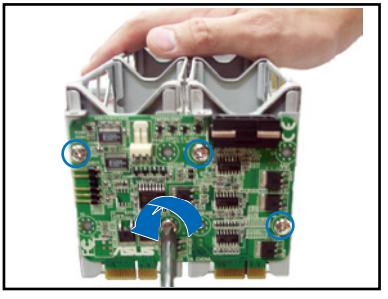


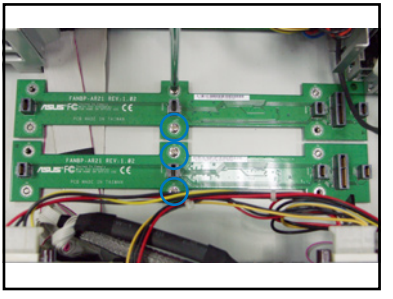
4. Remove rack fan for the power supply first and then loosen the screw that fastens the fan rack to the power supply cage.
5. Carefully lift the fan rack upward to remove it from the chassis.





6. Unscrew the mid-fan board and remove it from the fan rack.
7. Unscerw the main fan boards and remove them from the chassis.

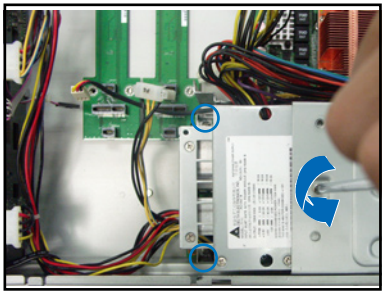




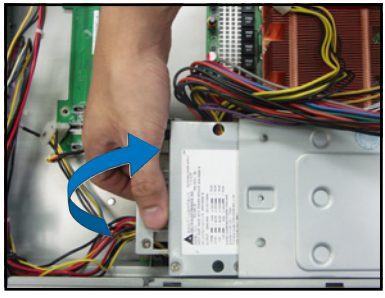
2.7.7 Power supply cage

To uninstall a power supply cage:

1. Follow the instructions in **2.7.2 Power supply module** to remove the installed modules.
2. Follow the instructions in **2.7.6 System fan board** to remove the fan rack.
3. Loosen the three screws that fasten the power supply cage.



4. Carefully lift the power supply cage upward a little to remove it from the chassis.

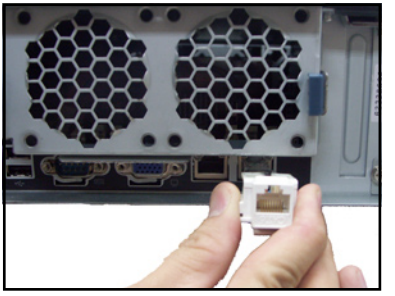


2.7.8 LAN adapter (Optional)

For your convenience, install a LAN adapter into the LAN port before you connect the LAN.

To install a LAN adapter:

1. Orient the LAN adapter and then plug it into the LAN port.
2. Connect your network cable to the LAN adapter.



To uninstall a LAN adapter:

1. Remove the screw on the top cover.
2. Press the tabs on each side of the rear fan cover with both hands and then remove it from the chassis.

4. Disconnect the LAN adapter from the rear panel of the system.

2.7.9 LAN cable

To disconnect a LAN cable:

Follow the same instructions of uninstalling a LAN adapter.

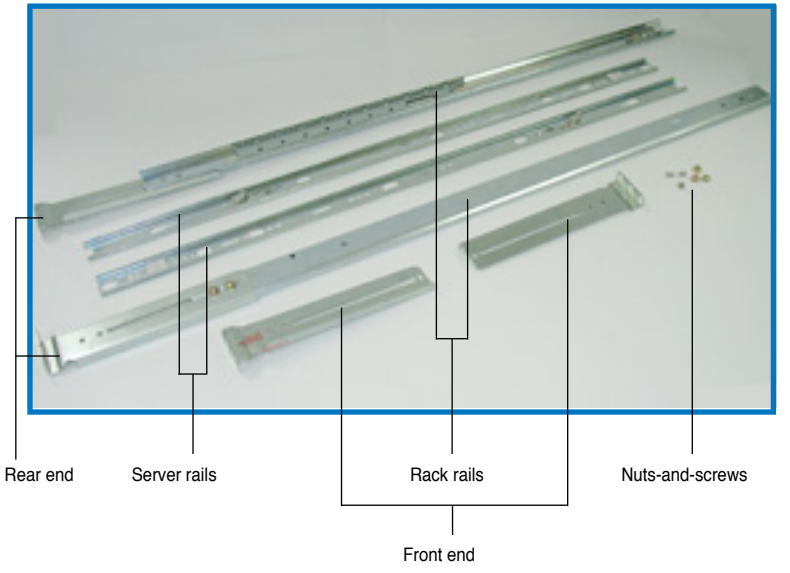
CHAPTER 3

Installation Options

3.1 Rackmount rail kit items

Your rackmount rail kit package contains:

- one pair of server rails (for the server)
- two pairs of rack rails (for the rack)
  ** to accommodate different sizes of rack*
- Nut-and-bolt type screws

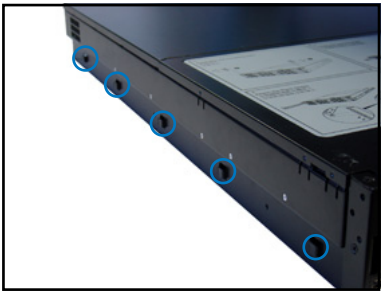


- The rear ends come pre-installed in the rack rails. The rear end nuts and screws are loosen to allow flexible installation on the industrial rack.
- Install the server in an industrial rack with at least 100 cm depth.

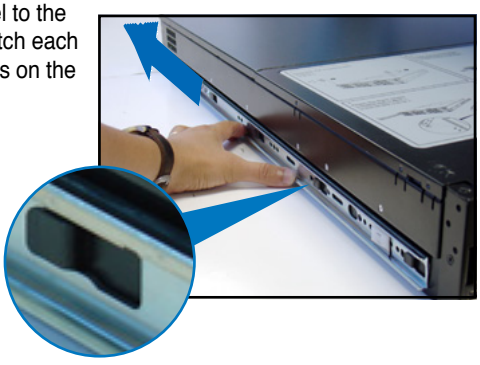
3.2 Attaching the rails to the server

To attach the server rails:

1. Locate the hooks on the side of the chassis.

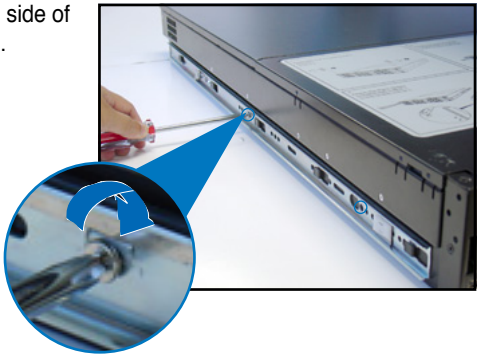


2. Position a server rail parallel to the side of the chassis, and match each of the five hooks to the holes on the rail.



Side hook locked to rail hole

3. Secure the server rail to the side of the chassis with two screws.

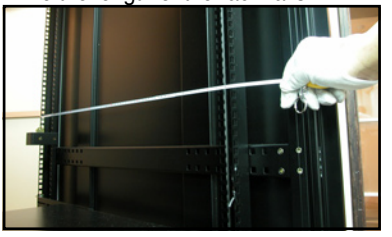


4. Repeat steps 1 to 3 to attach the second server rail to the other side of the chassis.

3.3 Attaching the rack rails

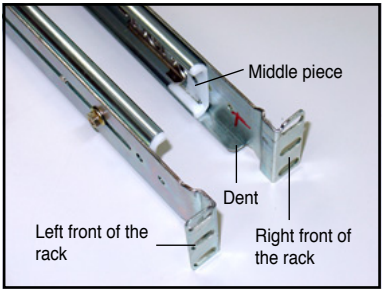
To attach the rack rails:

1. Select two units of space (2U) on the rack where you want to install the barebone server.
2. Install the nuts on the holes of the 2U space on the rack front.
3. Install the nuts on the holes of the 2U space on the corresponding rack rear.
4. Measure the depth of the rack to determine the length of the rack rails.

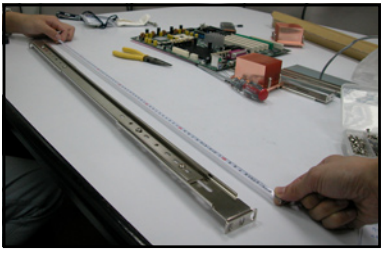


5. Take two pieces of rack rail, consisting of the middle piece with the pre-installed rear end, and one front end (left or right).

   Attach the front end to the middle piece using the supplied nuts and screws. Make sure that the front end dent supports the middle piece.



7. Measure the rack rail when assembled to make sure that it fits the rack.



8. Position the rack rail to the 2U space on the rack. Make sure that the front end of the rack rail goes to the front of the rack space.

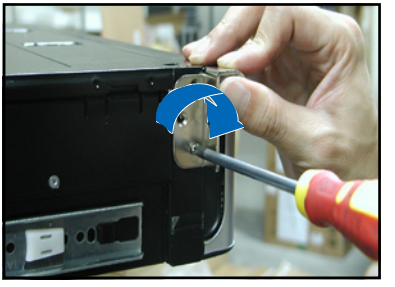
9. Secure the front end of the rail with two rack screws.
10. Secure the rear end of the rail with two rack screws.
11. Repeat steps 5 to 9 to assemble and attach the second rack rail.

3.4 Rackmounting the server

To mount the server to the rack:

1. Align the server rails with the rack rails and push the server halfway to the rack.

2. Align a mounting ear with the holes on a front corner of the chassis, then secure it with two screws.
3. Attach the other mounting ear to the other corner of the chassis.



4. Pull the server rail lock, then push the server all the way to the depth of the rack.

   Make sure that the mounting ear and the rack screw holes align.

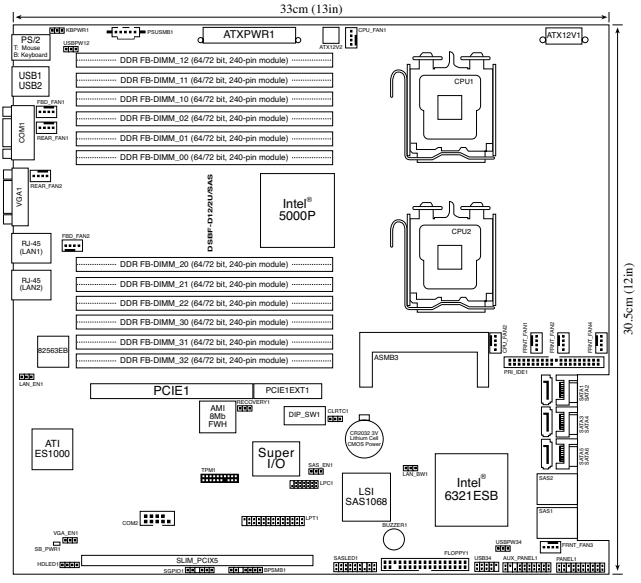
5. Drive a screw on the mounting ear to secure the server in place.

CHAPTER 4

Motherboard Information

4.1 Motherboard layout

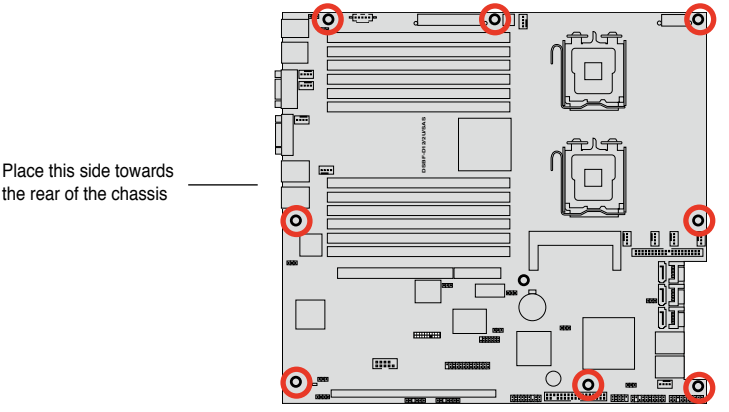
Make sure to unplug the chassis power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components!



4.1.1 Screw holes

Place eight (8) screws into the holes indicated by circles to secure the motherboard to the chassis.

Do not overtighten the screws! Doing so can damage the motherboard.



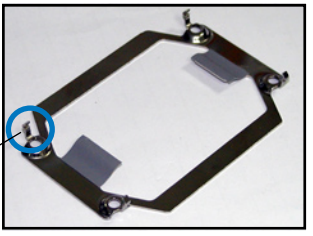
4.1.2 Layout contents

4.2 Support kits for the motherboard

For additional protection from motherboard breakage due to the weight of the CPU heatsinks, your motherboard package comes with CEK springs that you can use as weight support. Install the CEK springs if you want to install a new motherboard.

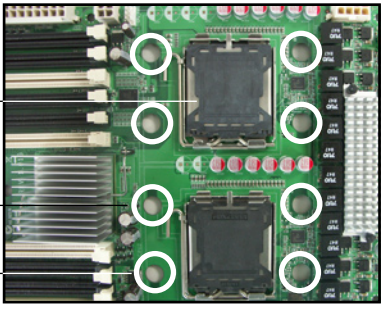
If your chassis is SSI EEB 3.61 compliant, we recommend that you use the CEK springs; otherwise, use the support plates kit.

Each CEK spring has four hooks to match the designated holes around the CPU area.

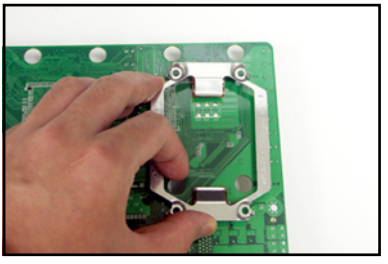


To install the CEK spring:

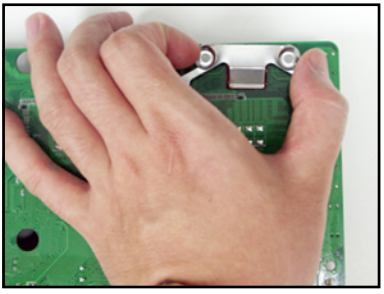
1. Locate the CPU heatsink holes on the motherboard.



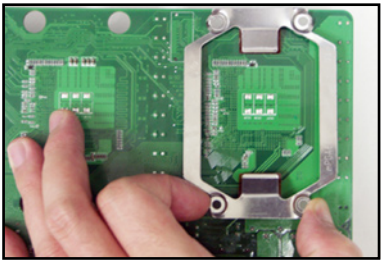
2. Position the CEK spring underneath the motherboard, then match the CEK spring hooks to the CPU1 heatsink holes.



3. Press the upper spring hooks inward, then insert to the upper CPU heatsink holes until they snap in place.

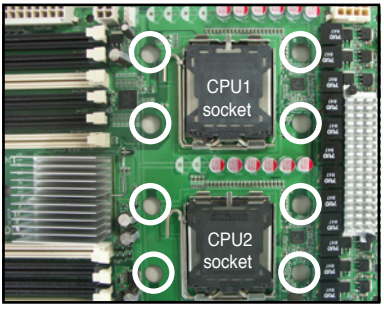


4. Press the lower spring clips inward, then insert to the lower CPU heatsink holes until they snap in place.



5. If you installed a second CPU, repeat steps 2 to 4 to install the CEK spring to the CPU2 heatsink holes.

6. Install the motherboard with the external I/O ports toward the chassis rear panel. The CPU sockets should be right on top of their respective standoffs.



Make sure that the standoffs perfectly match the CEK spring screw holes; otherwise, you can not install the CPU heatsinks properly.

7. Secure the motherboard with screws. Refer to section “4.1.1 Screw holes” for illustration.

4.3 Jumpers

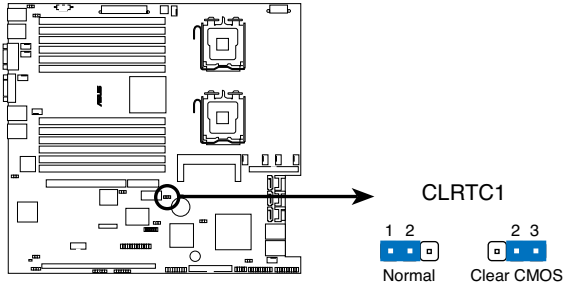
1. Clear RTC RAM (CLRTC1)

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. Remove the onboard battery.
3. 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.
4. Reinstall the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

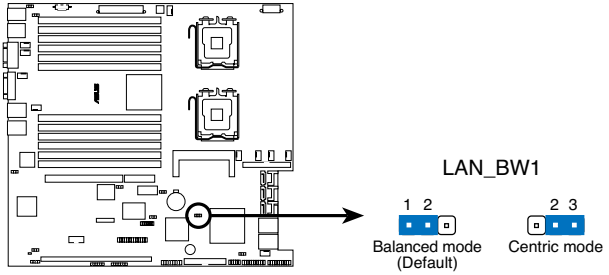
Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!



Clear RTC RAM

2. LAN bandwidth setting (3-pin LAN_BW1)

This jumper allows you to set the LAN bandwidth setting for more efficient IP load distribution.

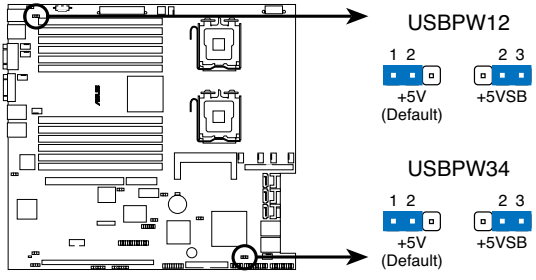


LAN bandwidth setting

Balance Mode: It's x8 link between MCH and ESB2;
LAN Centrical Mode: It's x4 link between MCH and ESB2.

3. USB device wake-up (3-pin USBPW12, USBPW34)

Set these jumpers to +5V to wake up the computer from S1 sleep mode (CPU stopped, DRAM refreshed, system running in low power mode) using the connected USB devices. Set to +5VSB to wake up from S4 sleep mode (no power to CPU, DRAM in slow refresh, power supply in reduced power mode).

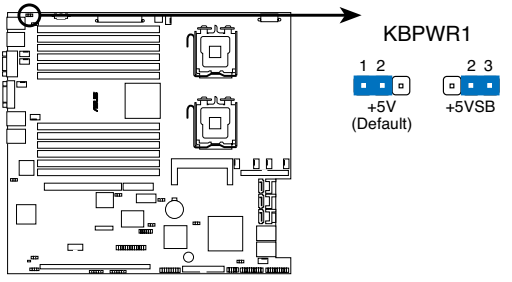


USB device wake up

- The USB device wake-up feature requires a power supply that can provide 500mA on the +5VSB lead for each USB port; otherwise, the system will not power up.
- If you are using Windows® 2000, you need to install Service Pack 4 to wake up the system from S4 sleep mode.
- The total current consumed must NOT exceed the power supply capability (+5VSB) whether under normal condition or in sleep mode.

4. Keyboard power (3-pin KBPWR1)

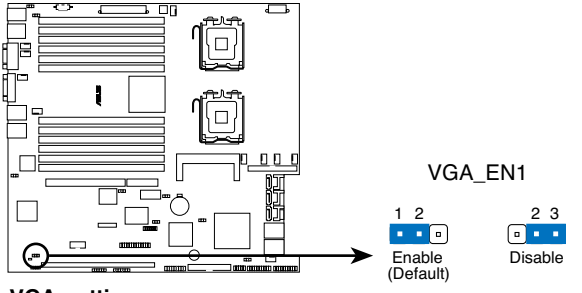
This jumper allows you to enable or disable the keyboard wake-up feature. Set this jumper to pins 2-3 (+5VSB) to wake up the computer when you press a key on the keyboard (the default is the Space Bar). This feature requires an ATX power supply that can supply at least 1A on the +5VSB lead, and a corresponding setting in the BIOS.



Keyboard power setting

5. VGA controller setting (3-pin VGA_EN1)

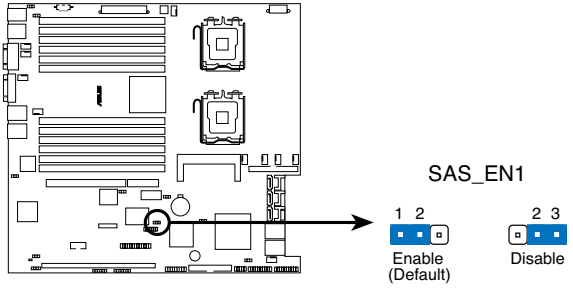
These jumpers allow you to enable or disable the onboard VGA controller. Set to pins 1-2 to activate the VGA feature.



VGA setting

6. Onboard storage setting (3-pin SAS_EN1)

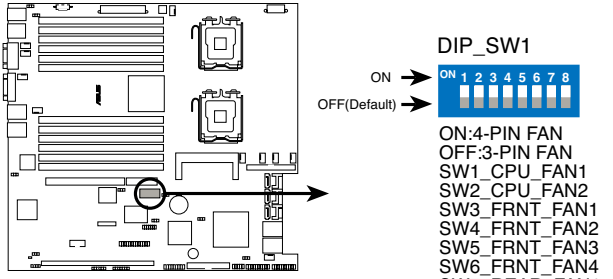
This jumper allows you to enable or disable the onboard LSI1068 SAS controller.



SAS setting

4.4 Switch

This motherboard features a DIP switch for fan pin selection.



DIP switches

The following table shows the corresponding switch for each fan connector.

Switch	Fan connector	Default setting
1	CPU_FAN1	OFF
2	CPU_FAN1	OFF
3	FRNT_FAN1	OFF
4	FRNT_FAN2	OFF
5	FRNT_FAN3	OFF
6	FRNT_FAN4	OFF
7	REAR_FAN1	OFF
8	REAR_FAN2	OFF

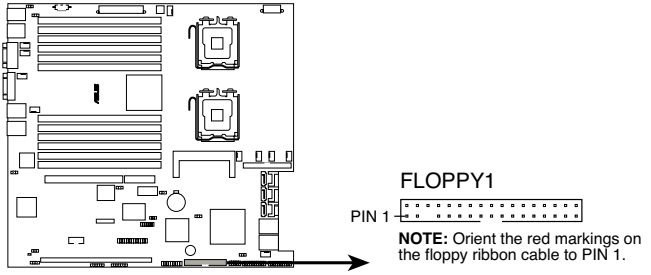
- If you use a 4-pin fan but set the DIP switch for a 3-pin fan, the fan you installed may not work.
- If you use a 3-pin fan but set the DIP switch for a 4-pin fan, the fan controll will not work and the fan you installed will always run at full speed.

4.5 Connectors

1. Floppy disk drive connector (34-1 pin FLOPPY1)

This connector is for the provided floppy disk drive (FDD) signal cable. Insert one end of the cable to this connector, then connect the other end to the signal connector at the back of the floppy disk drive.

Pin 5 on the connector is removed to prevent incorrect cable connection when using a FDD cable with a covered Pin 5.

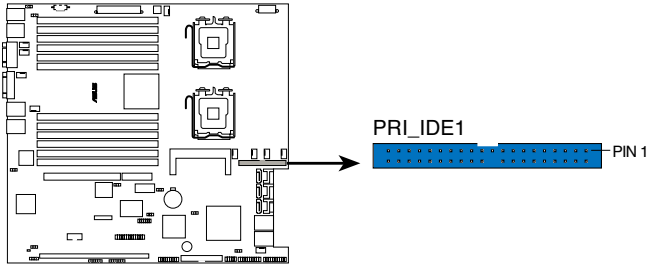


Floppy disk drive connector

2. IDE connector (40-1 pin PRI_IDE1)

This connector is for an Ultra DMA 100/66 signal cable. The Ultra DMA 100/66 signal cable has three connectors: a blue connector for the primary IDE connector on the motherboard, a black connector for an Ultra DMA 100/66 IDE slave device (optical drive/hard disk drive), and a gray connector for an Ultra DMA 100/66 IDE master device (hard disk drive). If you install two hard disk drives, you must configure the second drive as a slave device by setting its jumper accordingly. Refer to the hard disk documentation for the jumper settings.

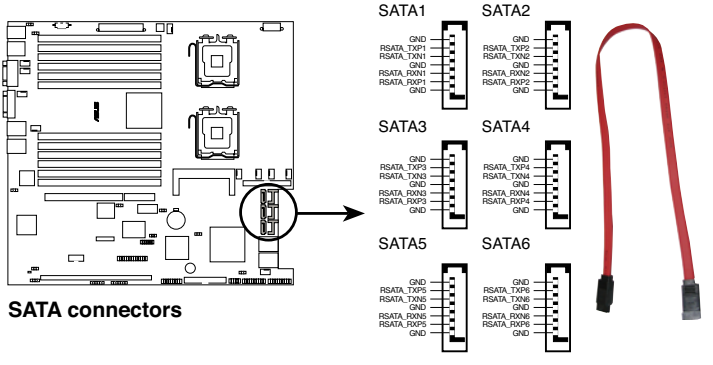
- Pin 20 on the IDE connector is removed to match the covered hole on the Ultra DMA cable connector. This prevents incorrect insertion when you connect the IDE cable.
- Use the 80-conductor IDE cable for Ultra DMA 100/66 IDE devices.



IDE connector

3. Serial ATA connectors (7-pin SATA1, SATA2, SATA3, SATA4, SATA5, SATA6)

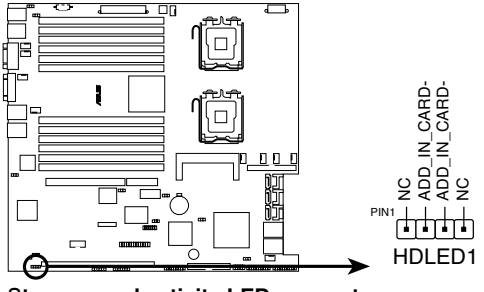
These connectors are for the Serial ATA signal cables for Serial ATA hard disk drives.



SATA connectors

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

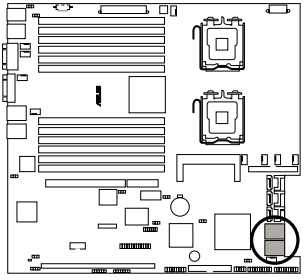
This connector is used to connect to a hard disk drive active LED connector on the SCSI or RAID card.



Storage card activity LED connector

5. Mini-SAS connectors

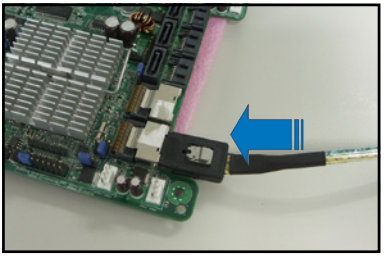
This motherboard comes with two Serial Attached SCSI (SAS) connectors, the next-generation storage technology that supports both Serial Attached SCSI and Serial ATA. Each connector supports up to four (4) devices.



MINI SAS connectors

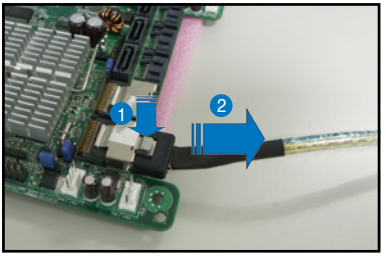
To connect the mini-SAS cable:

Plug in the mini-SAS cable to the mini-SAS connector until the cable lock snaps in place.



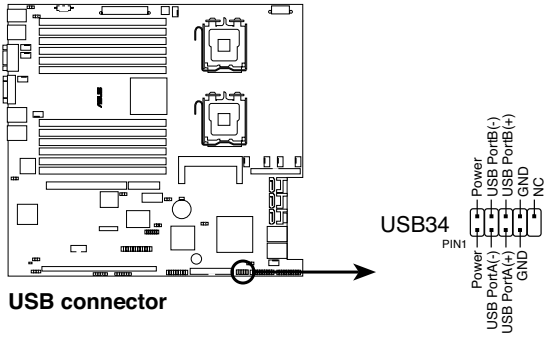
To disconnect the mini-SAS cable:

1. With your thumb, push down the cable lock to release.
2. While still keeping your thumb's grip on the cable lock, carefully pull away the cable from the connector



6. USB connector (10-1 pin USB34)

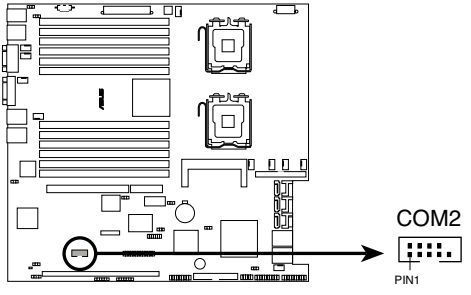
This connector is for USB 2.0 ports. Connect the USB module cable to this connector, then install the module to a slot opening at the back of the system chassis. This USB connector complies with USB 2.0 specification that supports up to 480 Mbps connection speed.



USB connector

7. 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.



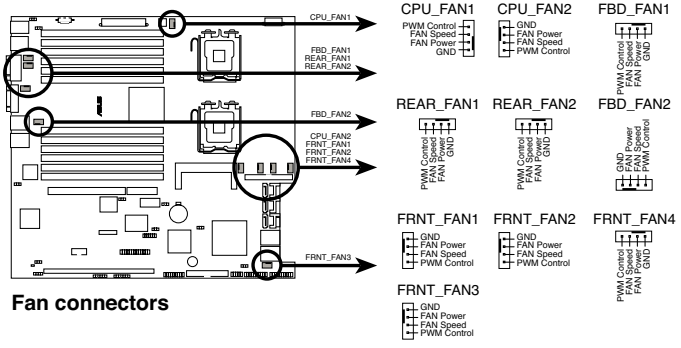
Serial port connector

The serial port module is purchased separately.

8. CPU and system fan connectors (4-pin CPU_FAN1/2, REAR_FAN1/2, FRNT_FAN1/2/3/4, FBD_FAN1/2)

The fan connectors support cooling fans of 350 mA ~ 740 mA (8.88 W max.) or a total of 2.1 A ~ 4.44 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.

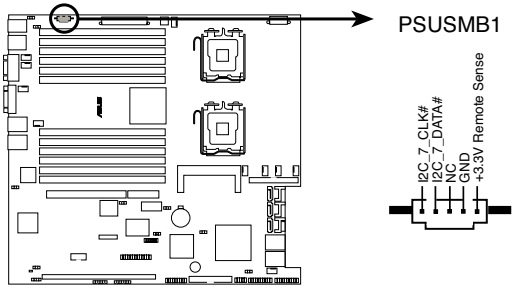
Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!



Fan connectors

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

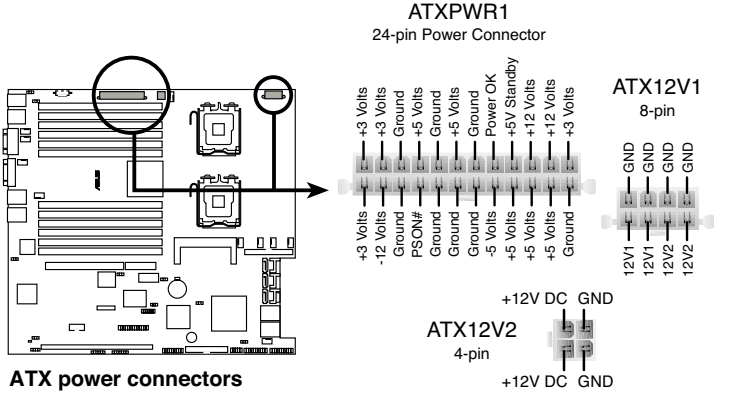
This connector is for the power supply SMB cable, if your power supply supports the SMBus function.



Power supply SMBus connector

10. SSI power connectors (24-pin ATXPWR1, 8-pin ATX12V1, 4-pin ATX12V2)
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.

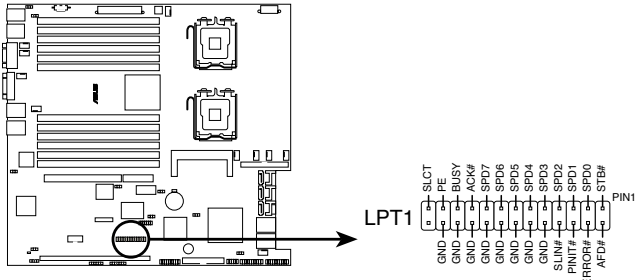
- For a fully configured system, we recommend that you use an SSI 12 V-compliant power supply unit (PSU) for LGA771-socket Intel® Xeon Dual Core processors (Bensley platform).
- Do not forget to connect the 24+8+4-pin power plugs; otherwise, the system will not boot up.
- Use of a PSU with a higher power 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.



ATX power connectors

11. Parallel port connector (26-1 pin LPT1)

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

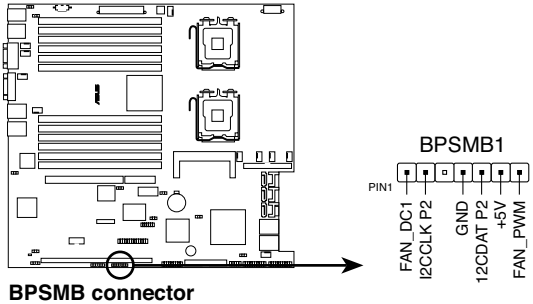


Parallel port connector

The parallel port module is purchased separately.

12. Backplane SMBus connector (7-1 pin BPSMB1)

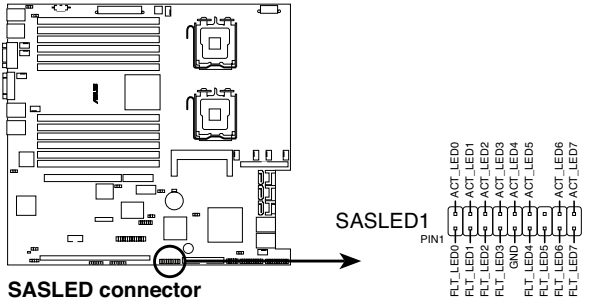
This connector allows you to connect SMBus (System Management Bus) devices. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface.



BPSMB connector

13. SAS LSI1068 ports LED connector (18-1 pin SASLED1)

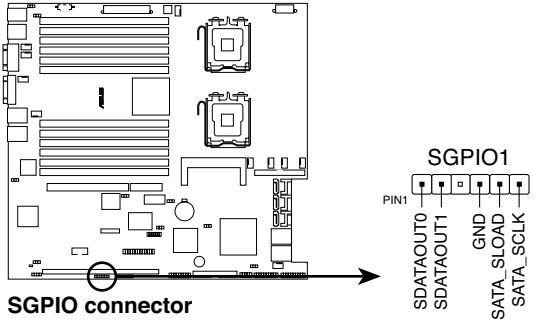
This connector is for the front panel LED port indicator that shows the SAS HDD status.



SASLED connector

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

This connector is used for the SGPIO peripherals for the LSI MegaRAID SATA LED.

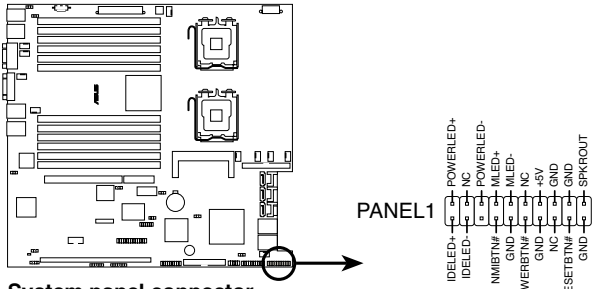


SGPIO connector

15. System panel connector (20-1 pin PANEL1)

This connector supports several chassis-mounted functions.

The system panel connector is color-coded for easy connection.



System panel connector

- **System power LED (Green 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.

- **Hard disk drive activity LED (Red 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.

- **System warning speaker (Orange 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.

- **ATX power button/soft-off button (Yellow 2-pin PWRSW)**

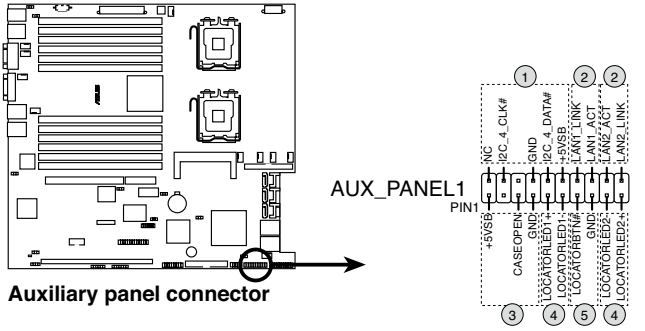
  This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **Reset button (Blue 2-pin RESET)**

  This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

16. Auxiliary panel connector (20-2 pin AUX_PANEL1)

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



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 (2 pin CHASSIS)

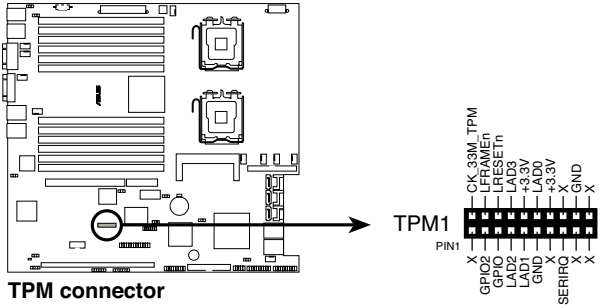
These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high-level signal to these leads to record a chassis intrusion event.

4/5 Locator LED/Switch (6-pin LOCATOR)

These leads are for the locator switch and LED on the front panel.

17. TPM connector (20-1 pin TPM)

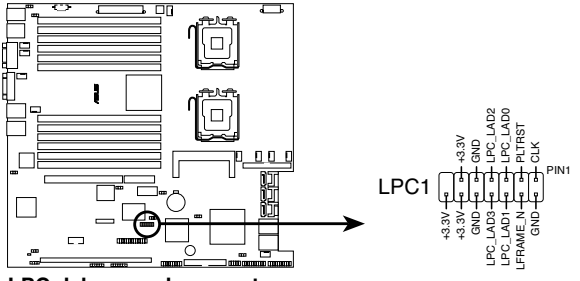
This connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.



TPM connector

18. LPC debug card connector.(14-1 pin LPC1)

This is a low pin count interface used to plug in the LPC debug card.



LPC debug card connector

This connector is for RMA engineer to debug only.

CHAPTER 5

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. **Phoenix Phlash16 BIOS Flash Utility** (Updates the BIOS in DOS mode using a bootable floppy disk.)

Refer to the corresponding sections for details on these utilities.

Save a copy of the original motherboard BIOS file to a bootable floppy disk in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using Phoenix Phlash16 BIOS utilities. Refer to page 4-3 for details.

5.1.1 Creating a bootable floppy disk

1. Do either one of the following to create a bootable floppy disk.

   DOS environment

   a. Insert a 1.44MB floppy disk into the drive.
   b. At the DOS prompt, type **`format A:/S`** then press <Enter>.

   Windows® XP environment

   a. Insert a 1.44 MB floppy disk to the floppy disk drive.
   b. Click **Start** from the Windows® desktop, then select **My Computer**.
   c. Select the 3 1/2 Floppy Drive icon.
   d. Right-click **File** from the menu, then select **Format**. A **Format 3 1/2 Floppy Disk** window appears.
   e. Select **Create an MS-DOS startup disk** from the format options field, then click **Start**.

5.1.2 Updating the BIOS using the Phoenix Phlash16 Utility

The Basic Input/Output System (BIOS) can be updated using the Phoenix Phlash16 Utility. Follow these instructions to update the BIOS using this utility.

1. Download the latest BIOS file from the Advantech web site. Rename the file to BIOS.WPH. Save the file to a floppy disk.

Make sure you copy the correct BIOS file for the specific model of your motherboard. Save only the updated BIOS file in the floppy disk to avoid loading the wrong BIOS file.

2. Copy the Phoenix Phlash16 (phlash16.exe) utility from the Software folder of the support CD to the floppy disk with the latest BIOS file.
3. Boot the system in DOS mode using the bootable floppy disk you created earlier.
4. When the A:> appears, replace the bootable floppy disk with the floppy disk containing the new BIOS file and the Phoenix Phlash16 Utility.
5. At the prompt, type the following command string:

   `phlash16 /x /mode=3 BIOS.WPH.`

6. The Phoenix Phlash16 Utility automatically updates the BIOS.

Do not turn off or reset the system during the flashing process!

7. Restart the system after the utility completes the updating process. Make sure you remove the floppy disk from the drive

5.2 BIOS setup program

This motherboard supports a programmable Low-Pin Count (LPC) chip that you can update using the provided utility described in section “4.1 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 LPC chip.

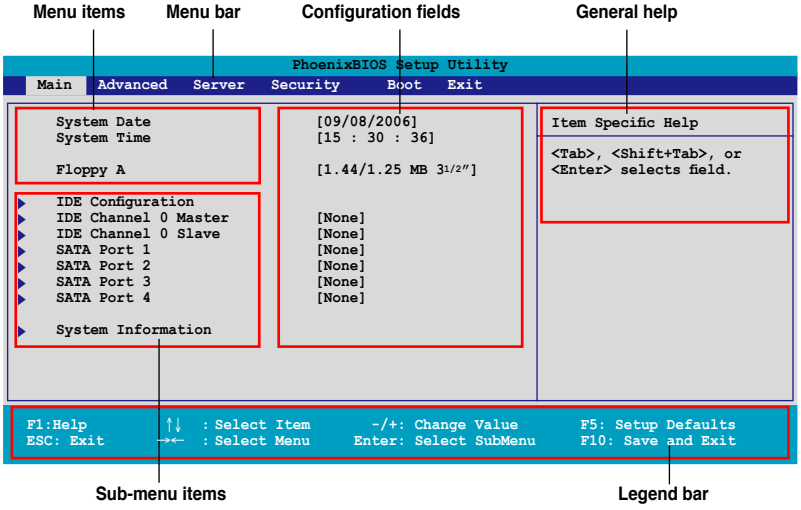
The LPC chip on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

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 Default Settings item under the Exit Menu. See section “4.8 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.

5.2.1 BIOS menu screen



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
Security	For changing the security 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 Legend bar

At the bottom of the Setup screen is a legend bar. The keys in the legend bar allow you to navigate through the various setup menus. The following table lists the keys found in the legend bar with their corresponding functions.

Navigation key	Function
<F1>	Displays the General Help screen
<F9>	Loads setup default values
<Esc>	Exits the BIOS setup or returns to the main menu from a sub-menu
Left or Right arrow	Selects the menu item to the left or right
Up or Down arrow	Moves the highlight up or down between fields
Page Down or – (minus)	Scrolls backward through the values for the highlighted field
Page Up or + (plus)	Scrolls forward through the values for the highlighted field
<Enter>	Brings up a selection menu for the highlighted field
<F10>	Saves changes and exit

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 iteam has a sub-menu. To display the sub-menu, select the item and press <Enter>.

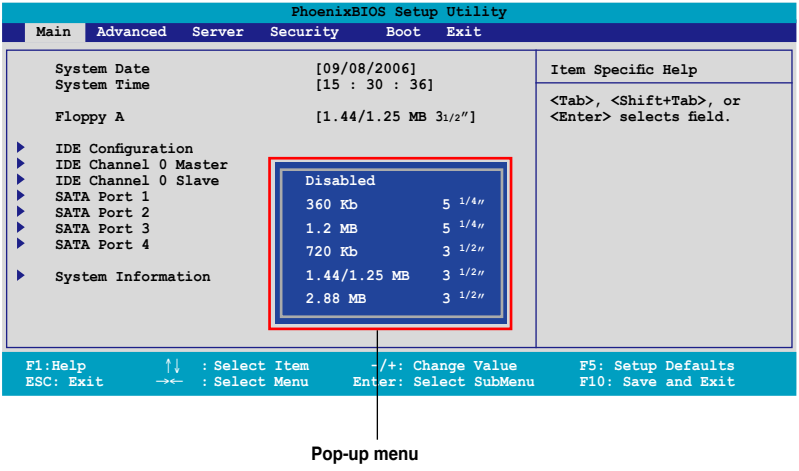
5.2.6 Configuration fields

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.



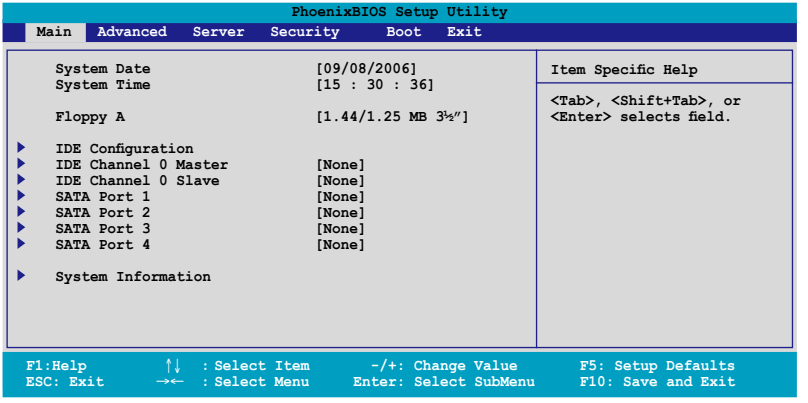
5.2.8 General help

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.



5.3.1 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

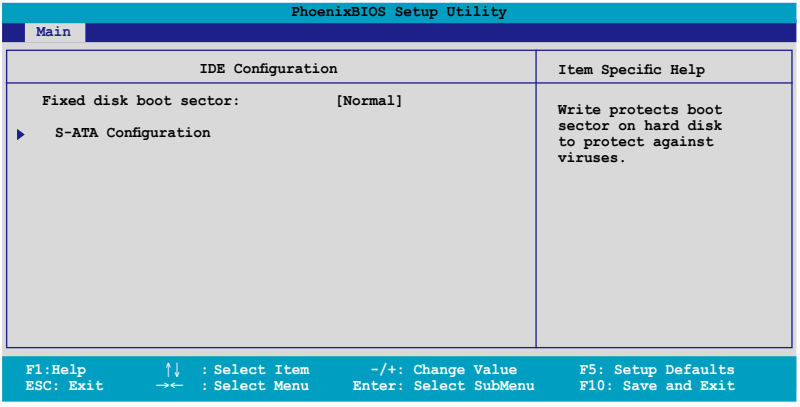
5.3.2 System Time [xx:xx:xx]

Allows you to set the system time.

5.3.3 Floppy A [1.44M, 3½in.]

Sets the type of floppy drive installed.
Configuration options: [Disabled] [360 Kb 5¼”] [1.2 MB 5¼”] [720 Kb 3 ½”] [1.44/1.25 MB 3 ½”] [2.88 MB 3½”]

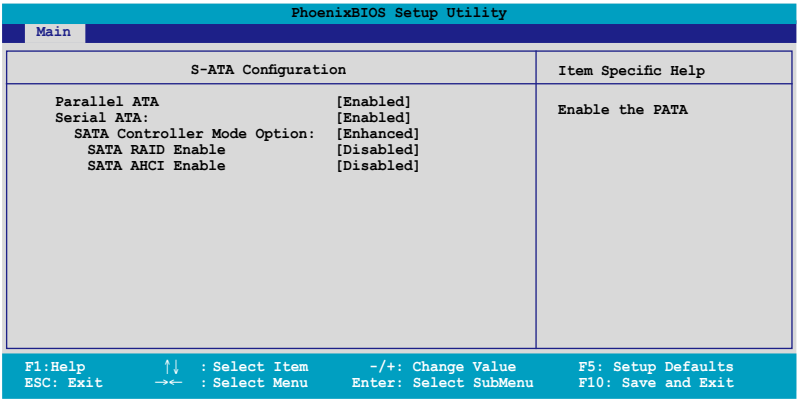
5.3.4 IDE Configuration



Fixed disk boot sector [Normal]

Setting this item to [Write Protect] prevents write access to the boot sector on the hard disk to protect against viruses. The default setting [Normal] allows write access. Configuration options: [Normal] [Write Protect]

S-ATA Configuration



Parallel ATA [Enabled]

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

Native Mode Operation [Auto]
Allows you to choose the native mode for ATA.
Configuration options: [Auto] [Serial ATA]

The above item appears only when the SATA Controller Mode Option is set to [Compatible]

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

SATA Controller Mode Option [Enhanced]
Allows selection of the Serial ATA operation mode depending on the operating system (OS) that you installed. When you set this item to Enhanced Mode, Serial ATA and Parallel ATA devices are auto-detected and placed in native IDE mode. Set to Enhanced Mode if you are using native OS, such as Windows® 2000/XP. When you set this item to Compatible Mode, Serial ATA and Parallel ATA devices are auto-detected and placed in legacy mode. Set this item to [Compatible] if you are using legacy OS, e.g. Windows ME/98/NT, MS-DOS. Configuration options: [Compatible] [Enhanced]

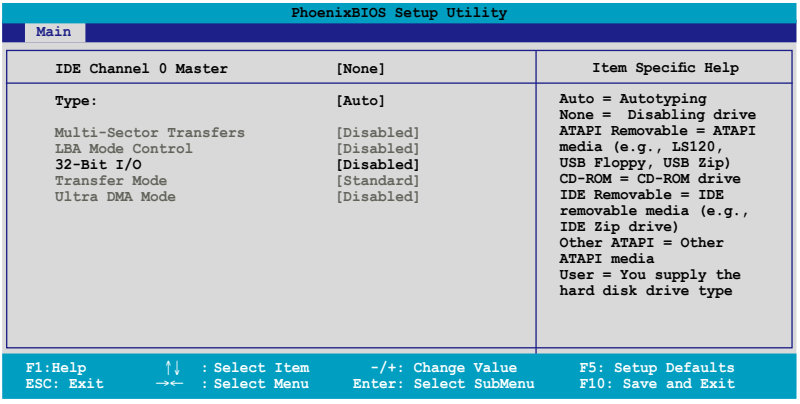
The following items appear only if you set the SATA Controller Mode Option item to [Enhanced].

SATA RAID Enable [Disabled]
Allows you to enable or disable the Serial ATA RAID function.
Configuration options: [Disabled] [Enabled]

SATA AHCI Enable [Disabled]
Allows you to enable or disable the Serial ATA AHCI function.
Configuration options: [Disabled] [Enabled]

- AHCI mode item will support only under Windows environment.
- Due to the driver limitation, you will not find any SATA driver if you install Fedora core 4.

5.3.5 IDE Channel 0 Master/Slave



Type [Auto]

Selects the type of IDE drive. Setting to Auto allows automatic selection of the appropriate IDE device type. Select [CD-ROM] if you are specifically configuring a CD-ROM drive. Select [ATAPI Removable] if your device is either a ZIP, or LS-120 drive. Select [User] to manually enter the parameters of the device.
Configuration options: [Auto] [User] [Other ATAPI] [IDE Removable] [CD-ROM] [ATAPI Removable] [None]

- Except for 32-Bit I/O item, the following items become user-configurable when the Type item is not set to [Auto].
- Suggest you to keep the default setting of this item [Auto].
- For items that have no sub-menu, you have to use -/+ to change the values.

Multi-Sector Transfers [Disabled]

Enables or disables data multi-sectors transfers. When set to 2~16 Sectors, 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] [2 Sectors] [4 Sectors] [8 Sectors] [16 Sectors]

LBA Mode Control [Disabled]

Enables or disables the LBA mode. Setting to Enabled 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] [Enabled]

32-Bit I/O [Disabled]

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

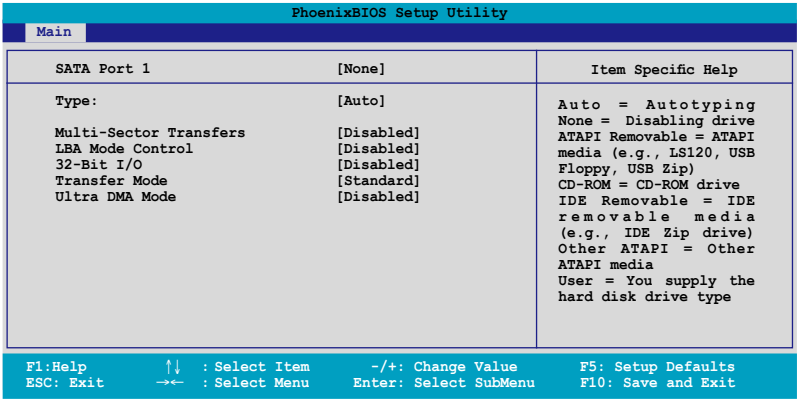
Transfer Mode [Stadard]

Allows you to select the mothod for the data transferring if the hard disk supports this feature.
Configuration options: [Standard] [Fast PIO 1] [Fast PIO 2] [Fast PIO 3] [Fast PIO 4] [FPIO 3 / DMA 1] [FPIO 4 / DMA2]

Ultra DMA Mode [Disabled]

When this item is set to [Mode 0-5], the UDMA capability allows improved transfer speeds and data integrity for supported IDE devices.
Configuration options: [Disabled] [Mode 0] [Mode 1] [Mode 2] [Mode 3] [Mode 4] [Mode 5]

5.3.6 SATA Port 1/2/3/4



Type [Auto]

Selects the type of IDE drive. Setting to Auto allows automatic selection of the appropriate IDE device type. Select [CD-ROM] if you are specifically configuring a CD-ROM drive. Select [ATAPI Removable] if your device is either a ZIP, LS-120, or MO drive. Select [User] to manually enter the parameters of the device.
Configuration options: [Auto] [User] [Other ATAPI] [IDE Removable] [CD-ROM] [ATAPI Removable]

- Except for 32-Bit I/O item, the following items become user-configurable when the Type item is not set to [Auto].
- For items that have no sub-menu, you have to use -/+ to change the values.

Multi-Sector Transfers [Disabled]
Enables or disables data multi-sectors transfers. When set to 2~16 Sectors, 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] [2 Sectors] [4 Sectors] [8 Sectors] [16 Sectors]

LBA Mode Control [Disabled]
Enables or disables the LBA mode. Setting to Enabled 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] [Enabled]

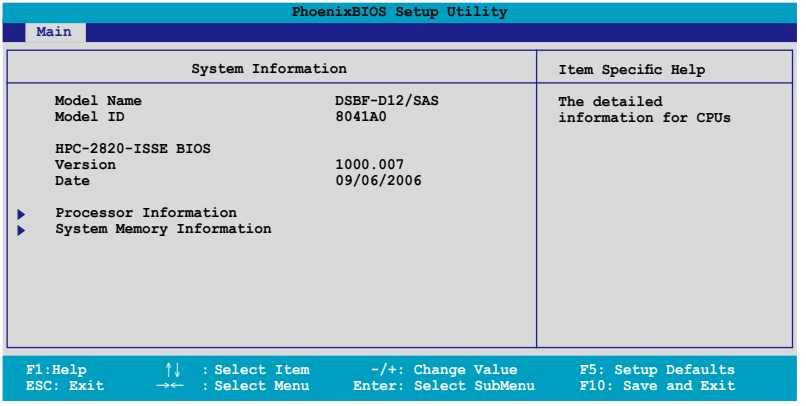
32-Bit I/O [Disabled]
Enables or disables 32-bit data transfer.
Configuration options: [Disabled] [Enabled]

Transfer Mode [Stadard]
Allows you to select the mothod for the data transferring if the hard disk supports this feature.
Configuration options: [Standard] [Fast PIO 1] [Fast PIO 2] [Fast PIO 3] [Fast PIO 4] [FPIO 3 / DMA 1] [FPIO 4 / DMA2]

Ultra DMA Mode [Disabled]
When this item is set to [Mode 0-5], the UDMA capability allows improved transfer speeds and data integrity for supported IDE devices.
Configuration options: [Disabled] [Mode 0] [Mode 1] [Mode 2] [Mode 3] [Mode 4] [Mode 5]

5.3.7 System Information

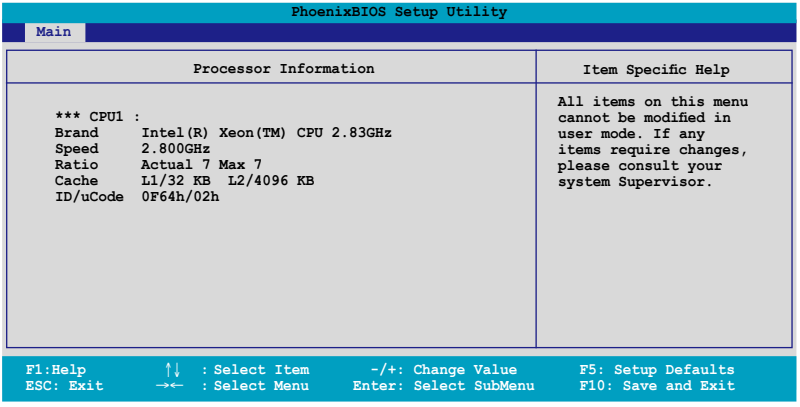
This menu gives you an overview of the general system specifications. The BIOS automatically detects the items in this menu.



The items in this menu are non-user configurable.

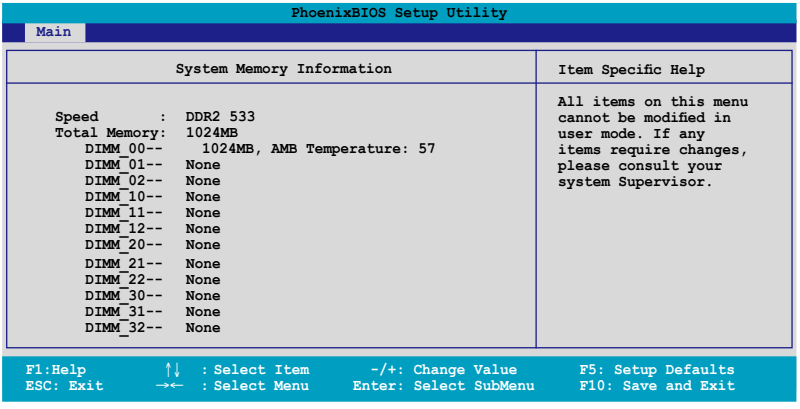
Processor Information

Displays the auto-detected CPU specification.



System Memory Information

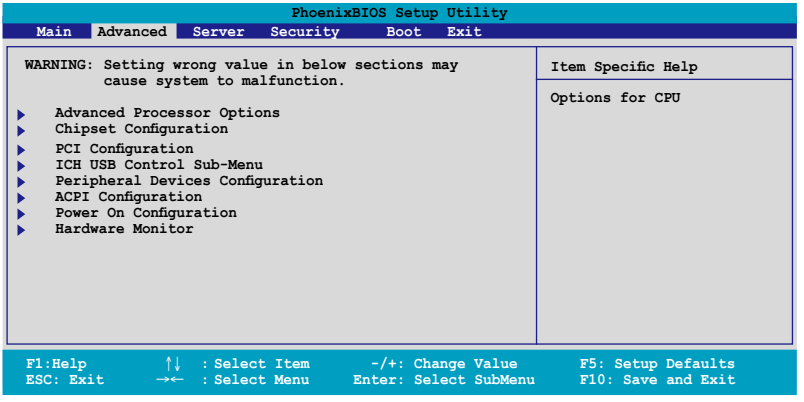
Displays the auto-detected system memory information.



5.4 Advanced menu

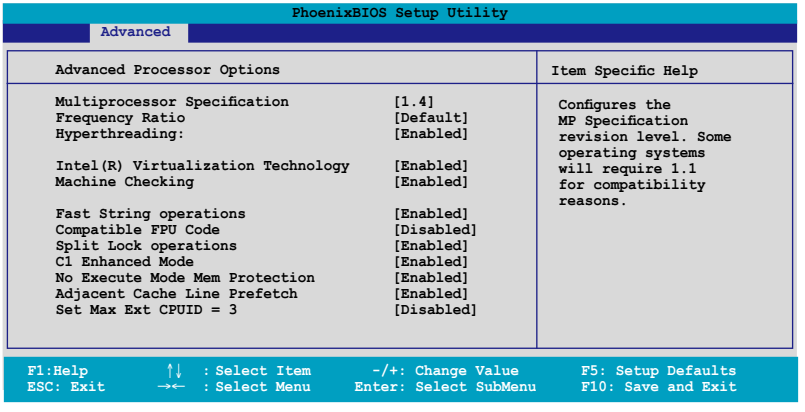
The Advanced menu items allow you to change the settings for the CPU and other system devices.

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



5.4.1 Advanced Processor Options

The following screen appears when you install an Intel® 5000 series CPU.



Multiprocessor Specification [1.4]

Allows you to configure the MP Specification revision level.
Configuration options: [1.1] [1.4]

Frequency Ratio [Default]

Allows you to select the processor frequency ratio.
Configuration options: [Default] [X 12]

Hyperthreading [Enabled]

Allows you to enable or disable the Intel® Hyper-Threading Technology feature.
Configuration options: [Disabled] [Enabled]

Intel(R) Virtualization Technology [Enabled]

Configuration options: [Disabled] [Enabled]

*Machine Checking [Enabled]

Configuration options: [Disabled] [Enabled]

*Fast String Operations [Enabled]

Configuration options: [Disabled] [Enabled]

*Compatible FPU Code [Disabled]

Configuration options: [Disabled] [Enabled]

*Split Lock operations [Enabled]

Configuration options: [Disabled] [Enabled]

C1 Enhanced Mode [Enabled]

Allows you to enable or disable C1E mode. In C1E mode, the CPU power consumption is lower when idle. Configuration options: [Disabled] [Enabled]

No Execute Mode Mem Protection [Enabled]

Configuration options: [Disabled] [Enabled]

Set Max Ext CPUID = 3 [Disabled]

Enable this item to boot legacy operating systems that cannot support CPUs with extended CPUID functions. Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetch [Enabled]

Configuration options: [Disabled] [Enabled]

Items with * mark are for technical personnel to debug only.

Echo TPR [Disabled]

Configuration options: [Disabled] [Enabled]

Scroll down to display the following items, which appear in both Intel® 5000, 5100, and 5300 series CPU.

Advanced Processor Options		Item Specific Help
Discrete MTRR Allocation	[Disabled]	
Intel EIST support:	[Disabled]	

F1:Help ↑↓ : Select Item -/+: Change Value F5: Setup Defaults
ESC: Exit →← : Select Menu Enter: Select SubMenu F10: Save and Exit

Discrete MTRR Allocation [Disabled]

Configuration options: [Disabled] [Enabled]

Intel EIST support [Disabled]

Enables or disables EIST support. When enabled, this item allows the CPU P state to dynamically change based on system loading.
Configuration options: [Disabled] [Enabled]

The following screen appears when you install an Intel® 5100 and 5300 series CPU. Refer to page 21 for the description of items that are in common with Intel® 5000 series CPU screen.

PhoenixBIOS Setup Utility

Advanced

Advanced Processor Options		Item Specific Help
Multiprocessor Specification	[1.4]	Configures the MP Specification revision level. Some operating systems will require 1.1 for compatibility reasons.
Numbers of Stop Grant	[Per Core]	
Intel(R) Virtualization Technology	[Enabled]	
Machine Checking	[Enabled]	
Fast String Operations	[Enabled]	
Compatible FPU Code	[Disabled]	
Split Lock operations	[Enabled]	
Thermal Management 2	[Enabled]	
C1 Enhanced Mode	[Enabled]	
No Execute Mode Mem Protection	[Enabled]	
Adjacent Cache Line Prefetch	[Enabled]	
Set Max Ext CPUID = 3	[Disabled]	
Echo TPR	[Disabled]	

F1:Help ↑↓ : Select Item -/+: Change Value F5: Setup Defaults
ESC: Exit →← : Select Menu Enter: Select SubMenu F10: Save and Exit

Numbers of Stop Grant [Per Core]

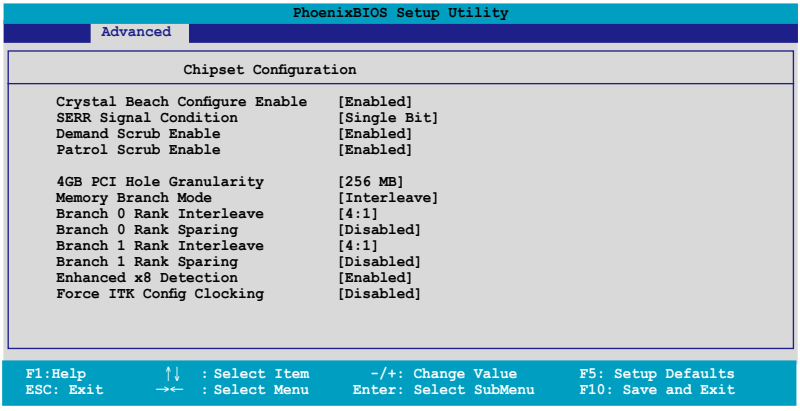
Configuration options: [Per Core] [Single]

Thermal Management 2 [Enabled]

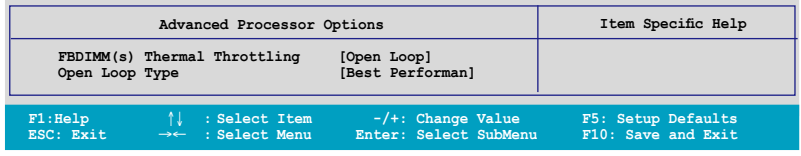
Configuration options: [Disabled] [Enabled]

5.4.2 Chipset Configuration

This menu shows the chipset configuration settings. Select an item then press <Enter> to display a pop-up menu with the configuration options.



Scroll down to display the following items:



Crystal Beach Configure Enable [Enabled]

Allows you to enable or disable the Configuration/Memory mapped accesses to the Crystal Beach Configuration space located in Device 8, Fn 0, and Fn 1. Configuration options: [Disabled] [Enabled]

SERR Signal Condition [Single Bit]

Allows you to select the ECC error that the SERR# asserts.
Configuration options: [None] [Single Bit] [Multiple Bit] [Both]

Demand Scrub Enable [Enabled]

Enables or disables the Demand Scrubbing.
Configuration options: [Disabled] [Enabled]

Patrol Scrub Enable [Enabled]

Enables or disables the Patrol Scrubbing.
Configuration options: [Disabled] [Enabled]

4GB PCI Hole Granularity [256 MB]

Allows you to select the granularity of the PCI hole for PCI resource.
Configuration options: [256 MB] [512 MB] [1.0 GB] [2.0 GB]

Memory Branch Mode [Interleave]

Allows you to select the memory branch mode.
Configuration options: [Sequential] [Interleave] [Mirror] [Single channel 0]

Branch 0 Rank Interleave [4:1]

Allows you to select the Branch 0 Rank Interleave.
Configuration options: [1:1] [2:1] [4:1]

Branch 0 Rank Sparing [Disabled]

Allows you to enable or disable the Branch 0 rank/DIMM Sparing feature.
Configuration options: [Disabled] [Enabled]

Branch 1 Rank Interleave [4:1]

Allows you to select the Branch 1 Rank Interleave.
Configuration options: [1:1] [2:1] [4:1]

Branch 1 Rank Sparing [Disabled]

Allows you to enable or disable the Branch 1 rank/DIMM Sparing feature.
Configuration options: [Disabled] [Enabled]

Enhanced x8 Detection [Enabled]

Allows you to enable or disable the enhanced x8 DRAM UC error detection.
Configuration options: [Disabled] [Enabled]

Force ITK Config Clocking [Disabled]

Allows you to enable or disable the FBD configuration for ITK test suite.
Configuration options: [Disabled] [Enabled]

FBDIMM(s) Thermal Throttling [Open Loop]

Allows you to disable or set the thermal throttling control.
Configuration options: [Open Loop] [Closed Loop] [MemCool Fan] [Disabled]

Set this item to [MemCool Fan] for a better fan management.

Open Loop Type [Best Performance]

Allows you to select the Open Loop Type.
Configuration options: [Best Performance] [Best Acoustic] [User Define]

The following items appear when you set the Open Loop Type to [User Define].

Environment Temperature [25 ºC]

Allows you to select the Environment Temperature value.
Configuration options: [20 ºC] ~ [40 ºC]

Temperature Rise [25 ºC]

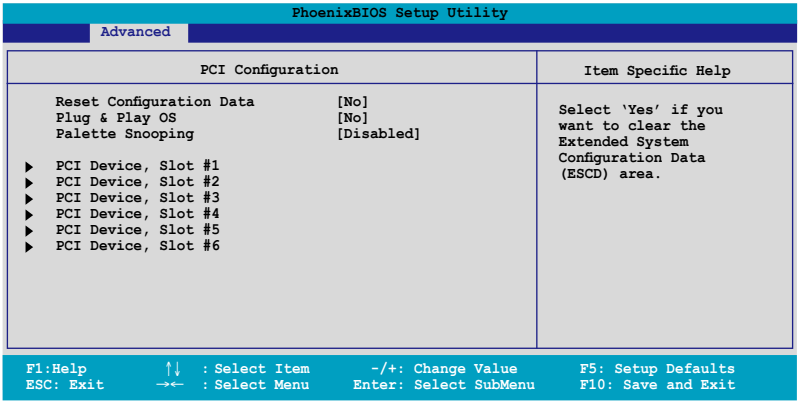
Allows you to select the Temperature Rise value.
Configuration options: [10 ºC] ~ [30 ºC]

FBDIMM(s) Air Flow [2.0]

Allows yout to select the Air Flow value.
Configuration options: [1.0] [1.5] ~ [5.0]

5.4.3 PCI Configuration

This menu shows the PCI configuration settings. Select an item then press <Enter> to display the configuration options.



Reset Configuration Data [No]

This item allows you to clear the Extended System Configuration Data (ESCD) area. Configuration options: [No] [Yes]

Plug & Play O/S [No]

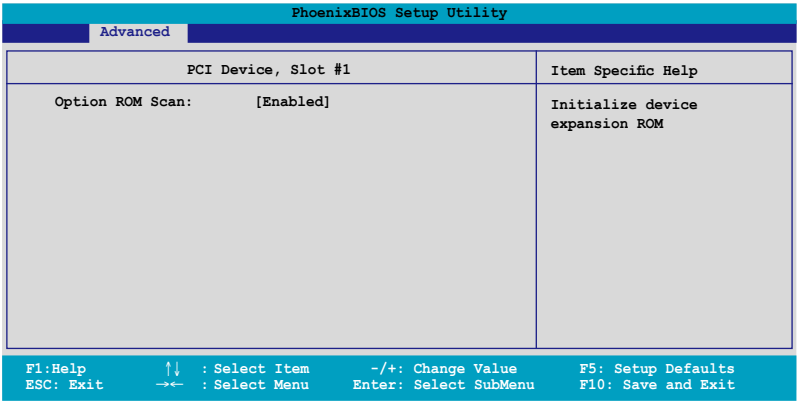
When set to [No], BIOS configures all the devices in the system. When set to [Yes] and if you install a Plug and Play operating system, the operating system configures the Plug and Play devices not required for boot.
Configuration options: [No] [Yes]

Palette Snooping [Disabled]

When set to [Enabled], the palette snooping feature informs the PCI devices that an ISA graphics device is installed in the system so that the latter can function correctly. Configuration options: [Disabled] [Enabled]

PCI Device, Slot #1 ~ 6

Allows you to configure the specific PCI devices.

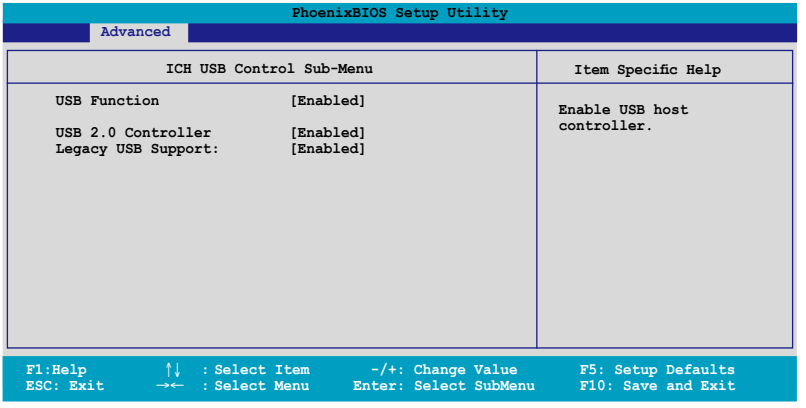


Option ROM Scan [Enabled]

Allows you to enable or disable the device expansion ROM.
Configuration options: [Enabled] [Disabled]

5.4.4 ICH USB Control Sub-Menu

The items in this menu allow you to display the USB configuration settings. Select an item then press <Enter> to display the configuration options.



USB Function [Enabled]

Allows you to enable the USB host controller.
Configuration options: [Disabled] [Enabled]

The following items appear only if you enable the USB Function item.

USB 2.0 Controller [Enabled]

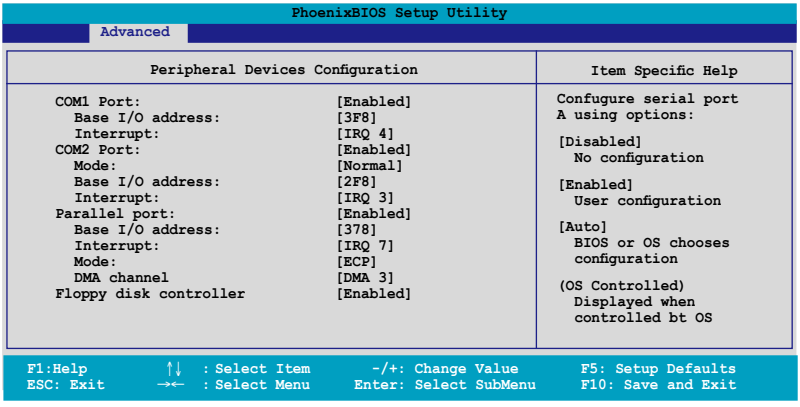
Allows you to enable or disable the USB 2.0 controller. Setting this item to [Enabled] allows the built-in high speed USB support in the BIOS to turn on automatically when you install high speed USB devices.
Configuration options: [Disabled] [Enabled]

Legacy USB Support [Enabled]

Allows you to enable or disable support for USB devices on legacy operating systems (OS). Setting to [Enabled] 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]

5.4.5 Peripheral Devices Configuration

This menu shows the peripheral devices configuration settings. Select an item then press <Enter> to display the configuration options.



COM1 Port [Enabled]

Allows you to configure COM1 port.
Configuration options: [Disabled] [Enabled] [Auto]

Base I/O address [3F8]

Allows you to select the base I/O address for COM1 port.
Configuration options: [3F8] [2F8] [3E8] [2E8]

Interrupt [IRQ 4]

Allows you to set the interrupt for COM1 port
Configuration options: [IRQ 3] [IRQ 4]

COM2 Port [Enabled]

Allows you to configure COM2 port.
Configuration options: [Disabled] [Enabled] [Auto]

Mode [Normal]

Allows you to set the mode for COM2 port.
Configuration options: [Normal] [IR] [ASK-IR]

Base I/O address [2F8]

Allows you to select the base I/O address for COM2 port.
Configuration options: [3F8] [2F8] [3E8] [2E8]

Interrupt [IRQ 3]

Allows you to set the interrupt for COM2 port.
Configuration options: [IRQ 3] [IRQ 4]

Parallel port [Enabled]

Allows you to configure the parallel port.
Configuration options: [Disabled] [Enabled] [Auto]

Base I/O address [378]
Allows you to select the base I/O address for the parallel port.
Configuration options: [378] [278] [3BC]

Interrupt [IRQ 7]
Allows you to set the interrupt for the parallel port.
Configuration options: [IRQ 5] [IRQ 7]

Mode [ECP]
Allows you to set the mode for the parallel port.
Configuration options: [Output only] [Bi-directional] [EPP] [ECP]

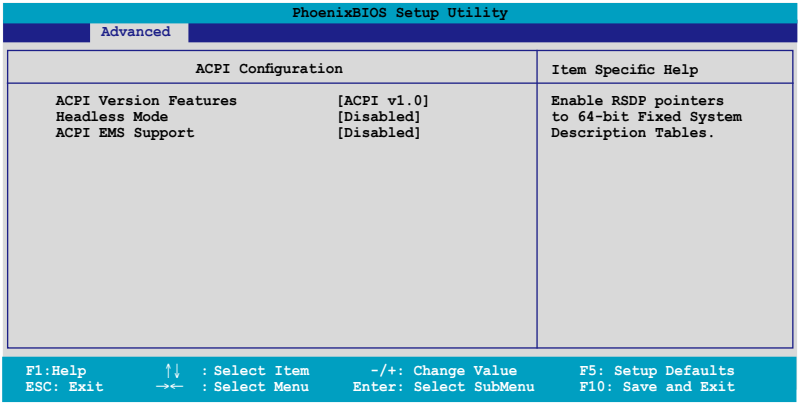
DMA channel [DMA 3]
Allows you to set the DMA channel for the parallel port.
Configuration options: [DMA 1] [DMA 3]

Floppy disk controller [Enabled]

Allows you to configure the floppy disk controller.
Configuration options: [Disabled] [Enabled] [Auto]

5.4.6 ACPI Configuration

This menu shows the Advanced Configuration and Power Interface (ACPI) configuration settings. Select an item then press <Enter> to display the configuration options.



ACPI Version Features [ACPI v1.0]

Allows you to enable RSDP pointers to 64-bit fixed system description tables.
Configuration options: [ACPI v1.0] [ACPI v2.0] [ACPI v3.0]

Headless Mode [Disabled]

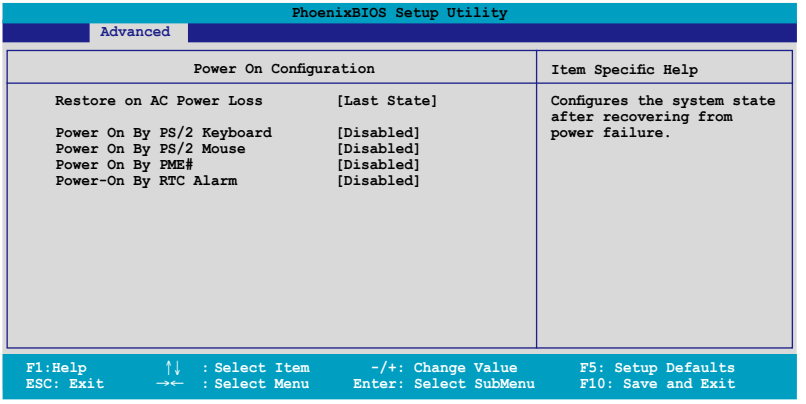
Allows you to enable or disable the headless operation mode through ACPI.
Configuration options: [Disabled] [Enabled]

ACPI EMS Support [Disabled]

Allows you to enable or disable the ACPI EMS support.
Configuration options: [Disabled] [Enabled]

5.4.7 Power On Configuration

This menu shows the power configuration settings. Select an item then press <Enter> to display the configuration options.



Restore on AC Power Loss [Last State]

When set to [Power Off], the system goes into “off state” after an AC power interruption. When set to [Power On], the system turns on automatically after a power interruption. When set to [Last State], the system goes into whatever was the system state (on or off) before the power interruption.
Configuration options: [Power Off] [Power On] [Last State]

Power On By PS/2 Keyboard [Disabled]

Allows you to use specific keys on the PS/2 keyboard to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.
Configuration options: [Enabled] [Disabled]

Power On By PS/2 Mouse [Disabled]

When set to [Enabled], this parameter allows you to use the PS/2 mouse to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead. Configuration options: [Enabled] [Disabled]

Power On By PME# [Disabled]

Allows you to enable or disable the PME and onboard LAN to generate a wake-up event. Configuration options: [Disabled] [Enabled]

Power On By 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 if you enable the **Power On By RTC Alarm** item.

RTC Alarm Date [0]

To set the date of alarm, highlight this item and press <Enter> to display a date chart. Press <+> or <-> to change scroll through the options, then press <Enter> when done. The default setting [0] is equivalent to everyday alarm.
Configuration options: [0] [1] ~ [31]

RTC Alarm Date [00 : 00 : 00]

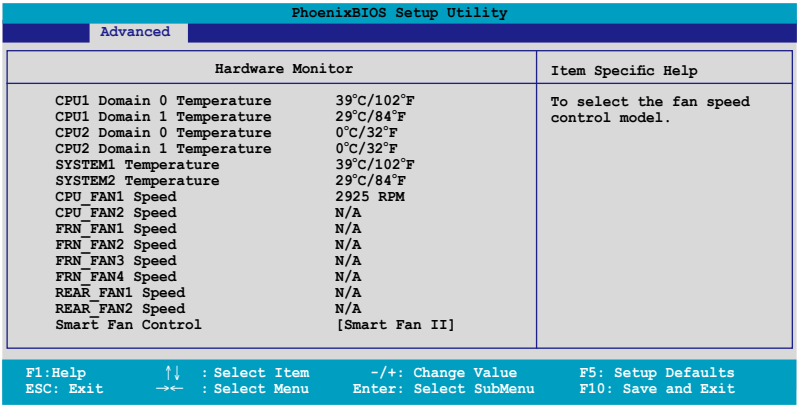
To set the time of alarm:

1. Press <+> or <-> to set the desired value.
2. Press <Tab> to move to the next field.
3. Press <Enter> when done.

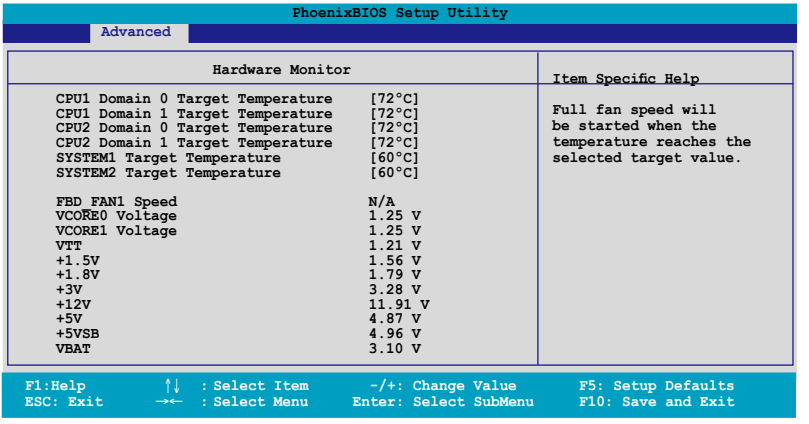
5.4.8 Hardware Monitor

This menu shows the hardware monitor configuration settings. Select an item then press <Enter> to display the configuration options.

The following screens appear when you install Intel® 5000 series CPU.



Scroll down to display more items:



CPU1/2 Domain 0/1 Temperature, SYSTEM1/2 Temperature, CPU_FAN1/2 Speed, FRN_FAN1/2/3/4 Speed, REAR_FAN1/2 Speed

These fields show the auto-detected values and are not user-configurable. If no fan is installed, the field shows 0 RPM.

Smart Fan Control [Smart Fan II]

Allows you to disable or configure the Smart Fan feature.
Configuration options: [Disabled] [Smart Fan] [Smart Fan II]

CPU1/2 Domain 0/1 Target Temperature (CPU1/2 Target Temperature)

Allows you to set the target CPU temperature at which the CPU fan will run at full speed. Configuration options: [44ºC] ~ [66ºC]

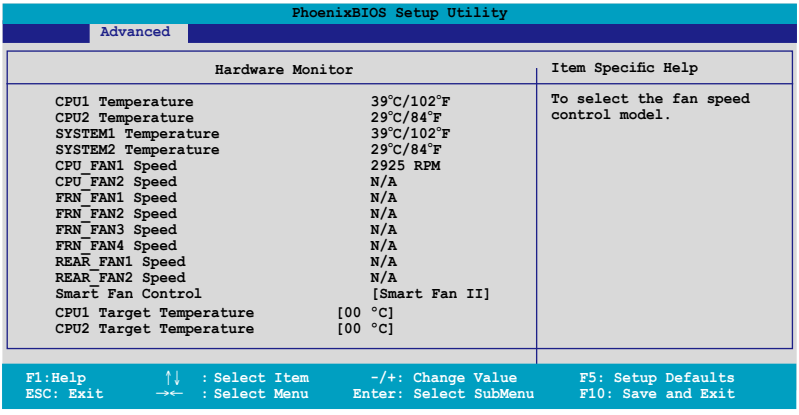
SYSTEM1/2 Target Temperature

Allows you to set the target sytem temperature at which the system fan will start running if the fan is not yet turned on.
Configuration options: [39ºC] ~ [60ºC]

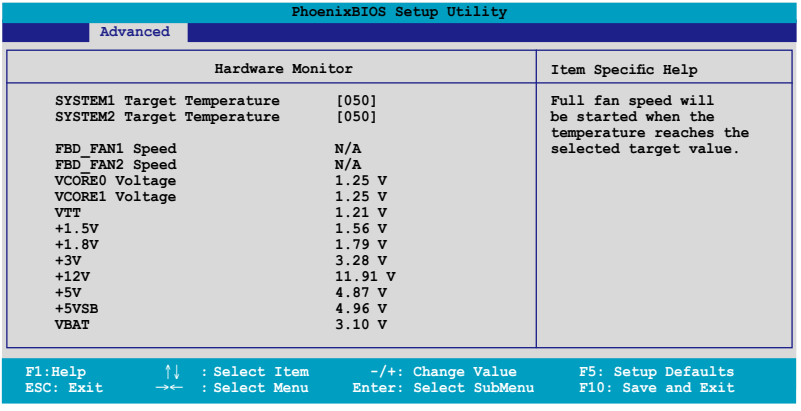
FBD_FAN1/2 Speed, VCORE0/1 Voltage, VTT, +1.5V, +1.8V, +3V, +12V, +5V, +5VSB, VBAT

These fields show the auto-detected values and are not user-configurable.

The following screens appear when you install Intel® 5100 and 5300 series CPU.



Scroll down to display more items:



CPU1/2 Temperature, SYSTEM1/2 Temperature, CPU_FAN1/2 Speed, FRN_FAN1/2/3/4 Speed, REAR_FAN1/2 Speed

These fields show the auto-detected values and are not user-configurable. If no fan is installed, the field shows 0 RPM.

Smart Fan Control [Smart Fan II]

Allows you to disable or configure the Smart Fan feature.
Configuration options: [Disabled] [Smart Fan] [Smart Fan II]

CPU1/2 Target Temperature

Allows you to set the target CPU temperature at which the CPU fan will run at full speed. Configuration options: [44ºC] ~ [66ºC]

SYSTEM1/2 Target Temperature

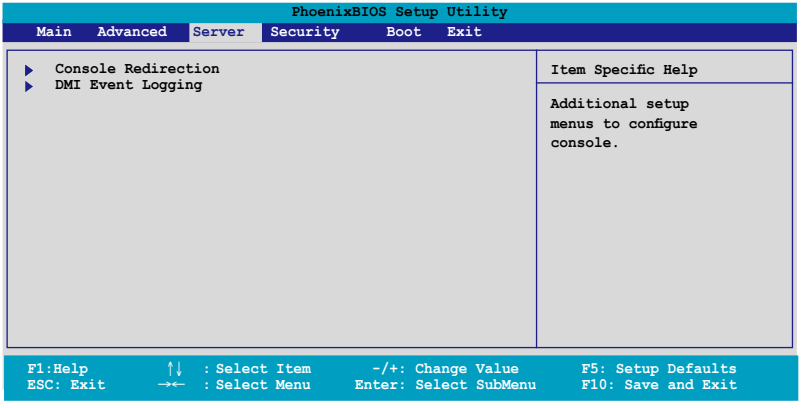
Allows you to set the target sytem temperature at which the system fan will start running if the fan is not yet turned on.
Configuration options: [39ºC] ~ [60ºC]

FBD_FAN1/2 Speed, VCORE0/1 Voltage, VTT, +1.5V, +1.8V, +3V, +12V, +5V, +5VSB, VBAT

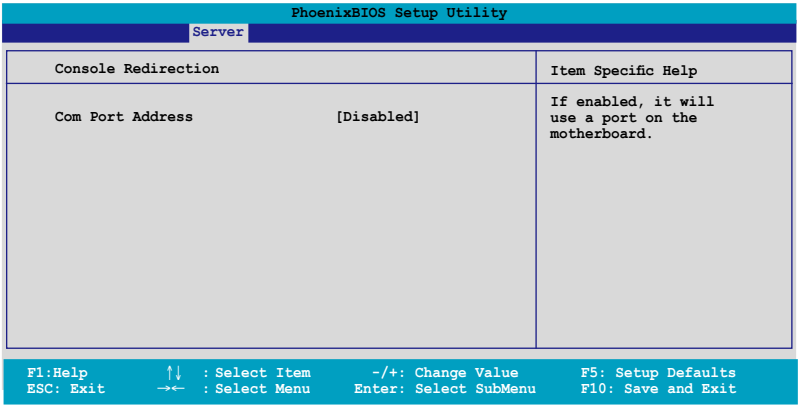
These fields show the auto-detected values and are not user-configurable.

5.5 Server menu

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



5.5.1 Console Redirection



Com Port Address [Disabled]

Allows you to disable or select the COM port to use.
Configuration options: [Disabled] [Onboard COM1 port] [Onboard COM2 port]

The following items appear only if you set the **Com Port Address** item to [Onboard COM1 port] or [Onboard COM2 port].

Baud Rate [57.6K]

Allows you to enable the specified baud rate.
Configuration options: [300] [1200] [2400] [9600] [19.2K] [38.4K] [57.6K] [115.2K]

Console Type [VT-UTF8]

Allows you to enable the specified console type.
Configuration options: [VT100] [VT100, 8bit] [PC-ANSI, 7bit] [PC ANSI] [VT100+] [VT-UTF8] [ASCII]

Flow Control [None]

Allows you to select the flow control for console redirection.
Configuration options: [None] [XON/XOFF] [CTS/RTS]

Console connection [Direct]

Allows you to select the console connection. [Direct] indicates that the console is connected directed to the system. [Via modem] indicates that a modem is used to connect. Configuration options: [Direct] [Via modem]

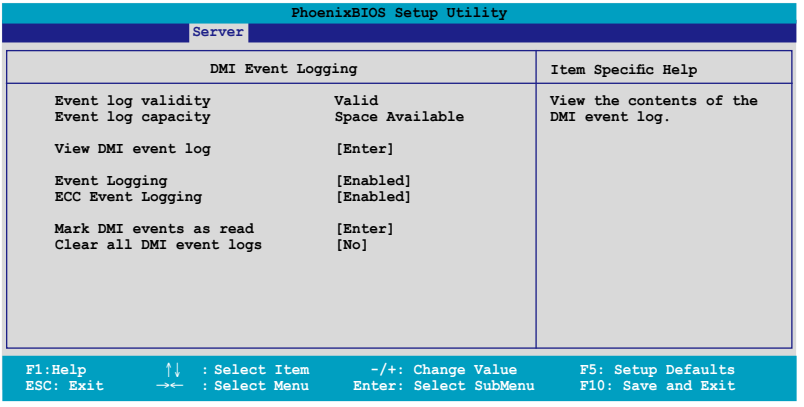
Continue C.R. after POST [Off]

Set this item to [On] if you want console redirection to continue after the operating system has loaded. Configuration options: [Off] [On]

of video pages to support [1]

Allows you to set the number of video pages to allocate for console redirection when the video hardware is not available. Press <-> or <+> to set the value, or enter the value using the numeric keypad. Configuration options: [1] ~ [8]

5.5.2 DMI Event Logging



Event log validity, Event log capacity

Displays the auto-detected system information.

View DMI event log [Enter]

Press <Enter> to view the contents of the DMI event log.

Event Logging [Enabled]

Enables or disables to allows logging of DMI events.
Configuration options: [Disabled] [Enabled]

ECC Event Logging [Enabled]

Enables or disables to allows logging of ECC events.
Configuration options: [Disabled] [Enabled]

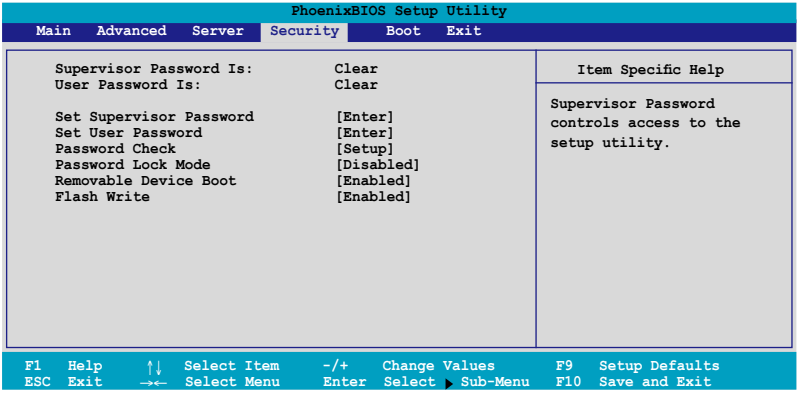
Mark DMI events as read [Enter]

Press <Enter> to mark all DMI events in the event log as read.

Clear all DMI event logs [No]

Allows you to keep or clear the DMI event log after rebooting.
Configuration options: [No] [Yes]

5.6 Security menu



Supervisor Password Is [Clear]
User Password Is [Clear]

These fields allow you to set passwords:

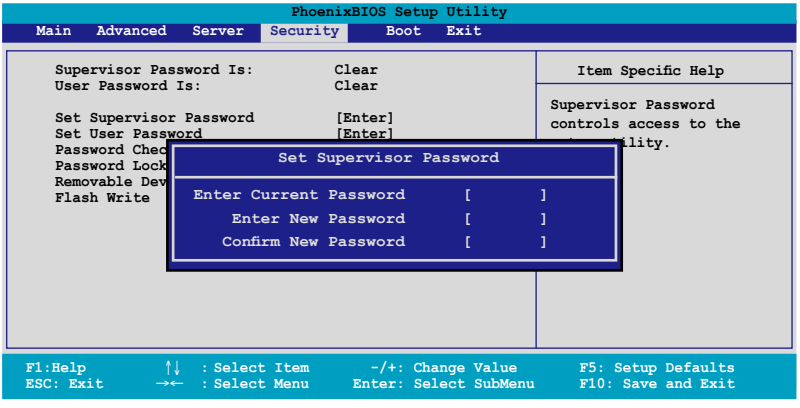
To set a password:

1. Select an item then press <Enter>.
2. Type in a password using a combination of a maximum of eight (8) alpha-numeric characters, then press <Enter>.
3. When prompted, confirm the password by typing the exact characters again, then press <Enter>. The password field setting is changed to Set.

To clear the password:

1. Select the item Set Supervisor Password or Set User Password, depending on which password you want to clear. Press <Enter>.

   The following message appears:



2. In the Enter current password field, type in your current password. Press <Enter>.
3. The cursor moves to the next field, Enter new password. Press <Enter>. Do not type anything in this field.
4. The cursor moves to the next field, Confirm new password. Press <Enter>. Do not type anything in this field.
5. When the confirmation message “Password has been changed” appears, press <Enter>.

   The display returns to the Security menu. Note that the password field on top is changed to Clear.

A note about passwords

The Supervisor password is required to enter the BIOS Setup program preventing unauthorized access. The User password is required to boot the system preventing unauthorized use.

Forgot your password?

If you forget your password, you can clear it by erasing the CMOS Real Time Clock (RTC) RAM. The RAM data containing the password information is powered by the onboard button cell battery. If you need to erase the CMOS RAM, refer to section “2.6 Jumpers” for instructions.

Password Check [Setup]

This field requires you to enter the password before entering the BIOS setup or the system. Select [Setup] to require the password before entering the BIOS Setup. Select [System] to require the password before entering the system. Configuration options: [Setup] [Always]

Password Lock Mode [Enabled]

When set to [Enabled], the keyboard is locked and the user has no privilege to launch the BIOS setup utility when installing adapter cards during option ROM initialization. Configuration options: [Disabled] [Enabled]

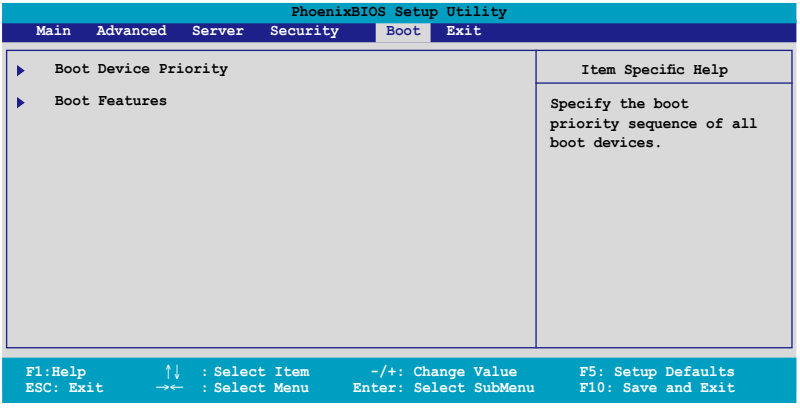
Removable Device Boot [Enabled]

Allows you to enable or disable booting from a legacy floppy, USB floppy, or IDE optical drive. Configuration options: [Disabled] [Enabled]

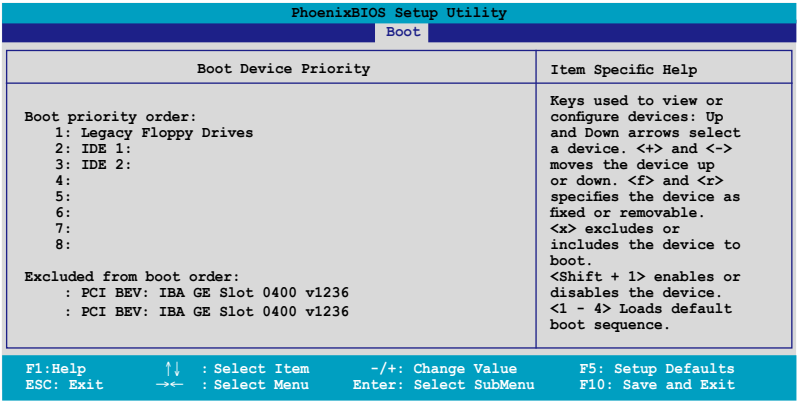
Flash Write [Enabled]

Set this item to [Disabled] to write-protect the BIOS flash memory. Configuration options: [Disabled] [Enabled]

5.7 Boot menu



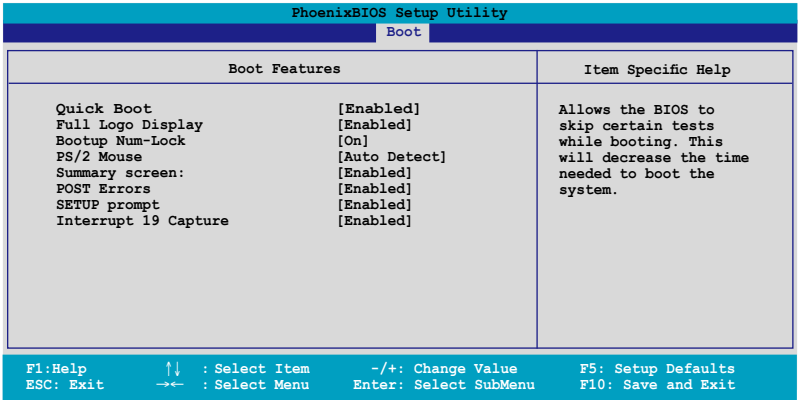
5.7.1 Boot Device Priority



Refer to the following table for keys assigned to configure devices.

Key/s	Use this key to...
<Up arrow> / <Down arrow>	select a device.
<+> / <->	move the device up or down.
<f> / <r>	specify the device as fixed or removable.
<x>	exclude or include the device to boot.
<Shift + 1>	enable or disable the device.
<1 - 4>	load default boot sequence.

5.7.2 Boot Features



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 Logo Display [Enabled]

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

Bootup Num-Lock [On]

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

PS/2 Mouse [Auto Detect]

Allows you to enable or disable support for PS/2 mouse.
Configuration options: [Disabled] [Enabled] [Auto Detect]

Summary screen: [Enabled]

When this item is enabled, the system configuration is displayed during POST.
Configuration options: [Disabled] [Enabled]

POST Errors [Enabled]

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

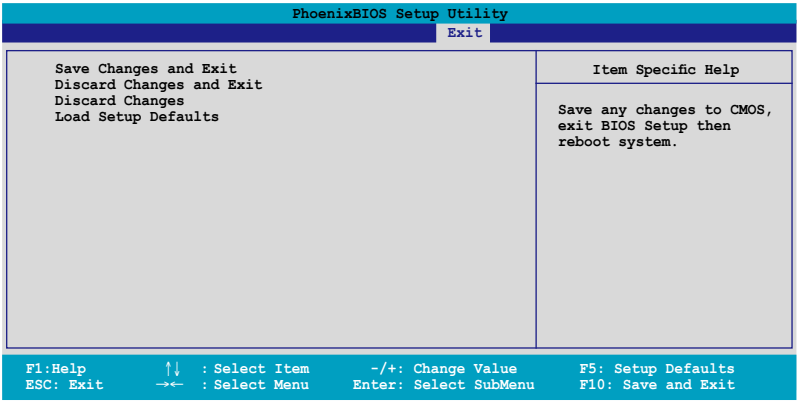
SETUP prompt [Enabled]

When this item is 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]

5.8 Exit menu



Save Changes and Exit

Select this option then press <Enter>, or simply press <F10>, to save your changes to CMOS before exiting the Setup utility.

When a confirmation window appears:

- select [Yes], then press <Enter> to save and exit.
- select [No], then press <Enter>, or simply press <Esc>, to cancel the command and return to the Exit menu.

Discard Changes and Exit

Select this option then press <Enter> if you wish to exit the Setup utility without saving your changes.

When a confirmation window appears:

- select [Yes], then press <Enter> to discard your changes and exit.
- select [No], then press <Enter>, or simply press <Esc>, to cancel the command and return to the Exit menu.

Discard Changes

Select this option to discard the changes that you made, and restore the previously saved values.

When a confirmation window appears:

- select [Yes], then press <Enter> to discard any changes and load the previously saved values.
- select [No], then press <Enter>, or simply press <Esc>, to cancel the command and return to the Exit menu.

Load Setup Defaults

Select this option then press <Enter>, or simply press <F9>, to load the optimized values for each of the Setup menu items.

When a confirmation window appears:

- select [Yes], then press <Enter> to load the default values.
- select [No], then press <Enter>, or simply press <Esc>, to cancel the command and return to the Exit menu.

CHAPTER 6

RAID Configuration

6.1 Setting up RAID

The motherboard comes with the following RAID solutions:

- LSI1068 PCI-X SAS controller supports SAS disk drives and RAID0, RAID1, and RAID1E configuration.

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 1-E *(Enhanced RAID 1)* has a striped layout with each stripe unit having a secondary (or alternate) copy stored on a different disk. You can use three or more hard disk drives for this configuration.

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. Available when you install an optional ZCR.

If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support CD to a floppy disk before you install an operating system to the selected hard disk drive.

6.1.2 Installing hard disk drives

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

To install the SATA hard disks for RAID configuration:

1. Install the SATA hard disks into the drive bays following the instructions in the system user guide.
2. Connect a SATA signal cable to the signal connector at the back of each drive and to the SATA connector on the motherboard.
3. Connect a SATA power cable to the power connector on each drive.

6.1.3 Setting the RAID item in BIOS

You must set the RAID item in the BIOS Setup before you can create a RAID set from SATA hard disk drives attached to the SATA connectors supported by the Intel® 6321ESB Southbridge chip. To do this:

1. Enter the BIOS Setup during POST.
2. Go to the **Main Menu** > **IDE Configuration** > **S-ATA Configuration**, then press <Enter>.
3. Set the **SATA Controller Mode Option** item to [Enhanced], then press <Enter>.
4. Set the **SATA RAID Enable** item to [Enabled].
5. Save your changes, then exit the BIOS Setup.

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

6.1.4 RAID configuration utilities

Depending on the RAID connectors that you use, you can create a RAID set using the utilities embedded in each RAID controller. For example, use the LSI Logic Embedded SATA RAID Setup Utility or the Intel® Matrix Storage Manager if you installed Serial ATA hard disk drives on the Serial ATA connectors supported by the Intel® 6321ESB Southbridge.

You may use the LSI1068 SAS Configuration Utility if you installed SAS hard disk drives to the mini-SAS connector(s) supported by the LSI1068 PCI-X SAS controller.

Refer to the succeeding sections for details on how to use LSI1068 SAS Configuration Utility.

6.2 LSI Logic MPT Setup Utility

The LSI Logic MPT Setup Utility is an integrated RAID solution that allows you to allows you to create the following RAID set(s) from SAS hard disk drives supported by the LSI1068 PCI-X SAS controller:

- RAID 1 (Integrated Mirroring)
- RAID 1E (Integrated Mirroring Enhanced)
- RAID 0 (Integrated Striping)

6.2.1 Integrated Mirroring

Overview

The Integrated Mirroring (IM) feature supports simultaneous mirrored volumes with two disks (IM). Integrated Mirroring Enhanced (IME) supports three to eight disks, or seven mirrored disks plus a hot spare disk.

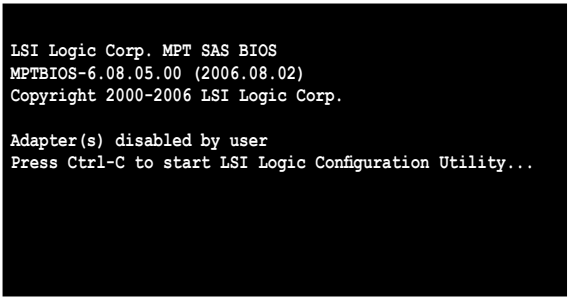
The IM feature supports hot swap capability, so when a disk in an IM volume failes, you can easily restore the volume, and the swapped disk is automatically re-mirrored.

Creating Integrated Mirroring volumes

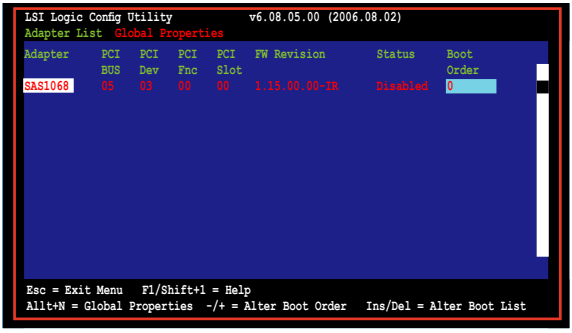
- You may use disks of different sized in IM and IME volumes; however, the size of the smallest disk determines the "logical" size of each member disk.
- Do not combine Serial ATA and SAS disks in one volume.
- The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

To create an IM volume:

1. Turn on the system after installing all SAS hard disk drives.
2. During POST, press <Ctrl+C> to enter the SAS configuration utility.

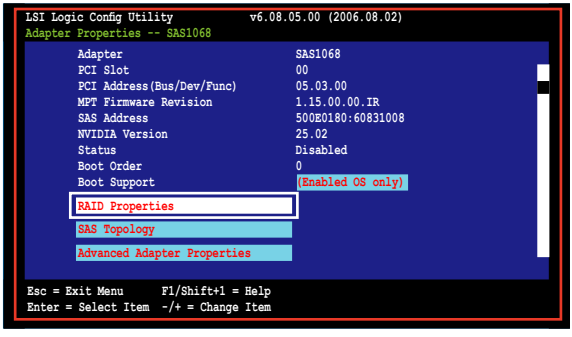


3. The following screen appears. Select a channel and press <Enter> to enter the setup.

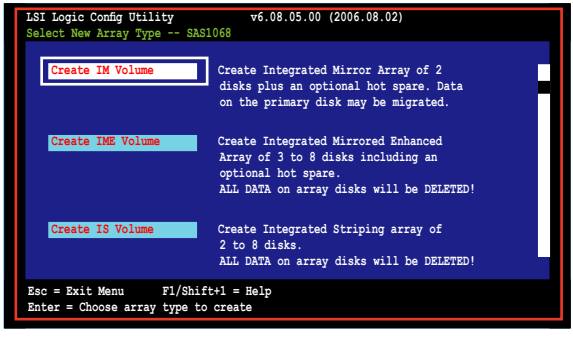


The numbers of the channel depend on the controller.

4. The **Adapter Properties** screen appears.
Use the arrow keys to select **RAID Properties**, then press <Enter>.

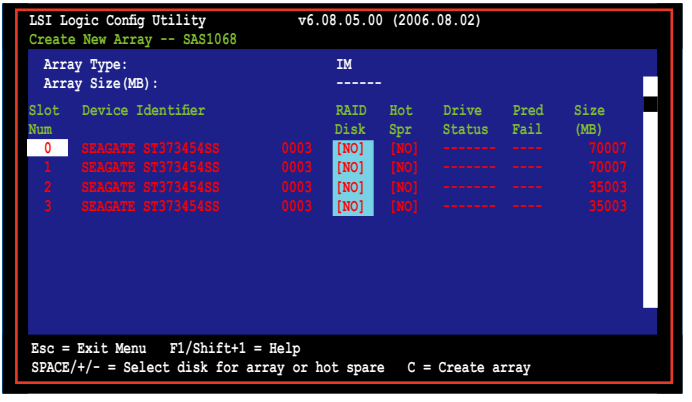


5. The **Select New Array Type** screen apprears.
Use the arrow keys to select **Create IM Volume**, then press <Enter>.



6. The Create New Array screen shows the disks you can add to make up the IM volume. Use the arrow key to select a disk, then move the cursor to the RAID Disk column. To include this disk in the array, press <+>, <->, or <Space>.

   You may also specify the Hot Spare disk here. Select the disk, then move the cursor to the Hot Spr column, then press <+>, <->, or <Space>.



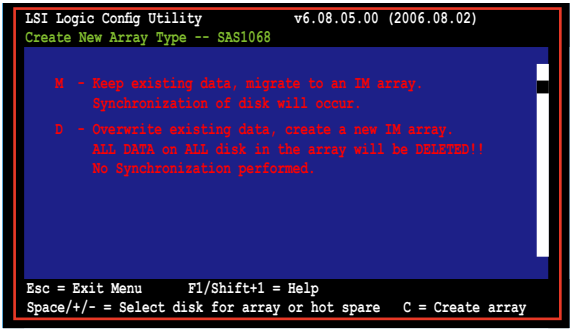
By default, the RAID Disk field shows No before array creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID array.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk has been selected as the Hot Spare for the RAID array.
- The disk is already part of another array.

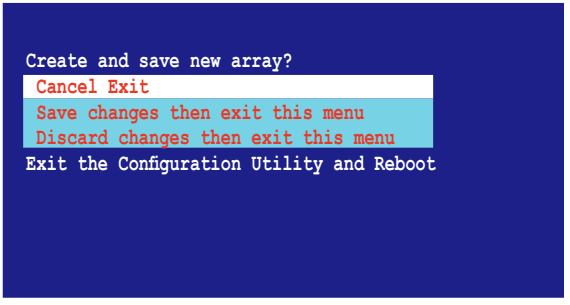
7. A confirmation screen appears.

   Press <M> to keep existing data on the first disk. If you choose this option, data on the first disk will be mirrored on the second disk that you will add to the volume later. Make sure the data you want to mirror is on the first disk.

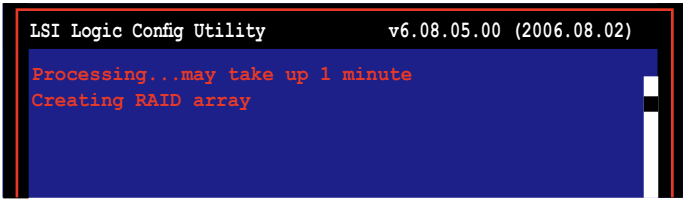
   Press <D> to overwrite any data and create the new IM array.



8. Repeat steps 5 and 6 to add the second disk to the volume.
9. When done, press <C> to create the array, then select Save changes then exit this menu.



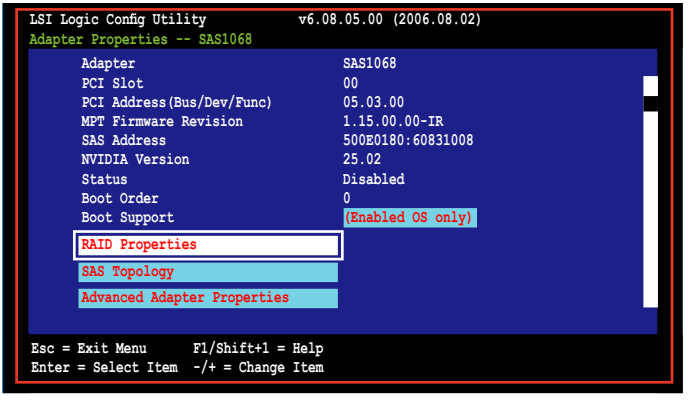
10. The utility creates the array.



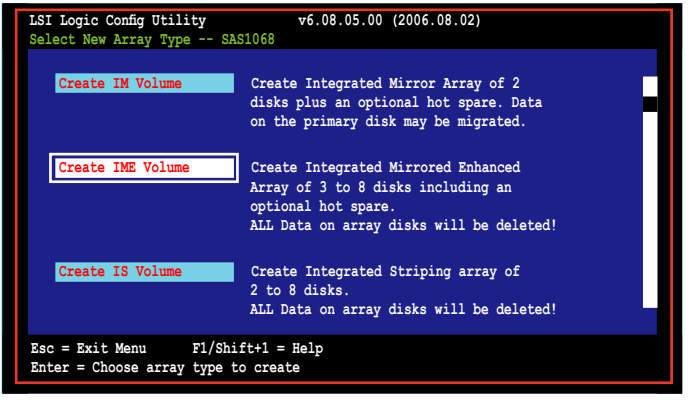
6.2.2 Integrated Mirroring Enhanced

To create an IME volume:

1. The **Adapter Properties** screen appears.
   Use the arrow keys to select **RAID Properties**, then press <Enter>.



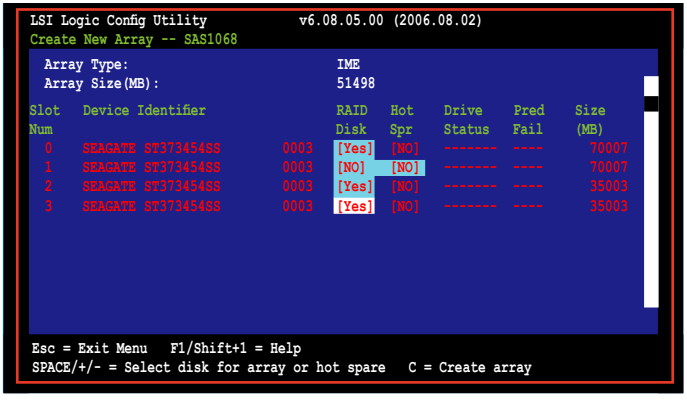
2. The **Select New Array Type** screen apprears.
   Use the arrow keys to select **Create IME Volume**, then press <Enter>.



3. The **Create New Array** screen shows the disks you can add to make up the IME volume.

   Integrated Mirroring Enhanced (IME) supports three to eight disks, or seven mirrored disks plus a hot spare disk. Use the arrow key to select a disk, then move the cursor to the RAID Disk column. To include this disk in the array, press <+>, <->, or <Space>.

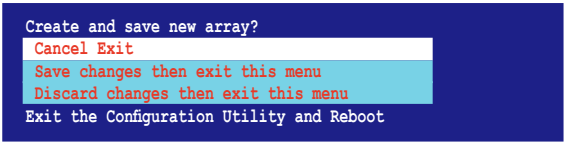
   You may also specify the Hot Spare disk here. Select the disk, then move the cursor to the Hot Spr column, then press <+>, <->, or <Space>.



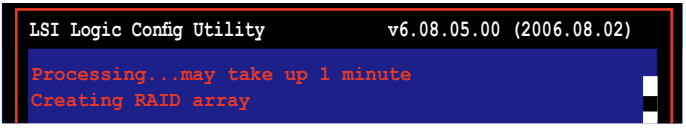
By default, the RAID Disk field shows No before array creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID array.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk has been selected as the Hot Spare for the RAID array.
- The disk is already part of another array.

4. Repeat step 5 to add the other disks to the volume.
5. When done, press <C> to create the array, then select Save changes then exit this menu.



6. The utility creates the array.



6.2.3 Integrated Striping (IS) volume

Overview

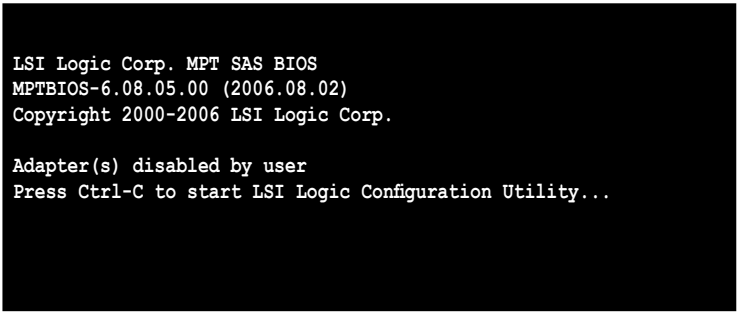
The Integrated Striping (IS) feature provides RAID 0 functionality, supporting volumes with two to eight disks. You may combine an IS volume with an IM or IME volume.

Creating Integrated Striping volumes

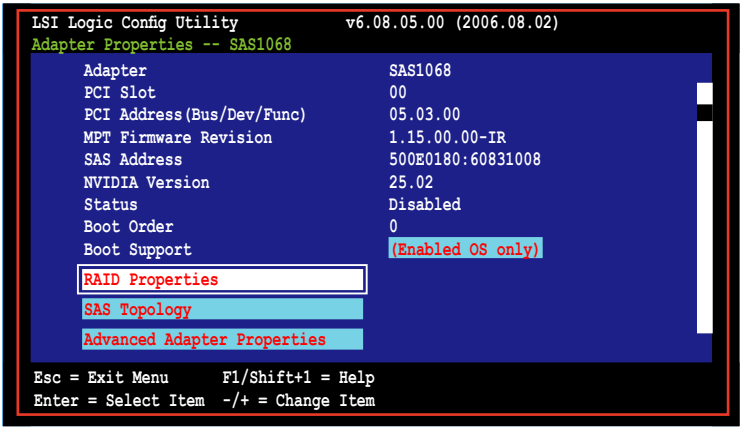
Do not combine Serial ATA and SAS disks in one volume.

To create an IS volume:

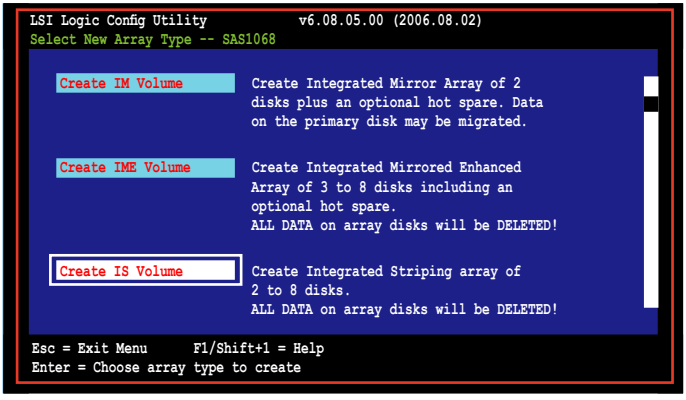
1. Turn on the system after installing all SAS hard disk drives.
2. During POST, press <Ctrl+C> to enter the SAS configuration utility.



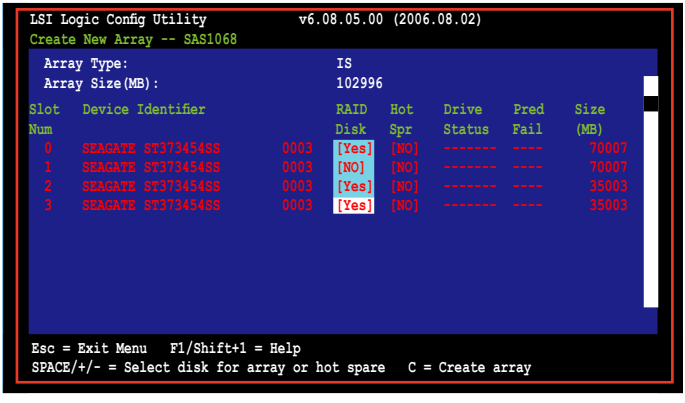
3. The **Adapter Properties** screen appears.
   Use the arrow keys to select **RAID Properties**, then press <Enter>.



4. The **Select New Array Type** screen apprears.
Use the arrow keys to select **Create IS Volume**, then press <Enter>.



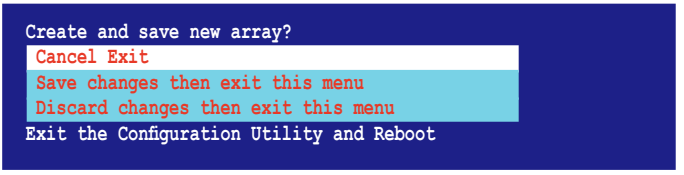
5. The **Create New Array** screen shows the disks you can add to make up the IS volume. Use the arrow key to select a disk, then move the cursor to the RAID Disk column. To include this disk in the array, press <+>, <->, or <Space>.



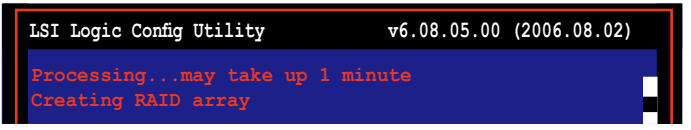
By default, the RAID Disk field shows No before array creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID array.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk has been selected as the Hot Spare for the RAID array.
- The disk is already part of another array.

6. Repeat step 5 to add the other disks to the volume.
7. When done, press <C> to create the array, then select Save changes then exit this menu.



9. The utility creates the array.



6.2.4 Managing Arrays

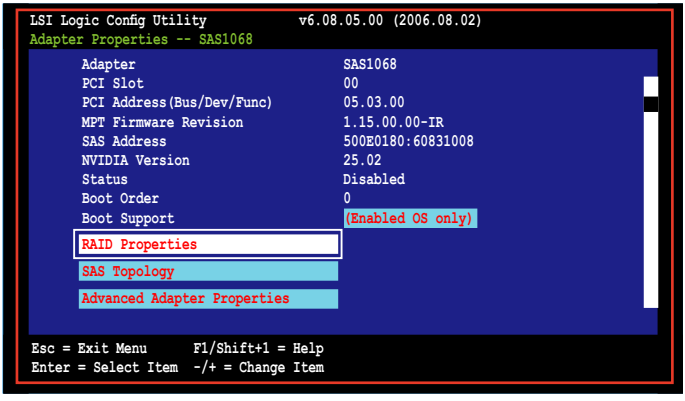
The LSI Logic MPT Setup Utility allows you to perform other tasks related to configuring and maintaining IM and IME volumes.

Refer to this section to view volume properties, manage the hot spare disk, synchronize the array, activate the array, and delete the array.

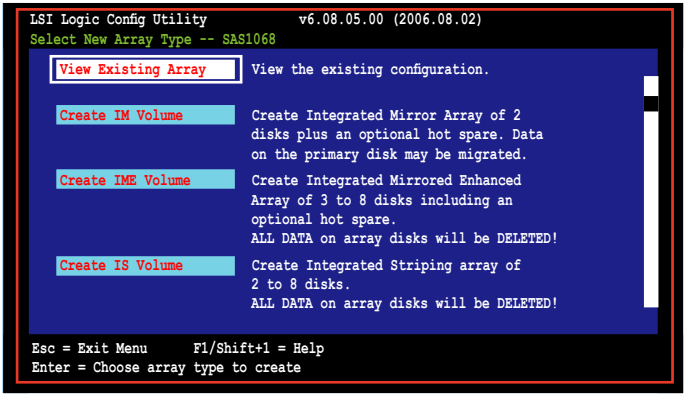
Viewing volume properties

To view volume properties:

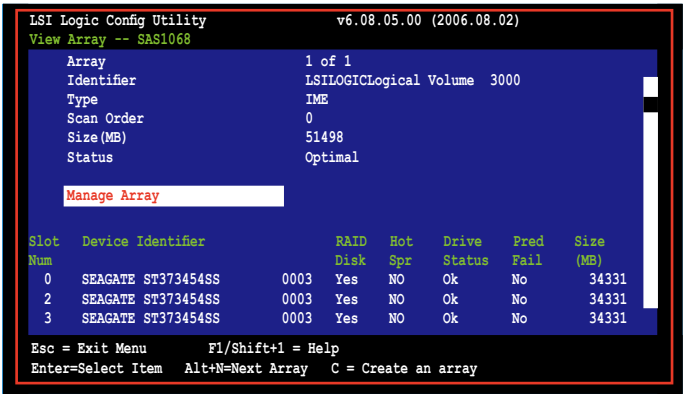
1. On the main menu, select **RAID Properties**.



2. On the next screen that appears, select **View Existing Array**.



3. The **View Existing Array** screen appears. Here you can view properties of the RAID array(s) created. If you have configured a hot spare, it will also be listed. if you created more than one array, you may view the next array by pressing <Alt+N>.



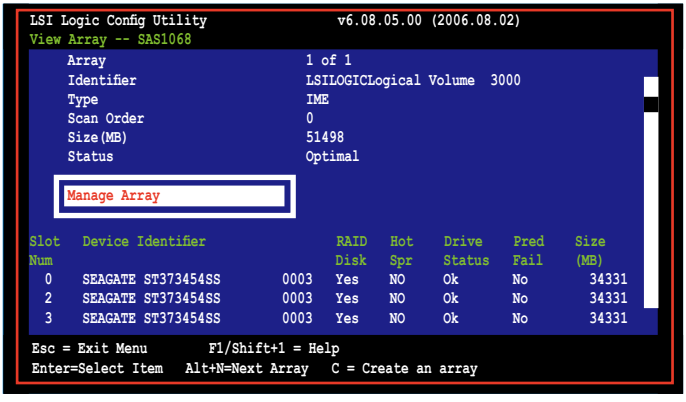
Managing hot spares

You may configure one disk as a global hot spare to protect critical data on the IM/IME volume(s). You may create the hot spare disk at the same time you create the IM/IME volume. Refer to this section when adding a hot spare disk on an existing volume.

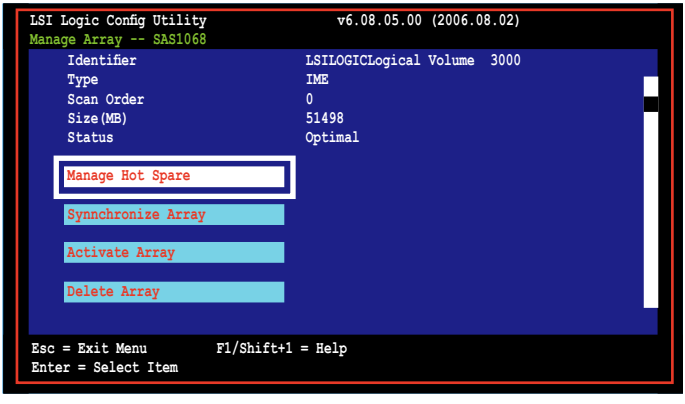
If a disk on an IM/IME volume fails, the utility automatically rebuilds the failed disk data on the hot spare. When the failed disk is replaced, the utility assigns the replacement as the new hot spare.

To create a hot spare:

1. Follow steps 1 ~ 3 of the section “Viewing volume properties.”
2. From the **View Array** screen, select **Manage Array**, then press <Enter>.

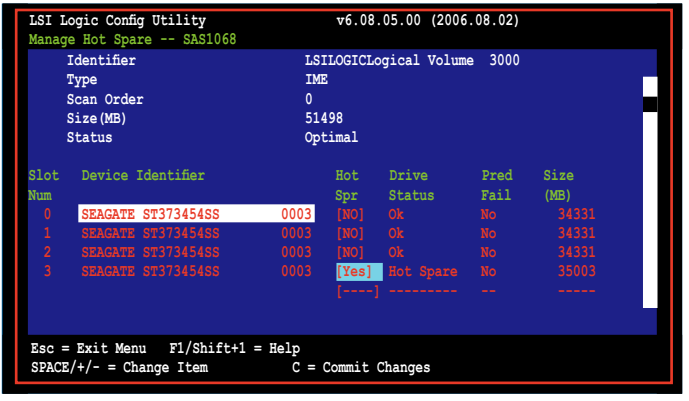


3. From the **Manage Array** screen select **Manage Hot Spare**, then press <Enter>.



4. Use the arrow key to select the disk you would like to configure as hot spare, then move the cursor to the Hot Spr column. Press <+>, <->, or <Space>. The Drive Status column field now shows Hot Spare.

   Press <C> to commit the changes.

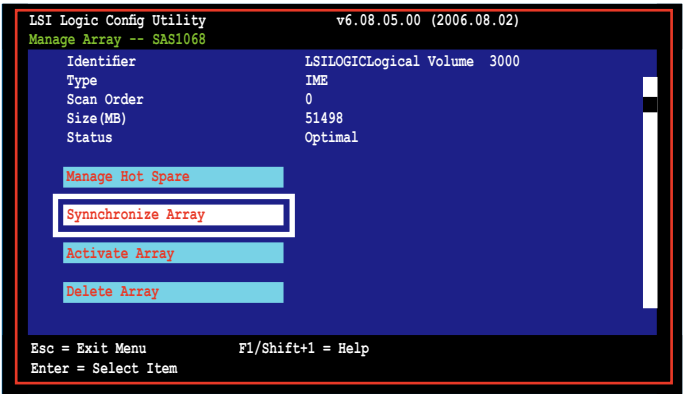


Synchronizing the array

Synchronizing the array allows the utility to resynchronize data on the mirrored disk in the array. This procedure is seldom required because data synchronization is automatically done during normal operation.

To synchronize the array:

1. Follow steps 1 ~ 3 of the section “Viewing volume properties” and step 2 of the section “Managing hot spares.”
2. From the **Manage Array** screen select **Synchronize Array**, then press <Enter>.



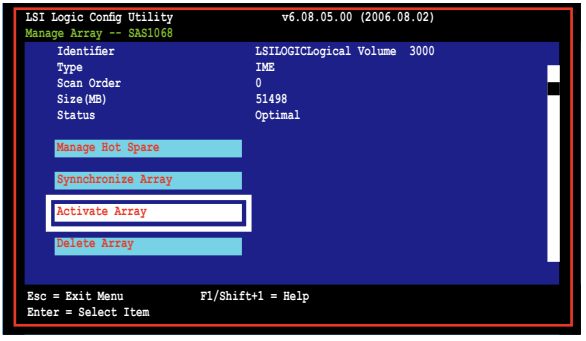
3. Press <Y> to begin the synchronization, or <N> to cancel.

Activating an array

If an array is removed from one controller/computer or moved to another, the array is considered inactive. When you add the array back to the system, you may reactivate the array.

To activate the array:

1. From the **Manage Array** screen, select **Activate Array**, then press <Enter>.



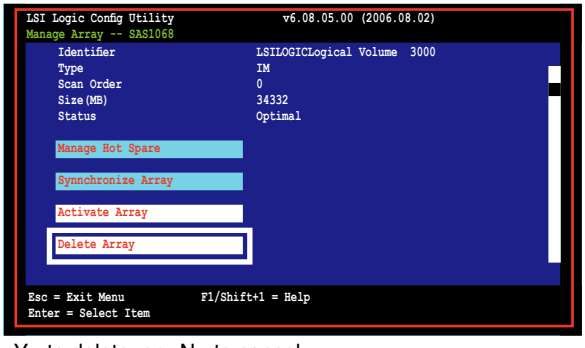
2. Press <Y> to activate, or <N> to cancel.

Deleting an array

- You cannot recover lost data if you delete an array. Make sure you back up important data before deleting an array.
- If you delete an IM (RAID 1) volume, the data is preserved on the primary disk.

To delete an array:

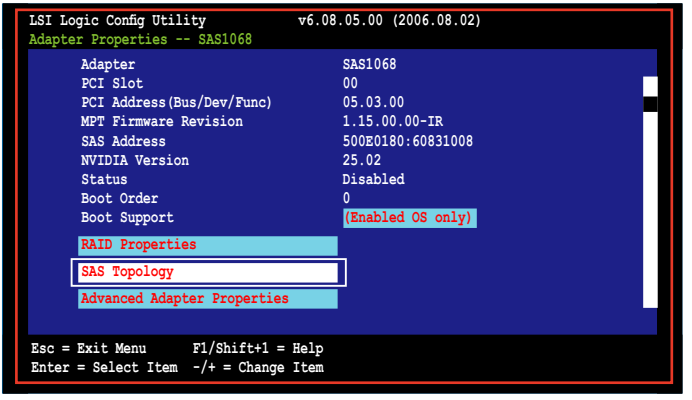
1. From the **Manage Array** screen, select **Delete Array**, then press <Enter>.



2. Press <Y> to delete, or <N> to cancel.

6.2.5 Viewing SAS topology

1. From the **Adapter Properties** screen, select **SAS Topology**.

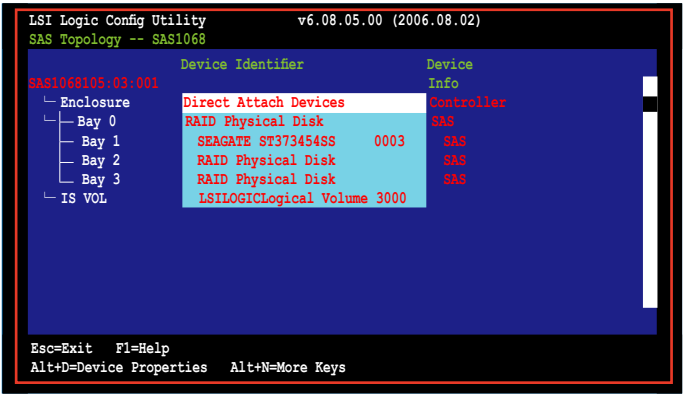


Press <Alt+D> to display device properties, or <Alt+M> to display more keys.

```
More keys for the SAS Topology display:

C = Clear Device Mappings for Non-Present Devices
R = Refresh SAS Topology
Enter = On a SAS Enclosure or Expander - Expand or Collapse Item
Enter = On a Disk Drive - Turn on the Locate LED (next key press turns off)
```

2. Information about the volume and its member-disks are then displayed.



Selecting a boot disk

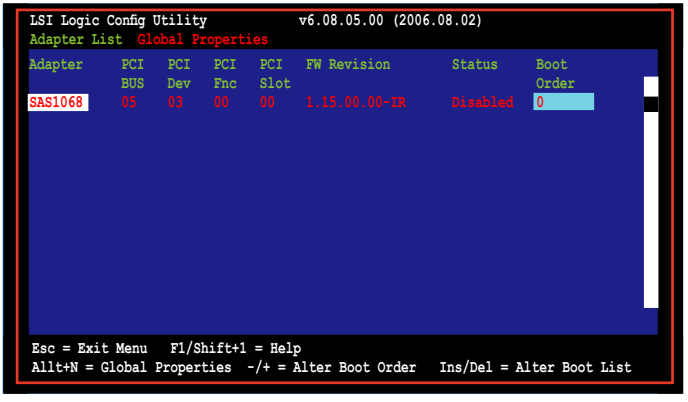
You can select a boot disk in the **SAS Topology** screen. This disk is then moved to scan ID 0 on the next boot, and remains at this position. This makes it easier to set BIOS boot device options and to keep the boot device constant during device additions and removals. There can be only one boot disk.

Follow these steps to select a boot disk:

1. In the **SAS BIOS CU**, select an adapter from the **Adapter List**.
2. Select the **SAS Topology** option.

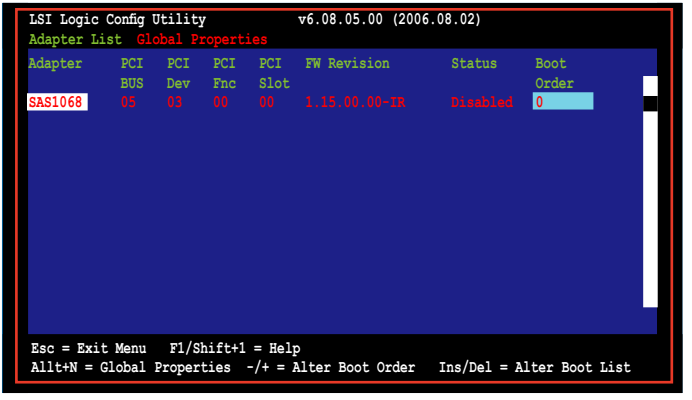
   The current topology is displayed. If the selection of a boot device is supported, the bottom of the screen lists the **Alt+B** option. This is the key for toggling the boot device. If a device is currently configured as the boot device, the **Device Info** column on the **SAS Topology** screen will show the word “Boot.”
3. To select a boot disk, move the cursor to the disk and press **Alt+B**.
4. To remove the boot designator, move the cursor to the disk and press **Alt+B**. This controller will no longer have a disk designated as boot.
5. To change the boot disk, move the cursor to the new boot disk and press **Alt+B**. The boot designator will move to this disk.

The firmware must be configured correctly in order for the **Alt+B** feature to work.



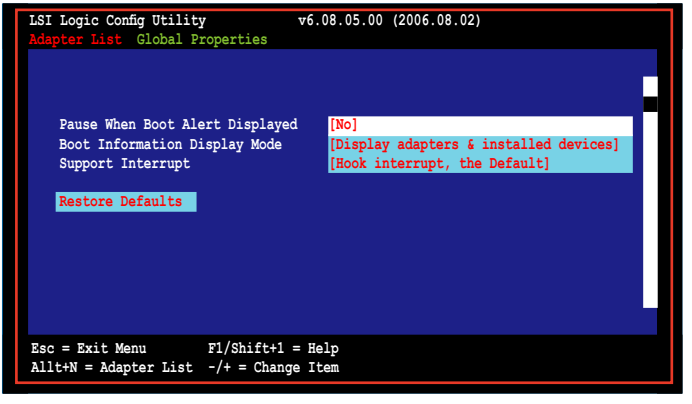
6.2.6 Global Properties

From the **Setup Utility** screen, press <Ctrl+C> to enter **LSI Logic Configuration**, then select **Global Properties**. The **Global Properties** menu allows you to change related settings.



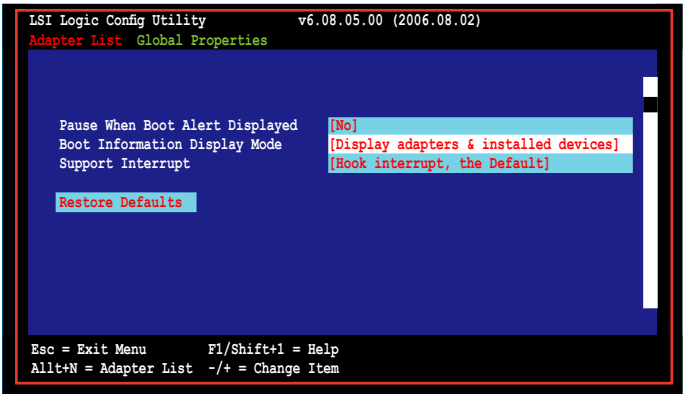
Pause When Boot Alert Displayed

Sets whether to pause or not when the boot alert displays.
Configuration options: [Yes] [No]



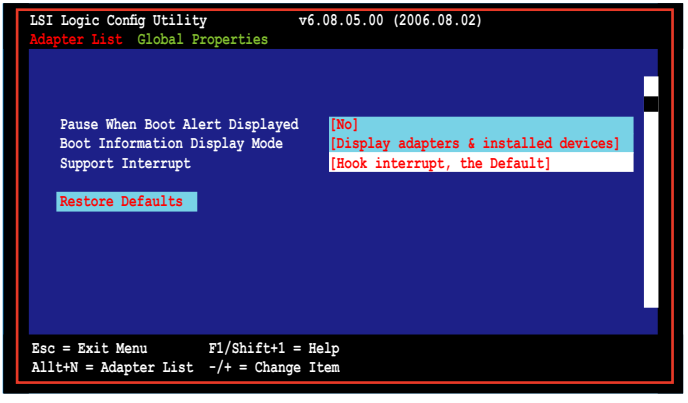
Boot Information Display Mode

Sets the disk information display mode.
Configuration options: [Display adapters & installed devices] [Display minimal information] [Display adapters and all devices] [Display adapters only]



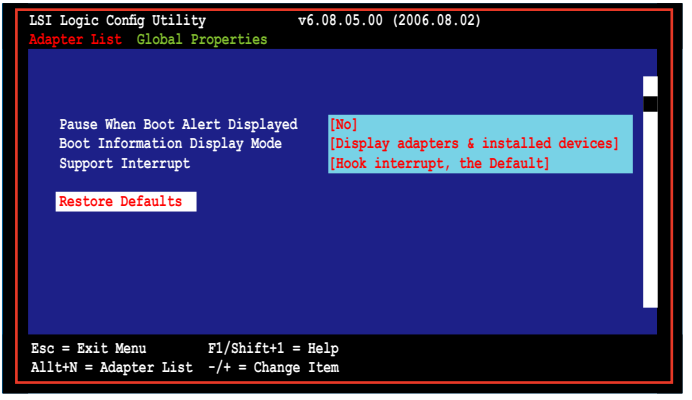
Support Interrupt

Configuration options: [Hook interrupt, the Default] [Bypass interrupt hook]



Restore Defaults

This option allows you to discard the selections you made and restore the system defaults.



CHAPTER 7

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 CD or from the Internet.

A floppy disk with the RAID driver is required when installing Windows® 2000/2003 or Red Hat® Enterprise /SuSE 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 CD).

To create a RAID driver disk in DOS environment:

1. Place the motherboard support CD in the optical drive.
2. Restart the computer, then enter the BIOS Setup.
3. Select the optical drive as the first boot priority to boot from the support CD. Save your changes, then exit the BIOS Setup.
4. Restart the computer.
5. Press any key when prompted to boot from CD.

```
Loading FreeDOS FAT KERNEL GO!
Press any key to boot from CDROM...
```

The Makedisk menu appears.

```
A)  FreeDOS command prompt
B)  Create LSI 1068 SAS for Win2k/Win2k3 32 bit Driver Disk
C)  Create LSI 1068 SAS for RHEL3 UP6 32 bit Driver Disk
D)  Create LSI 1068 SAS for RHEL3 UP6 64 bit Driver Disk
E)  Create LSI 1068 SAS for RHEL4 UP2 32 bit Driver Disk
F)  Create LSI 1068 SAS for RHEL4 UP2 64 bit Driver Disk
G)  Create the HPC-2820-ISSE emergent BIOS Recovery diskette
H)  Flash Phoenix BIOS for HPC-2820-ISSE SYSTEM
I)  ESB2 ASF Firmware update
J)  Write HPC-2820-ISSE FRU
Please choose A TO J:
```

6. Place a blank, high-density floppy disk to the floppy disk drive, then select the type of RAID driver disk you want to create by typing the number before the option
7. Press <Enter>.
8. Follow screen instructions to create the driver disk.

For systems with Red Hat® Enterprise versions that are not listed in the Makedisk menu, explore the support CD and copy the RAID driver disk from the following path:
For Intel® 6321 LSI MegaRAID: \Drivers\6321 LSI MegaRAID\Driver\Linux
For LSI 1068 SAS: \Drivers\LSI 1068\Driver\Linux
The paths above may differ based on variant models.

7.1.2 Installing the RAID controller driver

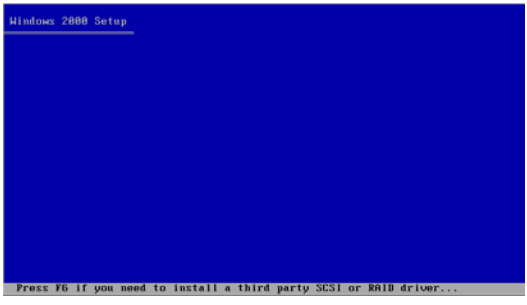
Windows® 2000/2003 Server OS

When installing the LSI 1068 driver to your OS, make sure the driver you are installing supports your current installed OS. We STRONGLY RECOMMEND that you use the LSI 1068 SAS utility bundled in the support CD to create a driver disk. Refer to page 6-1 for more information.

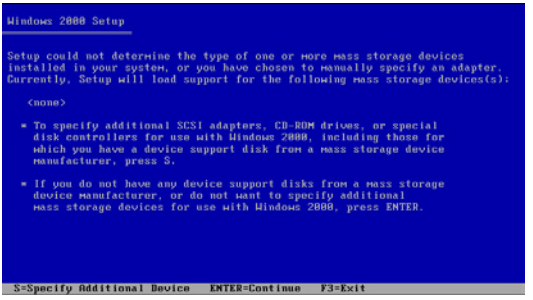
During Windows® 2000/2003 Server OS installation

To install the RAID controller driver when installing Windows® 2000/2003 Server OS:

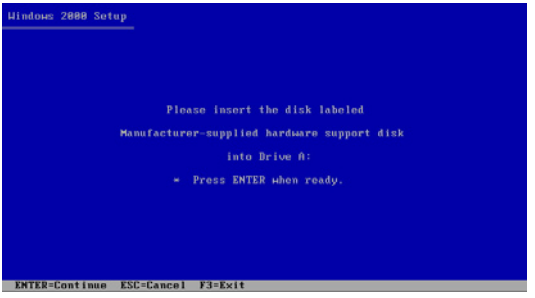
1. Boot the computer using the Windows® 2000/2003 Server installation CD. The Windows® 2000/2003 Setup starts.



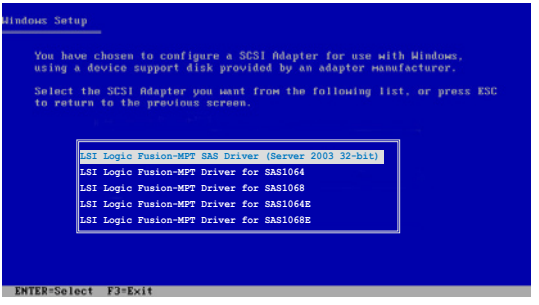
2. Press <F6> when the message “Press F6 if you need to install a third party SCSI or RAID driver...” appears at the bottom of the screen.
3. When prompted, press <S> to specify an additional device.



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



5. Select the RAID controller driver from the list, then press <Enter>.



- **LSI1068 PCI-X SAS controller** driver:

  - For Windows 2000, select **LSI Logic Fusion-MPT Drivers for SAS1068** .

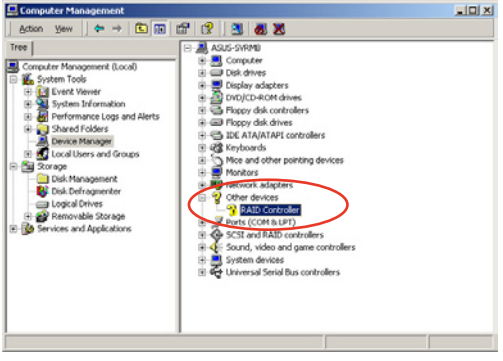
  - For 32-bit Windows Server 2003, select **LSI Logic Fusion-MPT SAS Driver (Server 2003 32-bit)**.

6. The Windows® 2000/2003 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.

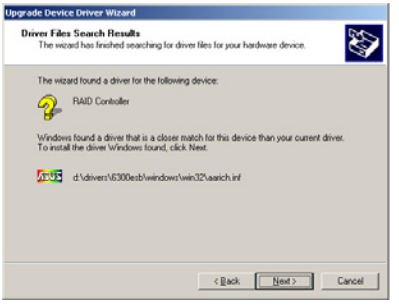
To an existing Windows® 2000/2003 Server OS

To install the RAID controller driver on an existing Windows® 2000/2003 Server OS:

1. Restart the computer, 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 , then select **Properties** from the menu.
4. Click the **Hardware** tab, then click the **Device Manager** button to display the list of devices installed in the system.

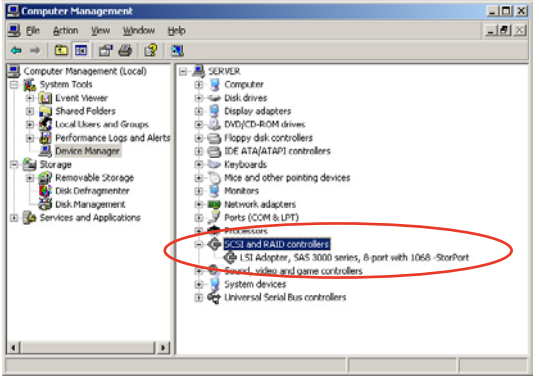


5. Right-click the **RAID controller** item, then select **Properties**.
6. Click the **Driver** tab, then click the **Update Driver** button.
7. The **Upgrade Device Driver Wizard** window appears. Click **Next**.
8. Insert the RAID driver disk you created earlier to the floppy disk drive.
9. Select the option **Search for a suitable driver for my device (recommended)**, 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 , then select **Properties** from the menu.
2. Click the **Hardware** tab, then click the **Device Manager** button.
3. Click the "+" sign before the item **SCSI and RAID controllers**, then the LSI Adapter, SAS 3000 series, 8-port with 1068-StorPort item should appear.



The screen differs based on the controller.

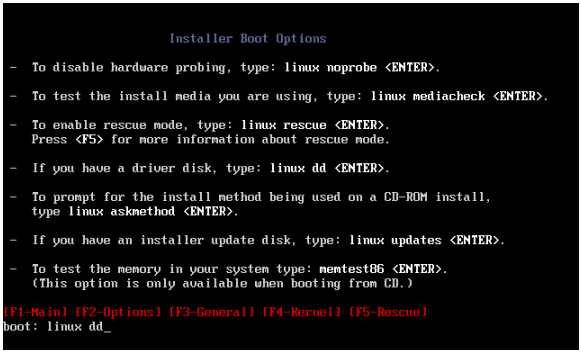
4. Right-click the **RAID controller** driver item, then select **Properties** from the menu.
5. Click the **Driver** tab, then click the **Driver Details** button to display the RAID controller drivers.
6. Click **OK** when finished.

Red Hat® Enterprise

To install the Intel® 6321ESB LSI Logic Embedded SATA RAID controller driver when installing Red Hat® Enterprise OS:

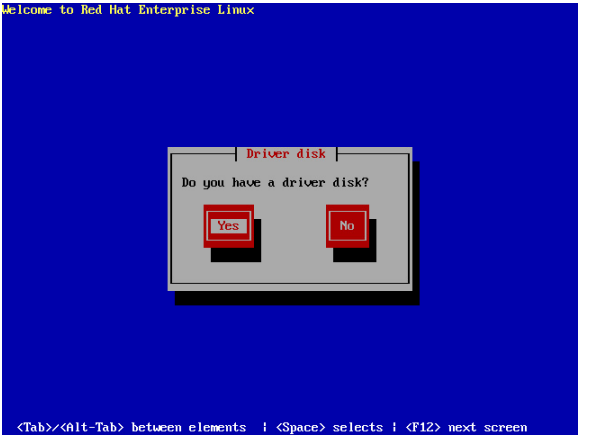
1. Boot the system from the Red Hat® Installation CD.

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

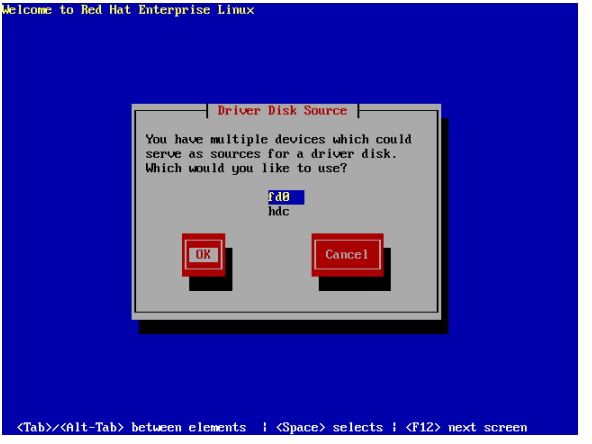


When installing a Red Hat 2.4 kernel with a Driver Update Disk (DUD) to a disk drive attached to a LSI HBA, use the command below at the install prompt: **linux dd updates.**

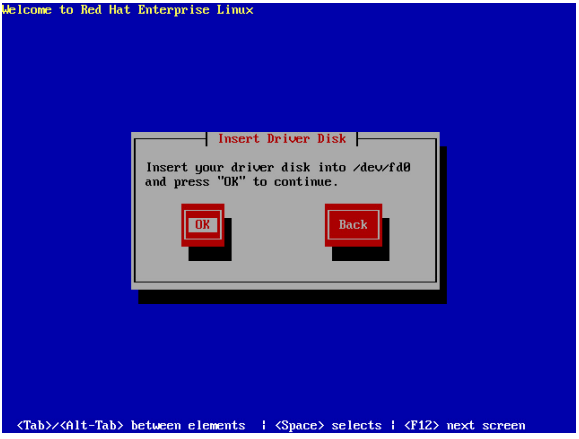
3. Select **Yes** using the <Tab> key when asked if you have the driver disk. Press <Enter>



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>.



5. When prompted, insert the Red Hat® Enterprise RAID driver disk to the floppy disk drive, select **OK**, then press <Enter>.



The drivers for the RAID controller are installed to the system.

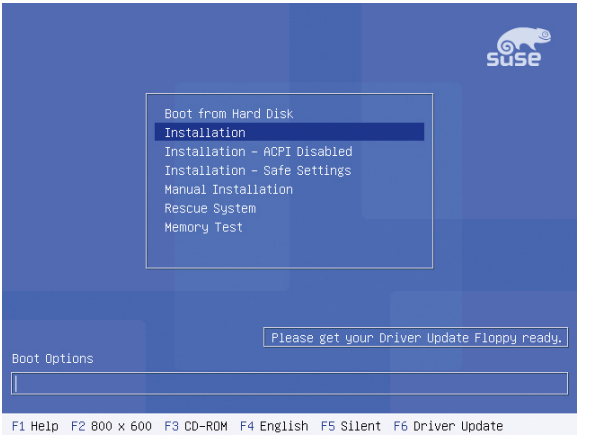
6. Follow screen instructions to continue the OS installation.

SuSE Linux

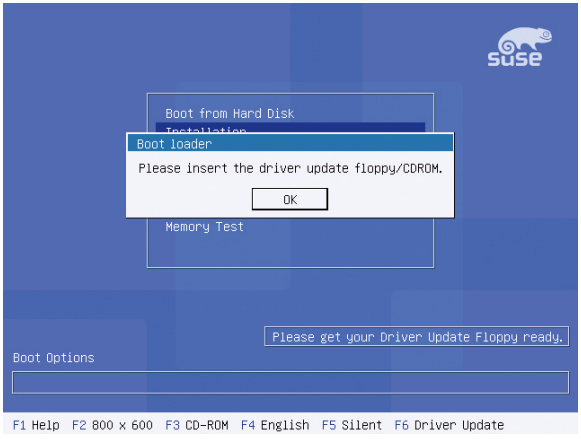
To install the RAID controller driver when installing SuSE Linux OS:

1. Boot the system from the SuSE Installation CD.
2. Select Installation from the **Boot Options** menu, then press <Enter>.

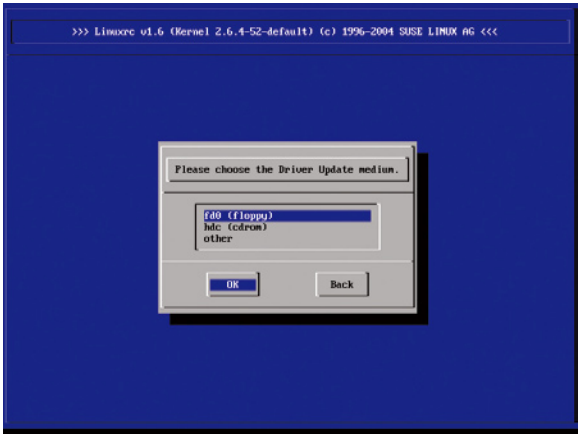
3. A message instructs you to prepare the RAID driver disk. Press <F6>.



4. When prompted, insert the RAID driver disk to the floppy disk drive, then press <Enter>.



5. When prompted, select the floppy disk drive (fd0) as the driver update medium, select **OK**, then press <Enter>.



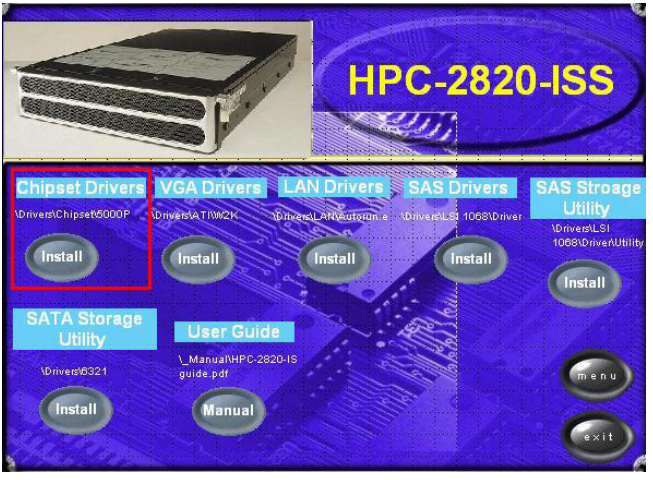
The drivers for the RAID controller are installed to the system.

7.2 Intel chipset software installation

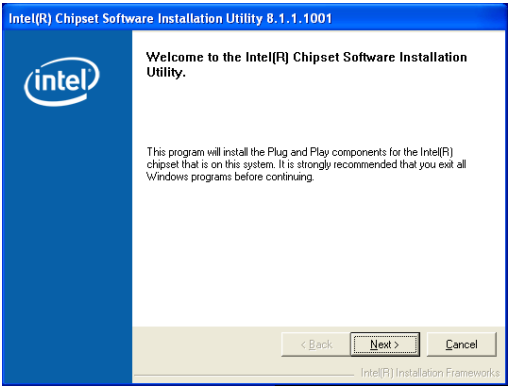
This section provides instructions on how to install the Plug and Play components for the Intel® chipset on the system.

You need to manually install the Intel® chipset software on a Windows 2000 / Server 2003 operating system. To install the Intel® chipset software:

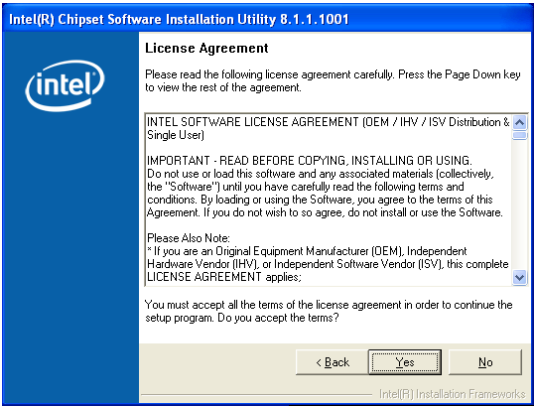
1. Restart the computer, then log on with **Administrator** privileges.
2. Insert the motherboard/system support CD to the optical drive. The support CD automatically displays the **Drivers** menu if Autorun is enabled in your computer.
3. Click the item **Chipset Drivers** from the menu.



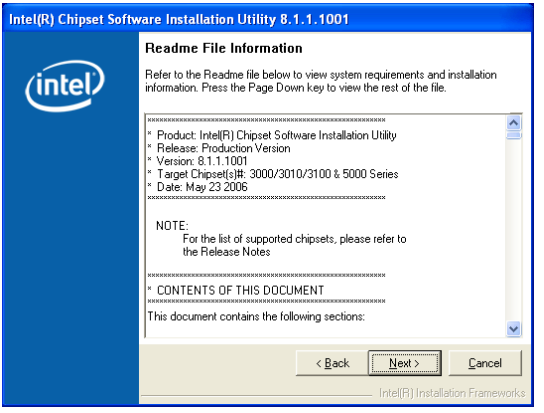
4. The **Intel(R) Chipset Software Installation Utility** window appears. Follow the screen instructions to complete installation.



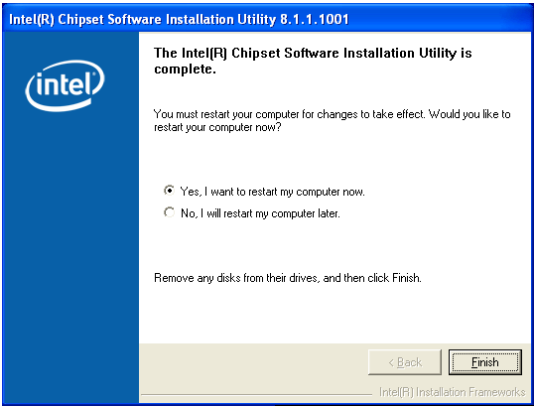
5. Select **Yes** to accept the terms of the **License Agreement** and continue the process.



6. Read the **Readme File Information** and press **Next** to activate the installation.



7. After completing the installation, click **Finish** to restart the computer.



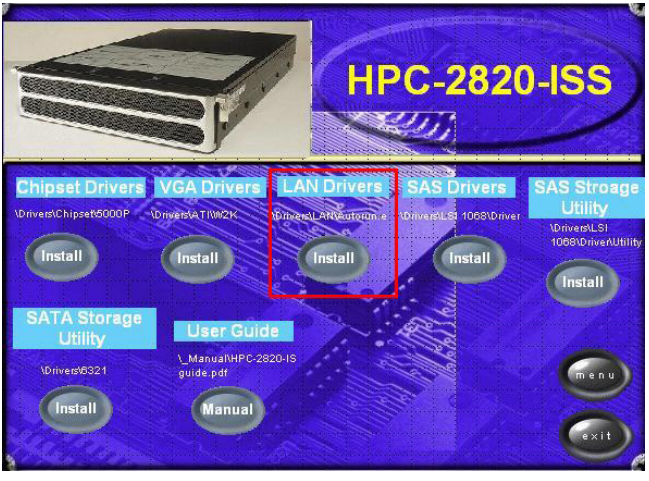
7.3 LAN driver installation

This section provides the instructions on how to install Intel® Gigabit LAN controller drivers.

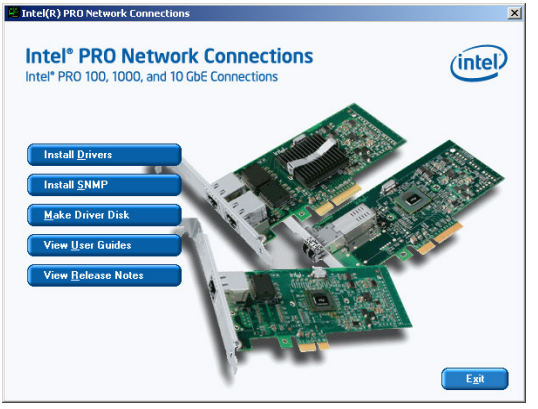
7.3.1 Windows 2000/Server 2003

To install the Intel® Gigabit LAN controller driver on a Windows® 2000/ Server 2003 OS:

1. Restart the computer, and then log on with **Administrator** privileges.
2. Insert the motherboard/system support CD to the optical drive. The CD automatically displays the **Drivers** menu if Autorun is enabled in your computer.
   - Windows® automatically detects the LAN controllers and displays window. Click **Cancel** to close this window.
   - If **Autorun** is NOT enabled in your computer, browse the contents of the support CD to locate the file **AUTORUN.EXE** from the **\Drivers\Intel 82563EB** folder. Double-click the **AUTORUN.EXE** and follow step 4 to run the installation.
3. Click the **LAN Drivers** option.

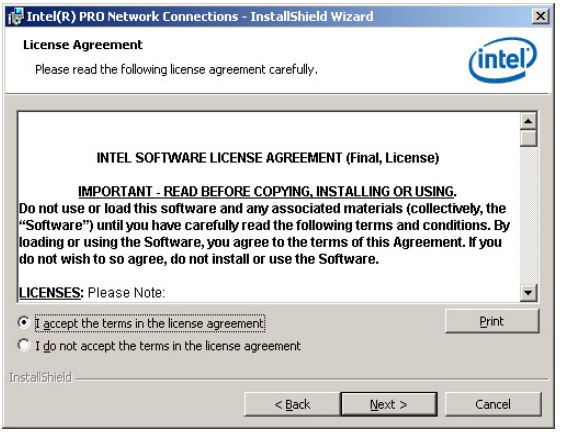


4. Click the **Install Drivers** option to begin installation.

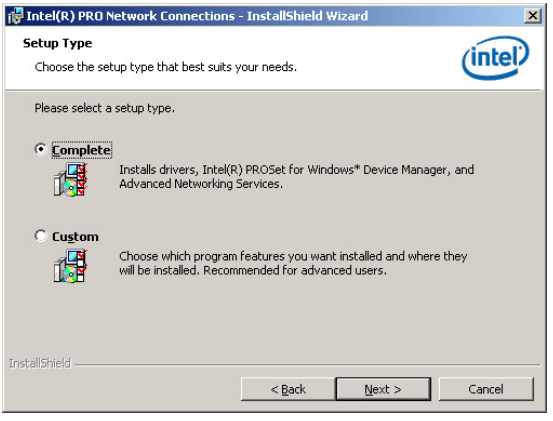


5. Click **Next** button when the **Intel® PRO Network Connections – InstallShield Wizard** window appears.

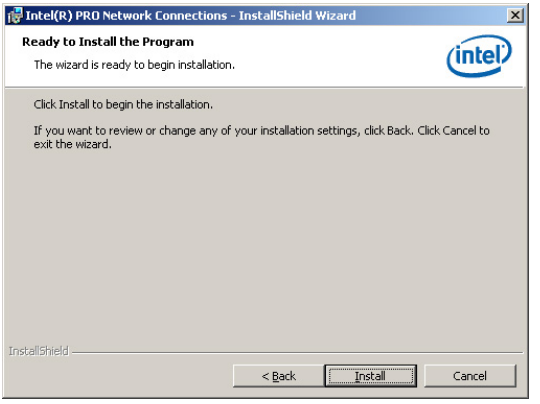
6. Select the **"I accept the terms in the license agreement"** and then click the **Next** button.



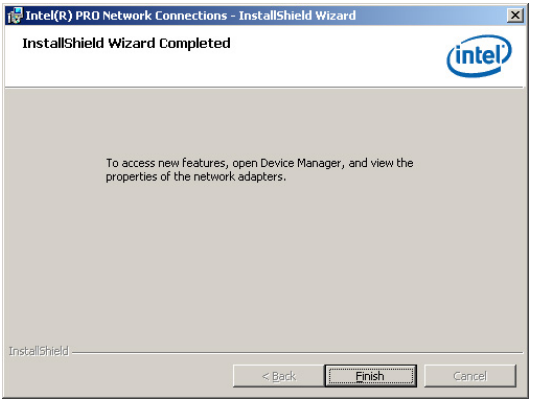
7. Press the **Complete** and click **Next** button to fully install the driver, Intel® PROSet for Windows Device Manager and Advanced Networking Services.



8. Follow the screen instructions to complete installation.

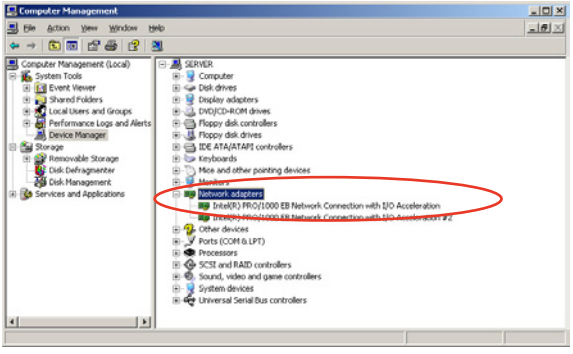


9. When finished, press **Finish** to continue.



To verify the LAN controller driver installation:

1. Right-click the **My Computer** icon on the Windows® desktop , then select **Properties** from the menu.
2. Click the **Hardware** tab, then click the **Device Manager** button.
3. Click the "+" sign before the item **Network adapters**, then **Intel(R) PRO/1000 EB Network Connection with I/O Acceleration** item should appear.



7.3.2 Red Hat/SuSE Linux

Follow these instructions when installing the Intel® LAN controller base driver for the in Red Hat® and SuSE Linux operating system.

Before installing the LAN driver:

Before installing the LAN driver, you must install the kernel development application. To install the kernel development:

1. Insert the Linux OS installation CD Disk 1 to the optical drive.
2. Double click "**Application" > "System setting" > "Add / Remove application**".
3. Select "**Kernel Development**" from the **Development Tools**.
4. Follow the later steps and add different CDs according to the instructions displayed.

Building the driver from the TAR file:

1. Insert the motherboard/system support CD to the optical drive and mount the optional drive in the Linux platform.
2. Copy the base driver tar file from the motherboard/system support CD to the directory of your local hard disk. The name format of driver file is "**e1000-<Version>.tar.gz**".

   For example: the file name of driver version 7.0.38 is "**e1000-7.0.38.tar.gz**".

   - The Intel® LAN driver for Linux OS is located in:

     \Drivers\INTEL 82563EB\PRO1000\LINUX
3. Untar or unzip the archive.
   tar zxf e1000-x.x.x.tar.gz
4. Change to the driver src directory.

   cd e1000-x.x.x/src/
5. Use the command "makeinstall" to compile the driver module.

   makeinstall
6. After reboot the system, please refer to Linux distribution documentation to configure the network protocol and IP address.

7.4 VGA driver installation

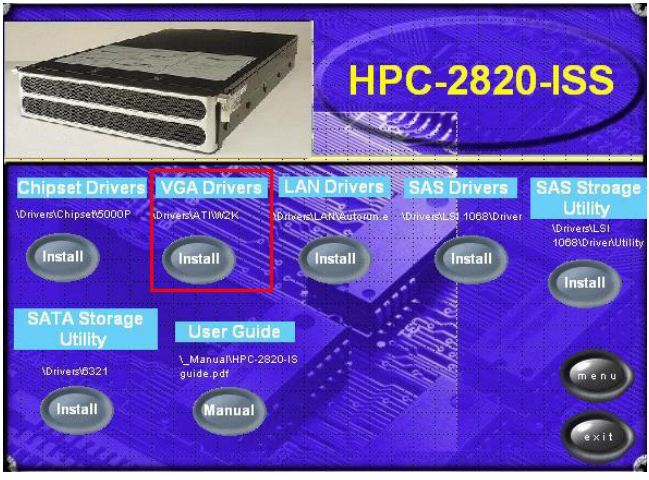
This section provides instructions on how to install the ATI® ES1000 Video Graphics Adapter (VGA) driver.

7.4.1 Windows® 2000/Server 2003

You need to manually install the ATI® ES1000 VGA driver on a Windows® 2000 / Server 2003 operating system. To install the ATI® ES1000 VGA driver:

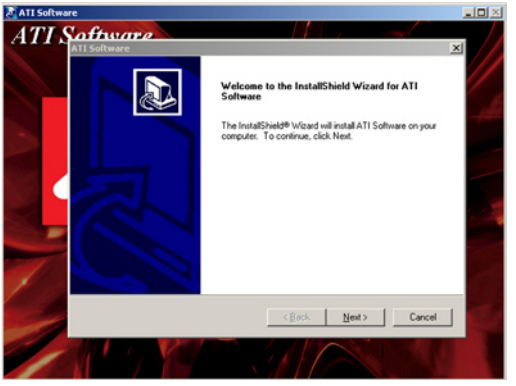
1. Restart the computer, then log on with Administrator privileges.
2. Insert the motherboard/system support CD to the optical drive. The support CD automatically displays the Drivers menu if Autorun is enabled in your computer.

The **VGA Drivers** menu if Autorun is enabled in your computer.

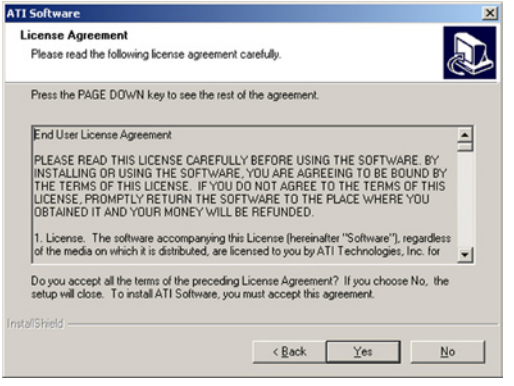


3. Click the item **ATI ES1000** from the menu.

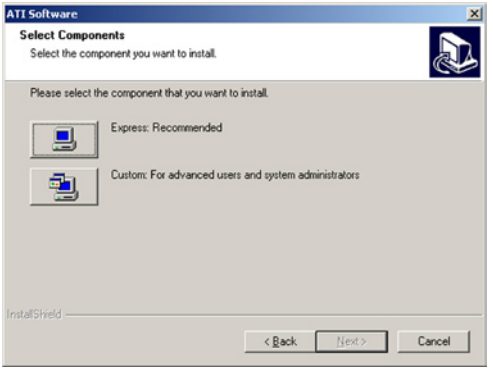
4. The **ATI Software** window appears. Follow the screen instructions to complete installation.



5. Select **Yes** to accept the terms of the **License Agreement** and continue the process.



6. Press the  button to select **Express** installation to activate quick installation.



7. After completing the installation, restart the computer.

APPENDIX

A

Reference Information

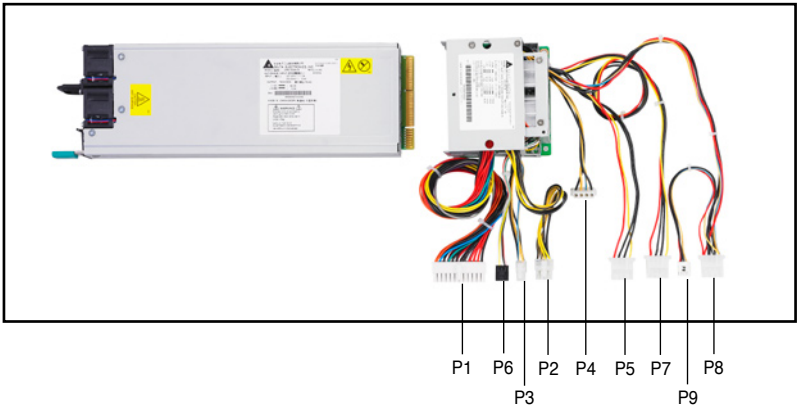
A.1 Power supply

A.1.1 General description

The barebone server comes with one SSI-type 750W redundant power supply with 115V/230V AC voltage, 50Hz/60Hz frequency.

- You may purchase and install a second power supply with the same specifications.
- When you installed two power supply modules, make sure to plug both modules to a power outlet to achieve redundancy.

There are nine (9) power plugs from the power supply unit. Take note of the devices to which you should connect the plugs.



P1 Motherboard 24-pin ATX power connector
P2 Motherboard 8-pin +12V CPU power connector
P3 Motherboard 4-pin power connector
P4 Mid-fan board power connector
P5 SAS HDD backplane board power connector
P6 SMBus connector
P7 SAS HDD backplane board power connector
P8 SAS HDD backplane board power connector
P9 Optical drive/floppy drive power connector

A.1.2 Specifications

Output voltage regulation

Output Voltage	Min (V)	Nom (V)	Max (V)	Ripple/Noise
+3.3V	3.25	3.30	3.35	50mVp-p
+5V	4.90	5.00	5.10	50mVp-p
+12V	11.40	12.00	12.60	120mVp-p
-12V	-11.40	-12.00	-13.80	120mVp-p
+5VSB	4.85	5.00	5.20	50mVp-p

Output current capacity

Output Voltage	Min (A)	Max (A)	Max. Output(W)
+3.3V	0.5	20.0	66.0
+5V	0.5	20.0	100.0
+12V1	0.5	12.5	216.0
+12V2	0.5	12.5	216.0
+12V3	1.5	14.0	300.0
+12V4	1.5	14.0	300.0
-12V	0.0	0.5	6.0
+5VSB	0.0	2.0	10.0

Over-voltage protection

Voltage	Min (V)	Max (V)
+3.3V	3.8	4.3
+5V	5.7	6.5
+12V	13.5	15.0

Redundant power LED

Refer to section 1.6.4 for details.

A.2 Troubleshooting

Some problems that you may encounter are not due to defects on the system or the components. These problems only requires simple troubleshooting actions that you can perform by yourself.

Problem	Action
The power LED on the server or on the monitor do not light up	1. Check if the power cable is properly connected to the power connector in the system rear panel. 2. Make sure that the power cables are connected to a grounded power outlet. 3. Press the power button to make sure that the system is turned on.
The keyboard does not work	Check if the keyboard cable is properly connected to the PS/2 keyboard port.
The mouse does not work	Check if the mouse cable is properly connected to the mouse port.
The system does not perform power-on self tests (POST) after it was turned on	1. Check the memory modules and make sure you installed the DIMMs the system supports. 2. Make sure that the DIMMs are properly installed on the sockets.
The system continuously beeps after it was turned on	1. Check the memory modules and make sure you installed supported DIMMs. 2. Make sure that the DIMMs are properly installed on the sockets.

Problem	Action
The message “Non-system disk or disk error” appears	1. Check if a bootable HDD is active. 2. Check if the HDDs are properly installed.
Network connection not available	1. Make sure that the network cable is connected to the LAN port on the rear panel. 2. Make sure that you have installed the LAN drivers from the support CD.
Why do the fans run in full speed after the system is switched on? (system fan: 5700RPM; rear fan: 11800RPM)	Please go to Hardware Monitor in BIOS setup and check the CPU temperature and setting of Smart-Fan Control. If Smart-Fan is disabled, please set Smart-FAN control to “Enabled”. If Smart -Fan is already enabled, please check the followings: 1. If CPU temperature is over 60^{0}C in BIOS setup, please shut down and re-install CPU’s heatsink to make sure that CPU’s heatsink is tightly secured to the CPU. 2. If CPU temperature is over 60 ^{0}C in BIOS setup, please check whether the arrow on the system fans points to the direction on the rear panel. Re-install the fan in case it causes CPU to overheat. 3. If CPU temperature is under 60 ^{0}C in BIOS setup, please check the CPU_FAN1 connector on the MB connected with 3-pin connectors on the mid-fan board (FANBPC-AR21).