User's Manual

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1 Safety Information

This document applies to MAXDATA PLATINUM Server Boards, MAXDATA PLATINUM Server Chassis (pedestal and rack-mount) and installed peripherals. To reduce the risk of bodily injury, electrical shock, fire, and equipment damage, read this document and observe all warnings and precautions in this guide before installing or maintaining your MAXDATA PLATINUM server product.

In the event of a conflict between the information in this document and information provided with the product or on the website for a particular product, the product documentation takes precedence.

Your server should be integrated and serviced only by technically qualified persons.

You must adhere to the guidelines in this guide and the assembly instructions in your server manuals to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products/components will void the UL Listing and other regulatory approvals of the product, and may result in noncompliance with product regulations in the region(s) in which the product is sold.

Safety Warnings and Cautions

To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following safety instructions and information. The following safety symbols may be used throughout the documentation and may be marked on the product and/or the product packaging.

\triangle	Indicates potential hazard if indicated information is ignored
<u>A</u>	Indicates shock hazard that results in serious injury or death if safety instructions are not followed
	Indicates hot components and surfaces
	Indicates electrostatic discharge cautions
	Indicates do not touch fan blades, may result in injury
	Indicates to unplug all AC power cord(s) to disconnect AC power

Table 1. Safety Warnings and Cautions

Intended Application Uses

This product was evaluated as Information Technology Equipment (ITE), which may be installed in offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environments (such as medical, industrial, residential, alarm systems, and test equipment), other than an ITE application, may require further evaluation.

General Warnings



The power supply in this product contains no user-serviceable parts. There may be more than one supply in this product. Refer servicing only to qualified personnel.



Do not attempt to modify or use the supplied AC power cord if it is not the exact type required. A product with more than one power supply will have a separate AC cord for each supply.



The DC push-button on/off switch on the front panel does not turn off system AC power. To remove power from the system, you must unplug each AC power cord from the wall outlet or power supply.



Ensure that the system is disconnected from its power source and from all telecommunication links, networks, and modem lines whenever the chassis cover is to be removed. This may require disconnecting multiple power cords. Do not operate the system with the cover removed.



A microprocessor and heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.



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



Depending on the weight of the product, two people together should lift it.



The system is designed to operate in a typical office environment. Choose a site that is:

- Clean and free of airborne particles (other than normal room dust).
- Well ventilated and away from sources of heat including direct sunlight.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppresser and disconnect telecommunication lines to your modem during an electrical storm.
- Provided with a properly grounded wall outlet.
- Provided with sufficient space to access the power supply cords, because they serve as the product's main power disconnect.

Place Battery Marking

There is insufficient space on this server board to provide instructions for replacing and disposing of the battery. For system safety certification, the following statement or equivalent statement may be required to be placed permanently and legibly on the chassis near the battery.

Risk of explosion if battery is incorrectly replaced.

Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Site Selection

The system is designed to operate in a typical office environment. Choose a site that is:

- Clean, dry, and free of airborne particles (other than normal room dust).
- Well-ventilated and away from sources of heat including direct sunlight and radiators.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppresser and disconnect telecommunication lines to your modem during an electrical storm.
- Provided with a properly grounded wall outlet.
- Provided with sufficient space to access the power supply cord(s), because they serve as the product's main power disconnect.

Equipment Handling Practices

Reduce the risk of personal injury or equipment damage:

- Conform to local occupational health and safety requirements when moving and lifting equipment.
- Use mechanical assistance or other suitable assistance when moving and lifting equipment.
- To reduce the weight for easier handling, remove any easily detachable components.

The power button, indicated by the stand-by power marking, DOES NOT completely turn off the system AC power, 5 V standby power is active whenever the system is plugged in. To remove power from system, you must unplug the AC power cord from the wall outlet. Your system may use more than one AC power cord. Make sure all AC power cords are unplugged. Make sure the AC power cord(s) is/are unplugged before you open the chassis, or add or remove any non hot-plug components.

Do not attempt to modify or use an AC power cord if it is not the exact type required. A separate AC cord is required for each system power supply.

Some power supplies in MAXDATA PLATINUM Servers use Neutral Pole Fusing. To avoid risk of shock use CAUTION when working with power supplies that use Neutral Pole Fusing.

The power supply in this product contains no user-serviceable parts. Do not open the power supply. Hazardous voltage, current and energy levels are present inside the power supply. Return to manufacturer for servicing.

When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing it from the server.

To avoid risk of electric shock, turn off the server and disconnect the power cord, telecommunications systems, networks, and modems attached to the server before opening it.

Power Cord Warnings

If an AC power cord was not provided with your product, purchase one that is approved for use in your country.



∕₽∖ CAUTION

To avoid electrical shock or fire, check the power cord(s) that will be used with the product as follows:

- Do not attempt to modify or use the AC power cord(s) if they are not the exact type required to fit into the grounded electrical outlets
- The power cord(s) must meet the following criteria:
 - The power cord must have an electrical rating that is greater than that of the electrical current rating marked on the product.
 - The power cord must have safety ground pin or contact that is suitable for the electrical outlet.
- The power supply cord(s) is/are the main disconnect device to AC power. The socket outlet(s) • must be near the equipment and readily accessible for disconnection.
- The power supply cord(s) must be plugged into socket-outlet(s) that is /are provided with a suitable earth ground.

System Access Warnings

To avoid personal injury or property damage, the following safety instructions apply whenever accessing the inside of the product:

- Turn off all peripheral devices connected to this product.
- Turn off the system by pressing the power button to off. •
- Disconnect the AC power by unplugging all AC power cords from the system or wall outlet.
- Disconnect all cables and telecommunication lines that are connected to the system.
- Retain all screws or other fasteners when removing access cover(s). Upon completion of accessing inside the product, refasten access cover with original screws or fasteners.
- Do not access the inside of the power supply. There are no serviceable parts in the power supply. Return to manufacturer for servicing.
- Power down the server and disconnect all power cords before adding or replacing any non hotplug component.
- When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing the power supply from the server.

CAUTION

If the server has been running, any installed processor(s) and heat sink(s) may be hot. Unless you are adding or removing a hot-plug component, allow the system to cool before opening the covers. To avoid the possibility of coming into contact with hot component(s) during a hot-plug installation, be careful when removing or installing the hot-plug component(s).



CAUTION

To avoid injury do not contact moving fan blades. If your system is supplied with a guard over the fan, do not operate the system without the fan guard in place.

Rack Mount Warnings

The equipment rack must be anchored to an unmovable support to prevent it from tipping when a server or piece of equipment is extended from it. The equipment rack must be installed according to the rack manufacturer's instructions.

Install equipment in the rack from the bottom up, with the heaviest equipment at the bottom of the rack.

Extend only one piece of equipment from the rack at a time.

You are responsible for installing a main power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the server(s).

To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed in it.

Electrostatic Discharge (ESD)

ESD can damage disk drives, boards, and other parts. We recommend that you perform all procedures at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground - any unpainted metal surface - on your server when handling parts.

Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the server, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface

Other Hazards

Battery Replacement

There is the danger of explosion if the battery is incorrectly replaced. When replacing the battery, use only the battery recommended by the equipment manufacturer.

Dispose of batteries according to local ordinances and regulations.

Do not attempt to recharge a battery.

Do not attempt to disassemble, puncture, or otherwise damage a battery.



Cooling and Airflow

Carefully route cables as directed to minimize airflow blockage and cooling problems. For proper cooling and airflow, operate the system only with the chassis covers installed. Operating the system without the covers in place can damage system parts. To install the covers:

- 1. Check first to make sure you have not left loose tools or parts inside the system.
- 2. Check that cables, add-in boards, and other components are properly installed.
- 3. Attach the covers to the chassis according to the product instructions.

Laser Peripherals or Devices

To avoid risk of radiation exposure and/or personal injury:

- Do not open the enclosure of any laser peripheral or device.
- Laser peripherals or devices are not user serviceable.
- Return to manufacturer for servicing.

2 Platform Description

The PLATINUM 7200 IR Server is a compact, high-density, rack-mount system with support for one to four Intel[®] Xeon[™] MP processors and 256 GB of 533 MHz / 667 MHz FBDIMM memory. The platform supports hot plug PCI-Express add-in cards; hot-swap, redundant power supply modules; hot swap, redundant cooling fans; memory with RAS features; and hot-swap hard disk drives. The server platform is shown below.



Figure 1. PLATINUM 7200 IR Server Front View

Platform Features

The platform features are outlined in the following table.

Feature	Description			
Dimensions	Height: 6.8 inches (173 mm) Width: 17.6 inches (447 mm) Depth: 27.8 inches (706 mm) Weight of fully configured system: 90 lbs (40 kg)			
Clearance requirements	 Front clearance: 3 inches (76 mm) Side clearance: 1 inch (25 mm) Rear clearance: 6 inches (152 mm) 			
Configuration flexibility/ Scaleability	 Support for one to four processors Support for at least two generations of processors Support for up to four 2.5-inch SATA hard drives, or eight 2.5-inch SAS hard drives with optional SAS riser board Support for up to seven PCI-Express adapters: Four x8 slots Three x4 slots Support for up to 256 GB Fully Buffered DIMM (FBD) Double Data Rate-2 (DDR2) 533 or 667 MHz memory Support for two integrated gigabit LAN ports, or four integrated gigabit LAN ports with optional I/O riser board 			
Serviceability	 Front access to hot-swap hard disk drives Front access to hot-swap fans Rear access to hot-swap power supplies System power and system status LEDs System ID buttons and LEDs on front panel and rear of system Memory status LEDs Processor failure LEDs Color-coded parts to identify hot-swap and non-hot-swap serviceable components 			
Availability	 Two hot-plug PCI Express slots Up to two 1570-watt power supplies in a redundant (1+1) configuration; the second power supply is optional Dual power cords (1+1) when two power supplies are installed Up to eight hot-swap system fans in a redundant (7+1) configuration; two rear fans are optional; four rear fans are required for redundancy Eight hot-swap 2.5-inch SAS hard drives SAS RAID riser board (optional) with a battery-backed DDR2 DIMM for disk cache 			
Manageability	 Remote management Emergency Management Port (EMP) Intelligent Platform Management Interface (IPMI) 1.5 compliant, partial IPMI 2.0 compliance Wired For Management (WfM) 2.0 compliant Remote diagnostics support Optional Intel[®] Remote Management Module 2 provides remote KVM and media features (requires optional I/O riser) 			
Front control panel	 System power button and LED System reset button NMI button System ID button and LED System status LED Hard drive status LED LAN1 and LAN2 status LEDs Video connector Three USB 2.0 ports 			

 Table 2. Chassis Feature Summary

Platform Front



Figure 2. Front Components

Table 3. Front Components

ltem	Description
Α.	CD-ROM / DVD-ROM drive bay
В.	5 ¼ peripheral bay
С.	Video connector
D.	USB 2.0 ports
Е.	Front control panel
F.	Hot-swap fan modules (2)
G.	Hot-swap disk drives (0-7, from left to right)

Standard Control Panel

The standard control panel provides a user interface for system management via switches and status LEDs. The control panel also contains the speaker. Figure 3 shows the location of the buttons and status LEDs on the standard control panel.



Figure 3. Front Panel Controls and Indicators

Table 4	Front	Panel	Controls	and	Indicators
	TION	anci	Controls	anu	mulcators

ltem	Feature	Description				
Front	Front Panel Connectors					
Α	Video connector	Video port, standard VG	A compatible, 15	-pin connector		
В	Three USB connectors	Three USB 2.0 ports, 4-p	in connectors			
Front	Panel Buttons and LED Indicato	rs				
С	Hard Drive Activity LED (Green/Amber)	Indicates hard drive activ	Indicates hard drive activity and fault status.			
		LED	State	Description		
		Green, On		A hard drive is being initialized.		
		Green, Blinking		A hard drive is active.		
		Amber, On		Hard drive/slot failure.		
		Amber, Slow Blinking (~1 Hz)		A predictive hard drive/slot failure or rebuild in process.		
		Amber, Fast Blinking (~2.5 Hz)		Hard drive rebuild interrupted or rebuild on empty slot.		
D, E	LAN1, LAN2 Status LEDs (Green)	Indicates LAN activity status				
		LED	State	Description		
		Off	Idle			
		On	Inactive	No Access		
		Blinking	Active	Access		

Item	Feature	Description		
F	System Status/Fault LED (Green/Amber)	Indicates system status.		
		LED	State	Description
		Off	Not ready	AC Power Off, POST error
		Green, On	Ready	System booted and ready
		Green, Blinking	Degraded	CPU or DIMM disabled
		Amber, On	Critical Alarm	Critical Power Supply, Blower, Voltage, or Temperature failure
		Amber, Blinking	Non-Critical Alarm	Redundant Power Supply or Blower failure. Non- Critical Blower, Voltage, and Temperature failure.
G	System Power LED (Green)	Indicates system power sta	tus.	
		LED	State	ACPI
		Off	Power off	No
		On	Power on	No
		Off	S4/S5	Yes
		Blinking	S1	Yes
		On	S0	Yes
H System ID LED (Blue) Identifies the system via server management or locally.			or locally.	
I	NMI button	Asserts NMI.		
J	System Reset button	Press to reset the system.		
К	System Power button	Press to turn the system power on or off.		
L	System ID button	Press to turn the System ID LED on or off.		

Platform Rear

This diagram shows the system with the optional I/O panel installed.



Figure 4. Rear Platform Features

Table 5.	Rear	Platform	Features
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Item	Description			
Α	PCI Slots			
	Slot 1	PCI Express x8, hot-plug		
	Slot 2	PCI Express x8, hot-plug		
	Slot 3 PCI Express x8, not hot-plug			
	Slot 4	PCI Express x8, not hot-plug		
	Slot 5	PCI Express x4, not hot-plug		
	Slot 6	PCI Express x4, not hot-plug		
	Slot 7	PCI Express x4, not hot-plug		
В	Intel [®] Remote Management Mo	odule 2 (RMM2) NIC		
С	I/O riser Ethernet ports (two)			
D	USB ports (two)			
Е	Standard VGA-compatible video port with 15-pin connector			
F	Serial port B connector			
G	Power supply LEDs			
	Power Supply LED Power Supply Status			
	Left: Power good (green)	Power supply is on		
	Center: Fault (amber)	Power supply failure		
	Right: AC OK (green)	Power supply is connected to AC		
Н	AC input power connector			
I	I/O riser card (optional)			
J	LAN 1 (left), LAN 2 (right) RJ45	Ethernet connectors		
	LAN Port LED	LAN Status		
	Status LED (green) Off: No Ethernet connected On: Ethernet link detected Blink: Ethernet link active Speed LED (green / amber) Off: 10 Mbps Green: 100 Mbps Amber: 1000 Mbps			

ltem	Description			
К	Power supply LEDs			
	Power Supply LED Power Supply Status			
	Left: Power good (green)Power supply is onCenter: Fault (amber)Power supply failure			
	Right: AC OK (green)	Power supply is connected to AC		
L	AC input power connector			
М	System ID button			
Ν	Blue system ID LED to identify the system from among many systems			

Processors

The PLATINUM 7200 IR Server supports from one to four 64-bit Intel[®] Xeon[™] processors MP (7x00 sequence).

System Memory

The memory boards connect to the main board through x16 PCI Express connectors. One to four memory boards can be installed, two on each side of the system. Memory board baffles are not needed for empty memory board slots, but DIMM blanks are required for each socket on each memory board in which a DIMM is not installed.



Figure 5. Memory Boards

Each memory board has these features:

- Supports up to eight FBD Generation-1 DIMMs
- Supports FBD speeds of 533MT/s (4-4-4, 5-5-5 latencies) and 667MT/s (5-5-5 latency)
- Supports FBDIMM configurations of x8, x4, single, dual-rank DDR2 DRAMs
- Supports DDR2 DRAM technologies of 512 Mbit, 1 Gbit, and 2 Gbit
- Supports Closed Loop Thermal Throttling with FBDIMM AMB temperature sensors
- LED fault indicators for each DIMM
- One field replaceable unit (FRU) EEPROM
- Supports memory mirroring and memory sparing

See "Memory Board" for additional information.

Available Memory Configurations

The BIOS configures the system memory into the best possible configuration after comparing the current FBDIMM population with the desired memory configuration selected by the user in BIOS Setup. Possible configurations are:

- **Dual-channel Mode (Maximum Performance Mode):** The default setting providing the highest system performance and increased FBD bandwidth. This requires each lock-stepped pair of FBDIMMs on a branch to be identical. A lock-stepped FBDIMM pair is defined as the FBDIMMs installed in identically numbered FBDIMM sockets on both memory riser boards (channels) on a given Memory Branch.
- **Single-channel Mode:** A failsafe mode when the installed memory configuration is incompatible with dual-channel operation. In single-channel mode, only Branch 0, Channel 0 is operational with all other FBDIMMs disabled automatically.
- **DIMM Sparing Mode:** Only supported in a lock-stepped (dual-channel) configuration. DIMM Sparing is the use of a lock-stepped FBDIMM rank on a memory branch to provide a backup in case any other lock-stepped FBDIMM rank on the same branch exceeds a user-selectable Memory ECC Correctable Error threshold in a fixed time period. This failure prediction mechanism allows the system to automatically:
 - Copy the contents of a failing FBDIMM rank to a backup or spare FBDIMM rank
 - Disable the failing FBDIMM rank

These actions are completed before the FBDIMM rank begins to generate more serious memory ECC uncorrectable errors that would bring down the system by corrupting memory.

• **Memory Mirroring Mode:** Memory Mirroring is a high availability mode providing a redundant image of the system memory. This image allows the system to continue operating if memory ECC uncorrectable errors would otherwise bring down the system in another memory configuration.

Power Subsystem

The power subsystem consists of the following:

- Power supply modules
- The Power Distribution Board

The power subsystem can be configured with two power supply modules installed for 1+1 redundancy at 220 VAC.

Power Supply Modules

The output rating of the power supply is 1570 W when operated between 180 VAC and 264 VAC. It is a current-sharing power supply with auto-ranging input. The power supply is approximately 7.75 inches wide by 14.5 inches deep by 1.47 inches high. The power supply modules have universal AC input with Power Factor Correction (PFC) Distributed Power Supplies (DPS). The AC input receptacle is an IEC-320 C14.

The power supply has two DC outputs: 12 V and 3.3 VSB. The 12 V main power is distributed through the server and is converted locally at the point-of-load using embedded VRM converters. The power supply is capable of power-safe monitoring.

In an N+1 configuration, the 12 VDC outputs have active (forced) current sharing. The two externally enabled outputs have the following maximum ratings:

- +12 VDC: 121 A
- +3.3 VDCSB: 5 A

Each power supply module requires one power cord to supply AC power to the system. When two power supply modules and two power cords are installed, the system supports (1+1) power cord redundancy. This feature allows the system to be powered by two separate AC sources. In the 1+1 configuration, the system continues to operate, without interruption, if one of the AC sources fails.

Each power supply module has three status LEDs. These are located next to the input connector, as shown by the following figure.



Figure 6. Power Supply Indicators

Table 6.	Power	Supply	Indicators
----------	-------	--------	------------

Location	Purpose	Description
A (left)	Power Good LED (green)	This green LED is driven by internal circuitry and is lit whenever the power is turned on.
B (center)	Fault LED (amber)	This amber LED is driven by internal circuitry and is lit when a power rail has failed. The LED is lit even if the power supply is in a latched state. The only time (during a fault) when it is not lit is if the +3.3 VSB is lost. The LED is not lit when the power supply is turned off by powering down the platform.
C (right)	AC OK LED (green)	This green LED is driven by internal circuitry and is lit whenever the AC power cord is plugged in to an active AC power source.

Cooling Subsystem



CAUTION

The chassis top cover must be installed for proper system cooling. Cooling components must be hotswapped within two minutes. This time period applies only to the time that the cooling component is physically removed, not from the time of failure.

The cooling subsystem consists of hot-swap, redundant (7+1) fans. In a redundant configuration, the system supports one fault at a time, either one fan fault or one power supply fault, and it supports hot-swapping one component at a time. If a cooling component fails, the system cooling is maintained and the system continues to operate while the component is hot-swapped.

Each front fan assembly has one status LED. The LED is off when both fans are operating normally. The LED illuminate amber if one or both of the fans fails. Failed front fans can be hot-swapped from the front of the system.

Each rear fan has one status LED. The LED is off when the fan is operating normally and illuminates amber if the fan fails. Failed rear fans can be replaced from the top of the system when the top cover is removed.



Figure 7. Rear Fan Locations

For proper processor cooling, the processor duct must always be in place. Systems that are configured with fewer than four processors should have processor blanks installed to maintain proper cooling.

Hot-swap PCI Slots

The two hot plug PCI slots have power and attention LEDs. The attention button is used to invoke a hot-plug sequence to remove or add an adapter without having to use the software interface. They are identified by the green arrow on the PCI divider label. The status of the LEDs is shown in Table 7 and Table 8.

Table 7. Power Indicator

Green Power LED State	Definition
Off	Power off: Power has been removed from the slot. A card can be inserted or removed.
On	Power on: The slot is powered on. A card cannot be inserted or removed.
Blinking	Power transition: The slot is in the process of powering up or down. A card cannot be inserted or removed.

Table 8. Attention Indicator

Amber Attention LED State	Definition	
Off Normal: Normal operation		
On	Attention: Power fault or operational problem has occurred with this slot.	
Blinking	Locate: The slot is being identified at the user's request.	

If you hot-remove a PCI card without following the proper procedure, power will automatically be turned off to the slot.

Peripherals

Hot-Swap Hard Drive

The hot-swap hard drive carrier and SAS backplane board accommodate 2.5-inch SAS or SATA hard drives.



Figure 8. Hard Drive Carrier

Table 9.	Hard	Disk	Drive	Carrier
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ltem	Description			
Α	Latch			
В	Green LED			
	Green on	SAS drive is installed and working correctly		
	Green blink	Hard drive is active		
С	Amber LED			
	Amber on	Hard drive or slot failure		
	Amber slow blink (~1 Hz)	Predictive hard drive / slot failure or rebuild is in process		
	Amber fast blink (~2.5 Hz)	Hard drive rebuild interrupted or rebuild on empty slot		

Removable Media Drive Bay Support

The DVD-ROM/CD-ROM drive is installed in a sheetmetal carrier and is inserted from the front of the chassis. The tape back-up drive is also installed from the front of the chassis. You must power down the platform and remove the top cover to remove or install these devices.

5 ¹/₄-inch Half-height Drive Bay

The system supports one 5 ¼-inch, half-height device mounted at the front of the system. A USB or SATA tape backup device can be cabled to the internal USB or SATA port located on the main board. Alternatively, a SCSI or SAS tape backup device can be cabled to a PCI Express add-in card (not included).

System Board Set

The board set consists of the following boards:

- Main board
- Memory boards
- I/O riser board (optional)
- SAS riser board (optional)
- Front panel board
- SAS backplane board
- Power distribution board
- SATA-to-IDE adapter board

Main Board

The main board contains:

- Chipset north and south bridge components
- Processor sockets
- Four memory board connectors
- Video components
- Trusted Platform Module
- Seven PCI Express slots
- Back panel I/O connectors



Figure 9. Main Board Component Locations

Table	10.	Main	Board	Component	Locations
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ltem	Description	ltem	Description
Α	Dual Ethernet ports	Р	Front panel connector
В	I/O riser slot	٥	Power distribution board connectors (3)
С	PCI Express x4 (slot 7)	R	Processor socket 1
D	Serial Port A	S	Processor socket 2
E	PCI Express x4 (slot 6)	Т	Processor socket 3
F	PCI Express x4 (slot 5)	U	Processor socket 4
G	PCI Express x8 (slot 4)	V	SAS riser slot
Н	PCI Express x8 (slot 3)	w	Chassis intrusion
1	PCI Express x8 hot-plug (slot 2)	X	4-port SATA connector
J	PCI Express x8 hot-plug (slot 1)	Y	Internal USB port
К	Serial port B	Z	Memory board (slot C)
L	Video port	AA	Single port SATA connectors
М	USB 1 (top), USB 2 (bottom)	BB	Memory board (slot D)
Ν	Memory board (slot A)	CC	Real-time clock battery
0	Memory board (slot B)		



Figure 10. Main Board Jumpers

Label	Name	Function	Location
A	Rolling BIOS	1 - 2 = Force other bank *2 - 3 = Normal mode	J3D1
В	Password disable or clear	*1 - 2 = Password protect 2 - 3 = Password disabled / cleared	J3C2
С	Clear CMOS / NVRAM	*1 - 2 = Normal 2 - 3 = Forced CMOS / NVRAM clear	J3C3
D	BMC force update	*1 - 2 = Disable BMC force update 2 - 3 = Enable BMC force update	J5C1
E	BMC flash write protect	*1 - 2 = Disable flash write protect 2 - 3 = Enable flash write protect	J6D1
F	Circuit breaker	1 - 2 = 20A/110V (USA) *2 - 3 = 15A/100V (Japan)	J6F1

*Default Jumper Setting

Video Support

The main board uses the ATI RN50 Embedded Video Controller with 32 MB of video RAM. The RN50 provides these features:

- 2D/3D video accelerator
- Dual DAC for simultaneous port support (front / rear video support)
- Resolutions from VGA up to UXGA (1600 x 1200)
- Digital Video Input/Output (DVI/DVO) interface routed to the Intel[®] Remote Management Module 2 (RMM) for KVM support up to 165 MHZ
- 3.3 V 32-bit / 33 MHz PCI host interface

The main board has a standard DB5 video connector.

Ethernet Support

1000/100/10 Ethernet capability is supported by the ESB2 MAC and 82563EB PHY (Physical Layer). The 82563EB PHY outputs two Gbit LAN ports and connects to a 1x2 RJ45 Gbit connector that is accessible at the rear of the system.

Memory Board

One, two, or four memory boards can be installed. Each memory board has eight DIMM sockets that support x4 or x8, single- or dual-rank FBD DDR2 DIMMs. FBD speeds of 533 MT/s (4-4-4, 5-5-5 latencies) and 667 MT/s (5-5-5 latency) are supported. DDR2 DRAM technologies of 512 Mbit, 1 Gbit, and 2 Gbit are supported. The memory boards connect to the main board through x16 PCI Express connectors. The memory boards have LEDs that indicate the status of the memory board power and the status of each DIMM.





ltem	Description
Α	Power Good LED (green). The memory board power is good
В	DIMM1 Fault LED (amber). DIMM1 had an error and needs to be replaced
С	DIMM2 Fault LED (amber). DIMM2 had an error and needs to be replaced
D	DIMM3 Fault LED (amber). DIMM3 had an error and needs to be replaced
E	DIMM4 Fault LED (amber). DIMM4 had an error and needs to be replaced
F	DIMM5 Fault LED (amber). DIMM5 had an error and needs to be replaced
G	DIMM6 Fault LED (amber). DIMM6 had an error and needs to be replaced
н	DIMM7 Fault LED (amber). DIMM7 had an error and needs to be replaced
I	DIMM8 Fault LED (amber). DIMM8 had an error and needs to be replaced
J	DIMM1 Socket
К	DIMM2 Socket
L	DIMM3 Socket
М	DIMM4 Socket
Ν	DIMM5 Socket
0	DIMM6 Socket
Р	DIMM7 Socket
Q	DIMM8 Socket

I/O Riser Board (optional)

The I/O riser board is a vertical riser that provides advanced server management with a dedicated maintenance Ethernet port, and additional dual-gigabit Ethernet ports.

The Remote Management Module 2 (RMM2) and RMM2 NIC plug into the I/O riser board to provide an upgrade path to advanced server management capabilities. When the optional RMM2 is installed, the original set of server management features continue to work and additional functionality is available. This functionality seamlessly integrates into the server, with respect to configuration functions and software support.

The RMM2 supports keyboard, mouse, video redirect, and media redirect functionality, which lets the user use the remote system to control the host server.

The Intel 82575EB PCI Express-based Ethernet controller provides advanced networking control and capability with dual-gigabit Ethernet ports. This controller hosts the Intel® I/O Acceleration Technology II (Intel® I/OAT2) capability that provides optimization of the TCP flow. The Intel® I/O riser provides an option to disable Gbit port A and / or port B in the BIOS. Server management traffic over these ports is not supported. For management traffic, use the main board LAN ports.





ltem	Description	ltem	Description
Α	RMM2 NIC	С	Dual gigabit LAN Ethernet ports
В	RMM2 NIC connector	D	Remote Management Module 2 connector

SAS Riser Board (optional)

The SAS riser board works with the SAS backplane board to support eight SAS hard drives. The SAS riser uses a dedicated slot at the front of the system to make cabling to the SAS backplane convenient.

The SAS riser board uses the LSI1078 SAS controller to provide eight SAS channels at up to 3Gb/s. The riser natively supports Integrated RAID levels 0, 1, and 1E.

If the optional RAID Activation Key and DDR2-667 registered DIMM are installed, hardware RAID levels 0, 1, 5, 6, 10, 50, and 60 are enabled. The optional RAID smart battery can be installed to provide DDR2 DIMM refresh support during a power failure.



Figure 13. SAS Riser Connectors

ltem	Description	ltem	Description
А	SES Connector	D	RAID Activation Key
В	SAS x4 Port A	E	RAID DIMM Connector
С	SAS x4 Port B		

Starting Up and Shutting Down the Server 3

Powering On the Server

Press the power button on the front control panel. The fans start and POST begins.

It might take three minutes or longer for video to be displayed, depending on the amount of memory installed.

The server attempts to boot from the first device on the list of available devices in the boot manager. If this device is not available, it will move to the second device. It continues down the list until it reaches the first available device.

Press F2 during POST to enter the BIOS setup utility. This utility also contains a boot manager that allows to select a boot device for immediate boot.

Shutting Down the Server

- 1. Exit the operating system (if applicable)
- 2. Press and hold the power button until the server shuts down.

Powering down the server with the power button does not remove all power from the system. The +3.3 V standby power is still available to the system even when it is not running. To remove standby power from the system, unplug all power cords from the system and unplug the power supplies. If you do not unplug the power supplies, standby power may be held up by the integrated capacitors for more than 10 minutes.

4 Server Platform Utilities

BIOS Setup Utility

The BIOS Setup Utility is a text-based utility that allows you to configure the system and view and change device settings and view environmental information for the platform. The BIOS Setup Utility interface consists of several screens, called pages. Each page contains information or links to other pages. The first page in Setup displays links for general categories. These links lead to pages containing specific configuration settings.

The BIOS Setup Utility is functional through console redirection over various terminal emulation standards. This may limit some functionality due to compatibility. For example, colors, some keys or key sequences, and mouse support may be limited.

To enter the BIOS Setup Utility, press <F2> when prompted during POST to access the Systems Options Menu.

BIOS Setup Utility Page Layout

The BIOS Setup Utility page layout is sectioned into functional areas. The following table lists and describes the functional areas and their position on the screen.

Functional Area	Description
Menu Selection Bar	The Menu Selection Bar is located at the top of the screen. It displays the major menu selections available.
Setup Item List	The Setup Item List is a set of configurable and informational items. The left column shows the setup item. The right column shows the corresponding option. The option contains an informational value or possible settings for the setup item.
Item Specific Help Area	The Item Specific Help area is located on the right side of the screen and contains help text for the highlighted Setup Item. Help information includes the meaning and usage of the item, allowable values, and the affects of the options.
Keyboard Command Area	The Keyboard Command Bar is located at the bottom of the screen and displays help for keyboard special keys and navigation keys. The keyboard command bar is context-sensitive. It displays keys relevant to the current page and mode.
Status Bar	The Status Bar is on the bottom line of the screen. The status value "NV" indicates you have made changes to Setup that have not been saved.

 Table 12. BIOS Setup Utility Page Layout

Keyboard Commands

The bottom right portion of the Setup screen provides a list of commands that are used to navigate through the BIOS Setup Utility. These commands are context sensitive.

The Keyboard Command Bar supports the following key presses:

Table 13. BIOS Setup: Keyboard Commands

Кеу	Option	Description
<enter></enter>	Execute Command	The <enter> key is used to activate sub-menus when the selected feature is a sub-menu, or to display a pick list if a selected option has a value field, or to select a sub-field for multi-valued features like time and date. If a pick list is displayed, the <enter> key will select the currently highlighted item, undo the pick list, and return the focus to the parent menu.</enter></enter>
<esc></esc>	Exit	The <esc> key provides a mechanism for backing out of any field. This key will undo the pressing of the <enter> key. When the <esc> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <esc> key is pressed in any sub-menu, the parent menu is re-entered. When the <esc> key is pressed in any major menu, the exit confirmation window is displayed and you are asked whether changes can be discarded. If "No" is selected and the <enter> key is pressed, or if the <esc> key is pressed, you are returned to where you were before <esc> was pressed without affecting any existing any settings. If "Yes" is selected and the <enter> key is pressed, setup is exited and the BIOS continues with POST.</enter></esc></esc></enter></esc></esc></esc></enter></esc>
Up Arrow	Select Item	The up arrow is used to select the previous value in a pick list, or the previous option in a menu item's option list. The selected item must then be activated by pressing the <enter> key.</enter>
Down arrow	Select Item	The down arrow is used to select the next value in a menu item's option list, or a value field's pick list. The selected item must then be activated by pressing the <enter> key.</enter>
Left and Right Arrow	Select Menu	The left and right arrow keys are used to move between the major menu pages. The keys have no affect if a sub-menu or pick list is displayed.
<tab></tab>	Select Field	The <tab> key is used to move between fields. For example, <tab> can be used to move from hours to minutes in the time item in the main menu.</tab></tab>
<->	Change Value	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list. This key only works for date and time.
<+>	Change Value	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list. On 106-key Japanese keyboards, the plus key has a different scan code than the plus key on the other keyboard, but will have the same effect. This key only works for date and time.
Кеу	Option	Description
-------------	----------------	---
<f9></f9>	Setup Defaults	Pressing <f9> causes the following to appear: Load default configuration now? (Y/N) If the "Y" key is pressed, all Setup fields are set to their default values. If the "N" key is pressed, or if the <esc> key is pressed, you are returned to where you were before <f9> was pressed without affecting any existing field values</f9></esc></f9>
<f10></f10>	Save and Exit	Pressing <f10> causes the following message to appear: Save Configuration changes and exit now? (Y/N) If the "Y" key is pressed, all changes are saved and Setup is exited. If the "N" key is pressed, or the <esc> key is pressed, you are returned to where you were before <f10> was pressed without affecting any existing values.</f10></esc></f10>

Each Setup Utility menu page contains a number of features. Some features are used for informative purposes only, and other features are associated with a value field that you can configure. Depending on the security option chosen and in effect, a menu feature's value may be changeable. If a value cannot be changed, the feature's value field is inaccessible.

Console Redirection

The BIOS supports redirection of both video and keyboard through a serial link (COM port). When console redirection is enabled, local (host server) keyboard input and video output are passed both to the local keyboard and video connections and to the remote console via the serial link. Keyboard inputs from both sources are considered valid and video is displayed to both outputs. With console redirection, the system can be operated without a host keyboard or monitor attached to the system and run entirely via the remote console. Setup and any other text-based utilities can be accessed via console redirection.

Serial Configuration Settings

When redirecting through a modem (as opposed to a null modem cable), the modem needs to be configured with the following:

- Auto-answer (for example, ATS0=2, to answer after two rings).
- Modem reaction to DTR set to return to command state (e.g., AT&D1).

Failure to provide the second item will result in the modem either dropping the link when the server reboots (as in AT&D0) or becoming unresponsive to server baud rate changes (as in AT&D2).

The option for handshaking must be set to RTS/CTS + CD for optimum performance. The CD refers to carrier detect. If EMP is sharing the COM port with serial redirection, the handshaking must be set to Xon/Xoff + CD. In selecting this form of handshaking, the server is prevented from sending video updates to a modem that is not connected to a remote modem. If this is not selected, video update data being sent to the modem inhibits many modems from answering an incoming call. An EMP option utilizing CD should not be used if a modem is not used and the CD is not connected.

Both EMP and console redirection require N, 8, 1 mode (no parity, 8-bit data, 1 stop bit).

The BIOS does not require that the splash logo be turned off for console redirection to function. The BIOS supports multiple consoles, some of which are in graphics mode and some in text mode. The graphics consoles can display the logo while the text consoles receive the redirected text.

The console redirection ends at the beginning of the Legacy OS boot (INT 19h).

Keystroke Mappings

During console redirection, the remote terminal (which may be a dumb terminal or a system with a modem running a communication program) sends keystrokes to the local server. The local server passes video back over this same link. The keystroke mappings follow VT-UTF8 format with the following extensions.

Setup Alias Keys

The and <Ctrl>-<function key> combinations are synonyms for the <F2> or "Setup" key. These are not prompted for in screen messages. These hotkeys are defined only for Console Redirection support, and are not used on locally attached keyboards.

Limitations

BIOS Console redirection terminates after an EFI-aware operating system calls EFI Boot Service ExitBootServices. The operating system is responsible for continuing the Console Redirection after that point. BIOS console redirection is a text console and any graphical data such as a logo are not redirected.

Interface to Server Management

If BIOS determines that console redirection is enabled, it passes the baud rate through the Intelligent Platform Management Bus (IPMB) to the appropriate management controller.

Sample Setup for Console Redirection

Below is an example of how to configure the console/host and server for console redirection. In this example, the console is running under Microsoft[®] Windows[®]. The console and server is directly connected through the serial ports of both systems using a serial null modem cable:

Server Configuration

- 1. Power on the server.
- 2. When prompted, press the $\langle F2 \rangle$ key to enter BIOS Setup.
- 3. The BIOS Setup menu displays the Main menu. Use the arrow keys move to the Server Management menu.
- 4. At the Server Management menu, select Console Redirection.
- 5. Select Serial B Console Redirection.
- 6. Set Console Redirect to "Enabled".
- 7. Set the Bit Rate to "115.2K".
- 8. Set the Flow Control to "RTS/CTS".
- 9. Set the Terminal Type to "PC-ANSI".
- 10. Press the <F10> key.
- 11. At the prompt to save changes and exit BIOS Setup, select "Yes" and press the <Enter> key.
- 12. The server reboots and console redirection is enabled.
- 13. Power down the server and configure the console.

Console Configuration

- 1. Boot the console into the operating system.
- 2. Click the Start button in the task bar.
- 3. Select Programs > Accessories > Communications and click "Hyperterminal".
- 4. At the Connection Description window, enter "guest" for the name and click "Ok".
- 5. At the Connect To window, select the COM port of the console that the Null modem is connected. In this example, it is COM1.
- 6. At the COM1 Properties window, select "115200" in the Bits per second (Baud rate) box to match what was configured on the server.
- 7. Select "Hardware" for the Flow Control to match what was configured in the BIOS Setup (CTS/RTS is the hardware flow control).
- 8. Leave the default settings for the other boxes. Click "Ok" to accept the settings and enter the Hyperterminal screen.
- 9. Power on the server. The console starts displaying the redirection once the video synchronizes on the server.

Extensible Firmware Interface (EFI) Shell

The EFI shell application allows other EFI applications to be launched, EFI device drivers to be loaded, and operating systems to be booted. The combination of the EFI firmware and the EFI Shell provides an environment that can be modified and adapted to many hardware configurations.

The EFI shell provides a set of basic commands to manage files and EFI NVRAM shell and boot variables. A list of these basic commands is in Table 14.

Extensive information is available on the EFI website at http://developer.intel.com/technology/efi.

Table 14. EFI Shell Commands

Command	Description
<drive_name>:</drive_name>	Change drives. For example, entering fs0: and pressing the <enter> key changes the drive to the LS-240 drive</enter>
alias [-bdv] [sname] [value]	Sets or gets alias settings
attrib [-b] [+/- rhs] [file]	Views or sets file attributes
bcfg -?	Configures boot driver and load options in EFI NVRAM
botmaint	Launches the Boot Maintenance Manager
break	Executes a breakpoint
cd [path]	Changes the directory
cls [background color]	Clears the screen
comp file1 file2	Compares two files
connect [-r] [-c] Handle# ½DeviceHandle# DriverHandle#	Binds the EFI driver to a device and starts the driver
cp [-r] file [file] [dest]	Copies files and directories, [-r] = recursive
date [mm/dd/yyyy]	Gets or sets the date
dblk device [Lba] [Blocks]	Performs a hex dump of Blklo Devices
devices [-b] [-1XXX]	Displays devices
devtree [-b] [-d]	Displays device tree
dh [-b] [-p prot_id] [handle]	Dumps handle information
disconnect DeviceHandle# [DriverHandle# [ChildHandle#]	Disconnects device from driver
dmem {address] [size] [;MMIO]	Displays the contents of memory
dmpstore	Dumps the variable store
drivers [-b] [-IXXX]	Displays drivers
drvcfg [-c] [-IXXX] [-f] [-v] [-s]	Invokes the driver configuration protocol
drvdiag [-c] [-IXXX] [-s] [-e] [m]	Invokes the driver diagnostics protocol
echo [[-on -off] [text]	Echoes text to the standard output device or toggles script echo
edit [filename]	Opens the text editor allowing you to create or edit a file
eficompress infile outfile	Compresses an EFI file
Efidecompress infile outfile	Decompresses an EFI file
endfor	Provides a delimiter for loop constructs (scripts only)
endif	Provides a delimiter for IFTHEN constructs (scripts only)
for var in <set></set>	
goto label	Makes batch file execution jump to another label
guid [-b] [sname]	Dumps known guide ids
help [-b] [internal_command]	Displays help information
hexedit [[-f]FileName [-d DiskName Offset Size] [-m Offset Size]]	Edits in HEX mode
if [not] condition then	Provides conditional constructs (scripts only)
load driver_name	Loads a driver
loadbmp [-c] [-t] [-i[UGA Instance]] file	Displays a bitmap file on the screen
loadpcirom romfile	Loads a PCI option ROM

Table 1	14. EFI	Shell	Commands	(continued)
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Command	Description
ls [-b] [dir] [dir]	Obtains directory listings
map [-bdvr] [sname[:]] [handle]	Maps sname to device path
mem [address] [size] [;MMIO]	Dumps Memory or Memory Mapped IO
memmap [-b]	Dumps memory map
mkdir dir [dir]	Creates a new directory
mm address [Width] [;Type] [n]	Memory Modify: type = Mem, MMIO, IO, PCI, [n] for non interactive mode when inside a .nsh file
mode [col row]	Sets or gets the current graphics mode
mount BlkDevice [sname[:]]	Mounts a file system on a block device
mv [src] [dst]	Move one or more files/directories to destination
pause	Prompts to quit or continue (scripts only)
pci [bus_dev] [func]	Displays PCI device information
rconnect DeviceHandle# [DriverHandle#	Reconnects one or more drivers from a device
[ChildHandle#]] [-r]	
reset [reset_string]	Performs a cold reset
rm file/dir [file/dir]	Removes files or directories
setsize file	Sets size of a new file
stall microseconds	Delays for the specified number of microseconds
time [hh:mm:ss]	Gets or sets the time
type [-a] [-u] [-b] file	Displays the contents of a file
ver	Displays version information
vol fs [volume_label]	Sets or displays a volume label

User Serviceable Platform Components 5

Tools and Supplies Needed

- Phillips #2 screwdriver
- Flat head screwdriver •
- Antistatic wrist strap (recommended)

Removing and Installing the Top Cover

WARNING

Make sure the rack is anchored securely so it will not tilt forward when the server chassis is extended. A crush hazard exists should the rack tilt forward. This could cause serious injury.

A CAUTIONS

For proper cooling and airflow, do not operate the server with the cover removed. Do not leave the chassis cover open or a system fan removed any longer than necessary; system cooling could be reduced.

The server comes with a removable top cover that allows the PCI cards, Memory Boards, and the system fans to be hot-swapped, and the system components to be serviced.

With the exception of the components described in this chapter, all servicing must be done by a qualified service technician.

Removing the Top Cover

To remove the top cover, follow these instructions:

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information".
- 2. If the chassis is rack-mounted, slide the chassis out far enough to expose the entire top cover.
- 3. Unscrew the two captive screws on the faceplate of the chassis.
- 4. Slide the top cover toward the back of the chassis until the tabs on the cover disengage with the slots in the chassis.
- 5. Lift the cover to remove it.



Figure 14. Removing the Top Cover

Installing the Top Cover

To install the top cover, follow these instructions:

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information"
- 2. Place the top cover on the chassis so the tabs on the cover align with the slots on the chassis.
- 3. Slide the top cover towards the front of the chassis until it is fully closed.
- 4. Tighten the captive screws on the face plate of the chassis.
- 5. Slide the server into the rack.

Hot-swapping a Front System Fan

Two cooling fan assemblies are located at the front of the chassis. Each assembly contains two fans. You cannot replace the individual fans within the assembly, but you can replace each fan assembly. You can replace a failed cooling fan assembly without turning off the power to the server only if the remaining fan in the assembly is fully operational. Each fan assembly uses an amber LED to indicate a failed fan condition. If the amber LED is on, the fan assembly needs to be replaced. The LED remains off during normal operation.

System cooling is reduced during the fan replacement process. Do not leave a system fan removed for longer than two minutes.

Do not touch the fan blades while they are turning.

- 1. Observe the safety, ESD, and other precautions described in "Safety Information."
- 2. Locate the fan assembly you are replacing. If a fan in the assembly has failed, the amber LED will be lit. See letter "A" in Figure 15.
- 3. Press the green button on the front of the fan assembly to release the handle. See letter "B" in the figure.
- 4. Use the handle to pull the fan from the system. See letter "C" in the figure.



Figure 15. System Fan Location and Removal

- 5. Open the handle on the replacement fan assembly.
- 6. Slide the replacement fan into the fan bay.
- 7. Push the handle closed until it clicks into place.

Hot-swapping a Rear System Fan

Four cooling fans are located at the rear of the chassis. The top cover must be removed before these fans can be serviced. You can replace a failed cooling fan assembly without turning off the power to the server only if the remaining system fans are fully functional.

Each fan assembly uses an amber LED to indicate a failed fan condition. If the amber LED is on, the fan assembly needs to be replaced. The LED remains off during normal operation.

System cooling is reduced during the fan replacement process. Do not leave a system fan removed for longer than two minutes.

Do not touch the fan blades while they are turning.

- 1. Locate the fan assembly you are replacing. If a fan in the assembly has failed, the amber LED on the fan model will be lit.
- 2. Grasp the fan by the finger holes and squeeze together.
- 3. Lift the fan upward. See the following figure.



Figure 16. Removing a Rear System Fan

- 4. Lower the replacement fan into the fan bay.
- 5. Push down on the fan until it clicks into place.

Hot-swapping Hard Disk Drives

The server supports five hot-swap drive carriers. Each carrier holds a standard one-inch high SCSI-2 or SCSI-3 hard drive.

The procedures in this section describe how to determine drive status, remove a faulty drive, and install a new drive. If a drive is in a redundant configuration, you can install or replace a hot-swap hard disk drive without powering down the server.

To ensure proper airflow and server cooling, all drive bays must contain either a carrier with a hard drive installed in it or a carrier with an air baffle installed.

Determining Drive Status

The drive carriers contain light-pipes that allow dual-color LED indicators to show through the bezel to display the hard disk drive status, as shown by Figure 17.



Figure 17. Hard Disk Drive Carrier

Table 15. Hard Disk Drive Carrier

ltem	Description
А	Latch
В	Activity LED (green) • On: SAS drive installed and working correctly • Blinking: Hard drive is active
С	 Fault LED (amber) On: Hard drive or slot failure Slow blinking (~1 Hz): Predictive hard drive / slot failure or rebuild in process Fast blink (~2.5 Hz): Hard drive rebuild interrupted or rebuild on empty slot

Removing a Hard Disk Drive

- 1. Observe the safety, ESD, and other precautions described in "Safety Information."
- 2. Press on the green drive carrier latch.
- 3. Pull the handle to remove the drive cage from the chassis.
- 4. Place the drive cage on a clean, static-free work surface.

Mounting a Hard Disk Drive in a Carrier

To mount a hard drive in a carrier:

- 1. Observe the safety, ESD, and other precautions described in "Safety Information."
- 2. Remove the hard disk drive from the protective wrapper and place it on a clean ESD-protected work surface.
- 3. Set any jumpers and/or switches on the drive according to the drive manufacturer's instructions.
- 4. If the drive carrier is installed in the chassis, remove it and place it on a clean static-free work surface. For instructions, see "Removing a Hard Disk Drive".
- 5. Remove the four screws that hold the air baffle in place.
- 6. Remove the air baffle from the carrier.
- 7. Store the air baffle for future reinstallation.
- 8. Position the drive in the carrier with the label-side up and the connector end of the drivefacing the back of the carrier.
- 9. Align the holes in the drive to the holes in the drive carrier slide track and insert the screws that you were attached to the air baffle.



Figure 18. Attaching the Hard Drive to the Carrier

Installing a Hard Disk Drive Assembly

- 1. Observe the safety, ESD, and other precautions described in "Safety Information".
- 2. With the drive carrier handle fully open, slide the drive carrier all the way into the drive bay in the chassis.
- 3. Use the handle to push the carrier until it docks in the chassis, then close the drive carrier handle.

Hot-swapping Power Supplies

If your server is configured with two power supplies, you can replace a failed or failing power supply without powering down the server.



Because of chassis airflow disruption, a power supply bay should never be vacant for more than two minutes when the server power is on. Exceeding five-minutes might cause the system to exceed the maximum acceptable temperature and possibly damage system components.

Removing a Power Supply

/!\ CAUTION

Any unoccupied power supply slots must be covered with a filler panel. Uncovered slots can disrupt the airflow used for cooling the system.

- 1. Observe the safety, ESD, and other precautions described in "Safety Information".
- 2. Remove the AC power cord from the power supply to be removed.
- 3. Unscrew the thumb latch to unlock the power supply handle.
- 4. Open the handle on the power supply.
- 5. Pull the power supply from the chassis and set it on a clean, ESD-protected work surface.
- 6. Install a replacement power supply or a filler panel. For instructions, see "Installing a Power Supply".

Installing a Power Supply

- 1. Remove the new power supply from the protective packaging and place it on a clean ESD protected work surface.
- 2. Remove the filler panel from the back of the chassis, if installed.
- 3. Position the power supply with the handle at the right side of the power supply.
- 4. Slide the new power supply partway into the power supply bay.
- 5. With the handle in the open position, push the power supply fully into the bay until it stops.
- 6. Rotate the handle to the closed position.
- 7. Tighten the thumbscrew to secure the power supply.
- 8. Plug the power cord into the AC receptacle on the power supply.
- 9. Use the LEDs on the power supply to confirm the power supply is functioning.

Installing and Removing PCI Cards

This section outlines the procedures for performing a hot-plug operation with PCI cards and installing and removing non-hot-plug PCI cards. Cards can be hot-swapped in PCI slots 1 through 5. The server must be powered down to install or remove a card from PCI slots 6 and 7.

A CAUTION

Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emission characteristics of the server and to ensure proper cooling of the system.

Removing Hot-plug PCI Card with Operating System Hot-Plug Interface

/ CAUTION

Only PCI add-in cards in PCI slots 1 and 2 are hot-swappable. If you are adding or removing a PCI card from PCI slots 3 through 7, see "Removing a Non-Hot-Plug PCI Card" and "Installing a Non-Hot-Plug PCI Card".

- 1. Observe the safety, ESD, and other precautions described in "Safety Information".
- 2. Remove the top cover. For instructions, see "Removing the Top Cover".
- 3. If you are using a Microsoft[®] Windows[®] operating system, double-click the "Unplug/Eject" icon in the taskbar to open the "Unplug or Eject Hardware" menu.
- 4. Select the device to be removed and click "Stop".
- 5. Wait for the PCI slot power LED at the rear of the slot to turn off.
- 6. Disconnect any cables attached to the card.
- 7. Rotate the retention latch at the rear of the card slot into the up position.
- 8. If a long card is installed, press the blue plastic piece at the front of the card.
- 9. Pull up on the card to remove it.
- 10. Store the card in an antistatic protective wrapper.
- 11. Install an expansion slot cover over the empty slot or install a replacement PCI card:
 - To install an expansion slot cover: align the cover with the slot from the rear of the chassis. Press the cover into the slot. Rotate the bracket at the rear of the card slot into the down position.
 - To install a replacement PCI card: see "Installing a Hot-plug PCI Add-in Card".
- 12. Install the top cover. For instructions, see "Installing the Top Cover".

Removing Hot-plug PCI Card with Hardware Hot-Plug Interface



Only PCI add-in cards in PCI slots 1 and 2 are hot-swappable. If you are adding or removing a PCI card from PCI slots 3 through 7, see "Removing a Non-Hot-Plug PCI Card" and "Installing a Non-Hot-Plug PCI Card".

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information".
- 2. Remove the top cover. For instructions, see "Removing the Top Cover".
- 3. Press the attention button for the slot.

Press the attention button again within five seconds to abort the hot-plug operation.



Figure 19. PCI Slot Attention Button

- 4. Wait for the power LED on the slot to turn off.
- 5. Disconnect any cables to the PCI card.
- 6. Rotate the retention latch at the rear of the card slot into the up position.
- 7. If a long card is installed, press the blue plastic piece at the front of the card.
- 8. Pull up on the card to remove it.
- 9. Store the card in an anti-static bag.
- 10. Install an expansion slot cover over the empty slot or install a replacement PCI card:
 - To install an expansion slot cover: align the cover with the slot from the rear of the chassis. Press the cover into the slot. Rotate the retention latch at the rear of the board slot into the down position.
 - To install a replacement PCI card: see "Installing a Hot-plug PCI Add-in Card".
- 11. Install the top cover. For instructions see "Installing the Top Cover".

Installing a Hot-plug PCI Add-in Card



Only PCI add-in cards in PCI slots 1 and 2 are hot-swappable. If you are adding or removing a PCI card from PCI slots 3 through 7, see "Removing a Non-Hot-Plug PCI Card" and "Installing a Non-Hot-Plug PCI Card".

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information".
- 2. If your server is operating, use your operating system or GUI application to power down the PCI slot.
- 3. Remove the top cover. For instructions, see "Removing the Top Cover".
- 4. Being careful not to touch the components or gold edge-connectors on the add-in card, remove the card from the anti-static bag, and place it on a clean, ESD-protected work surface.
- 5. Rotate the retention latch at the rear of the card slot into the up position.
- 6. If necessary, remove the expansion slot cover in the slot you are using by sliding it up from inside the chassis.
- 7. Align and slide the adapter board down until it seats in its connector. If you are installing a fulllength card, guide the front of the card into the appropriate slot.
- 8. Press the card down firmly until it seats into the slot.

CAUTION

Some accessory/option board outputs exceed Class 2 or limited power source limits. Use appropriate interconnecting cabling in accordance with the national electrical code.

- 9. Rotate the retention latch at the rear of the card slot into the down position.
- 10. Connect any required cabling to the PCI add-in board.
- 11. If using the operating system hot-plug interface:
 - Wait for the software user interface to appear on your monitor and then confirm the device to be enabled.
 - Wait for the power LED to turn on.

If using the hardware hot-plug interface:

- Press the attention button for the slot. If you need to abort the hot-plug operation, press the attention button again within five seconds.
- Wait for power LED to turn on.

Image: Second secon

For either the operating system interface or the hardware hot-plug interface, if the attention LED is blinking, a power fault has occurred. You may need to remove the adapter, wait for the LED to turn off, and re-start the hot insertion.

12. Install the top cover. For instructions, see "Installing the Top Cover".

Removing a Non-Hot-Plug PCI Card

PCI cards installed in slots 1 and 2 are hot-swappable. If you are adding or removing a card from one of these slots, you can do so without powering down the server. If you wish to do so, follow the instructions under "Removing Hot-plug PCI Card with Operating System Hot-Plug Interface" or "Removing Hot-plug PCI Card with Hardware Hot-Plug Interface", and "Installing a Hot-plug PCI Add-in Card".

Damage to the system occurs if power is not removed from the system prior to removal or installation of non-hot-plug boards.

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information".
- 2. Turn off all peripheral devices connected to the system.
- 3. Power down the system and unplug both AC power cords to remove power from the server.
- 4. Remove the top cover. For instructions, see "Removing the Top Cover".
- 5. Disconnect any cables attached to the PCI card.
- 6. Rotate the retention latch at the rear of the card slot into the up position.
- 7. Pull up on the card to remove it.
- 8. Place the PCI card on a clean, static-free work surface or inside a static-free plastic bag.
- 9. Install an expansion slot cover over the empty slot or install a replacement PCI card:
 - To install an expansion slot cover: align the cover with the slot from the rear of the chassis. Press the cover into the slot. Rotate the bracket at the rear of the chassis into the down position.
 - To install a replacement PCI card: see "Installing a Non-Hot-Plug PCI Card".

10. Install the top cover. For instructions, see "Installing the Top Cover".

Installing a Non-Hot-Plug PCI Card

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information"
- 2. Turn off all peripheral devices connected to the system.
- 3. Power down the system and unplug both AC power cords.
- 4. Remove the top cover. For instructions, see "Removing the Top Cover".
- 5. Being careful not to touch the components or the gold edge connectors on the PCI card, remove it from its protective wrapper. Place the card component-side up on a clean, static free work surface.
- 6. Rotate the retention latch at the rear of the card slot into the up position.
- 7. If necessary, remove the expansion slot cover in the slot you are using by sliding it up from inside the chassis.
- 8. Align and slide the adapter board down until it seats in its connector. If you are installing a fulllength card, guide the front of the card into the appropriate slot.
- 9. Press the card down firmly until it seats into the slot.
- 10. Rotate the retention latch at the rear of the card slot into the down position.
- 11. Attach the required cables to the PCI card.
- 12. Install the top cover. For instructions, see "Installing the Top Cover".

Installing and Removing Memory Boards

At least one memory board and one DIMM must be installed for the server to function. Supported memory board configurations are as follows:

- One memory board installed in Slot A, at the right side of the system
- Two memory boards, installed in Slots A and B, the two boards at the right side of the system
- All four memory boards, Slots A, B, C, and D

AC power must be removed from the system before servicing the memory boards.

Removing a Memory Board

- 1. Remove the top cover. For instructions, see "Removing the Top Cover".
- 2. Rotate the latches on the memory board upward to disengage the memory board from the main board. See letters "A" and "B" in the following figure.



Figure 20. Opening Memory Board Latches

3. Lift the memory board by the latches to pull it from the server.



Figure 21. Removing a Memory Board

Installing a Memory Board

- 1. Ensure the latches on the memory board are in the open / up position.
- 2. Align the edges of the board in the card guides and slide the memory board into the main board.
- 3. Once the board is lowered as far as possible, rotate the latches downward to firmly engage the board into the memory board slot.
- 4. Install the top cover. For instructions, see "Installing the Top Cover".

Installing and Removing DIMMs

Memory Population Rules

- Memory must be populated beginning with memory board A, slot 1. This is DIMM Slot A1. Memory board A is at the right side of the system.
- To increase memory capacity, additional memory can be added to memory board A beginning with slot A2, and followed by slot A3 and then slot A4.
- To ensure proper system thermal performance, all DIMM slots must be populated with either a DIMM or a DIMM blank.



Figure 22. Minimum Memory Population

If only memory boards A and B are installed:

- Identically numbered FBDIMM sockets for both memory boards must be populated with FBDIMMs identical in terms of timing, technology, and size. For example, DIMM A1 and B1 must be identical.
- FBDIMMs installed in different socket positions (numbers) on a riser board do not need to be identical for dual-channel operation. For example, DIMMs A1 and B1 can be different from DIMMs A2 and B2.
- Additional memory can be added by installing identical pairs of DIMMs in the lowest numbered available slots.



Figure 23. Memory Board A and B Population

If memory boards A, B, C and D are installed:

- Identically numbered FBDIMM sockets for both memory boards in a branch must be populated with FBDIMMs identical in terms of timing, technology, and size. For example, DIMM A1 and B1 must be identical, and DIMM C1 and D1 must be identical.
- FBDIMMs installed in different socket positions (numbers) on a memory board do not need to be identical. For example, DIMMs A1 and B1 can be different from DIMMs A2 and B2.
- If memory mirroring is not required, FBDIMMs installed in the same socket positions (numbers) across the two branches do not need to be identical. For example, DIMMs A1 and B1 can be different from DIMMs C1 and D1.
- If memory mirroring is required, FBDIMMs installed in the same socket positions (numbers) across the two branches must be identical. For example, DIMMs A1 and B1 must be identical to DIMMs C1 and D1.
- Additional memory can be added by installing identical pairs of DIMMs in the lowest numbered available slots.



Figure 24. Memory Board A, B, C, D Population

Installing **DIMMs**



Cautions

- Use extreme care when installing a DIMM. Applying too much pressure can damage the • connector. DIMMs are keyed and can be inserted in only one way.
- Hold DIMMs only by the edges. Do not touch the components or gold edge connectors.
- Install DIMMs with gold-plated edge connectors only. •
- The maximum DIMM height is 4.445 cm (1.75 inches). Do not install DIMMs that exceed this • height.
- 1. Remove the top cover. For instructions, see "Removing the Top Cover".
- 2. Remove the memory board. For instructions, see "Removing a Memory Board".
- 3. Press down on the hooks on the underside of the memory board to disengage them. See letter "A" in the following figure.
- 4. Lift the memory board DIMM cover from the memory board.



Figure 25. Remove Memory Board DIMM Cover

- 5. Open the plastic levers on each end of the DIMM socket(s). Remove the DIMM from its antistatic container. Hold the DIMM only by the edges. Do not touch the components or gold edge connectors.
- 6. Install DIMMs in the correct order. See "Memory Population Rules".
- 7. Position the DIMM above the socket. Align the notch on the bottom edge of the DIMM with the key in the DIMM socket.
- 8. Insert the bottom edge of the DIMM into the socket.
- 9. Push down on the top edge of the DIMM. The levers at each end of the DIMM socket will close. Make sure the levers close securely.



Figure 26. Install DIMMs

- 10. Lower the memory board DIMM cover over the DIMM slots.
- 11. Line up the hooks in the cover with the notches on the bottom edge of the memory board.
- 12. Press down on the cover until the hooks on both the top and bottom of the cover click into place around the memory board.
- 13. Install the memory board. For instructions, see "Installing a Memory Board".

Removing DIMMs



A Caution

Use extreme care when removing DIMMs. Too much pressure can damage the connector. Apply only enough pressure on the plastic levers to release the DIMM.

- 1. Remove the top cover. For instructions, see "Removing the Top Cover".
- 2. Remove the memory board. For instructions, see "Removing a Memory Board".
- 3. Press down on the hooks on the underside of the memory board to disengage them.
- 4. Lift the memory board DIMM cover from the memory board.
- 5. Open the plastic levers on each end of the DIMM socket(s). The DIMM will lift from the socket.
- 6. Hold the DIMM only by the edges. Do not touch the DIMM components or the gold edge connectors. Store it in an antistatic bag.
- 7. Install replacement DIMMs if necessary. For instructions, see "Installing DIMMs".
- 8. Install the memory board. For instructions, see "Installing a Memory Board".

6 Replacing the CMOS Battery

The lithium battery on the Main Board powers the real-time clock (RTC) for three to four years in the absence of power. When the battery weakens, it loses voltage and the system settings stored in CMOS RAM and the Real Time Clock (such as the date and time) can be wrong. Contact your customer service representative or dealer for a list of approved replacement batteries.

The following warning and translations are required by specific certifying agencies to be printed immediately adjacent to the procedure for removing the battery.

Risk of explosion if the battery is replaced with an incorrect type. Batteries should be recycled where possible. Disposal of used batteries must be in accordance with local environmental regulations.



VORSICHT

Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.



PRÉCAUTION

Risque d'explosion si la pile usagée est remplacée par une pile de type incorrect. Les piles usagées doivent etre recyclées dans la mesure du possible. La mise au rebut des piles usagées doit respecter les réglementations locales en vigueur en matičre de protection de l'environnement.



OSTRZEŻENIE

lstnieje niebezpieczeństwo wybuchu w przypadku zastosowania niewłaściwego typu baterii. Zużyte baterie należy w miarę możliwości utylizować zgodnie z odpowiednimi przepisami ochrony środowiska.

- 1. Observe the safety precautions, warnings, and cautions described in "Safety Information".
- 2. Turn off all peripheral devices connected to the system.
- 3. Power down the system and unplug both AC power cords.
- 4. Remove the top cover. For instructions, see "Removing the Top Cover".
- 5. Remove the Memory Board or the Memory Board air baffle from Slot A to expose the battery. For instructions, see "Cold Removal of Memory Board".
- 6. Place your finger on the edge of the battery, between the two smaller prongs that hold the battery in place.
- 7. Without pulling up on the battery, push the battery toward the larger prongs until the edge of the battery clears the small prongs.
- 8. Maintain pressure on the battery while pulling up on the released edge of the battery to lift it from the server. See Figure 27.



Do not attempt to pull the battery up until it is pushed clear of the smaller prongs. Doing so may damage the battery holder on the Main Board.



Figure 27. Removing the Battery

- 9. Dispose of the battery according to local ordinance.
- 10. Remove the new lithium battery from its package.
- 11. Being careful to observe the correct polarity, insert the battery at an angle into the battery socket with the edge of the battery under the larger prongs in the battery socket.
- 12. Push the battery toward the larger prongs while pushing down on the raised edge of the battery until it clicks into place under all four prongs.
- 13. Install the Memory Board or the Memory Board air baffle into slot A. For instructions, see "Cold Insertion of a Memory Board".
- 14. Install the top cover. For instructions, see "Installing the Top Cover".

7 Regulatory and Integration Information

Product Regulatory Compliance

Product Safety Compliance

The server board complies with the following safety requirements:

- EN 60950 (European Union)
- IEC 60950 (International)
- CE Low Voltage Directive (73/23/EEC) (European Union)

Product RoHS Compliance

Restriction of Hazardous Substances: This server system is compliant to European Directive 2002/95/EC (RoHS).

Product EMC Compliance

The server board has been has been tested and verified to comply with the following electromagnetic compatibility (EMC) regulations when installed a compatible host system.

- CISPR 22, 3rd Edition (Class A) Radiated & Conducted Emissions (International)
- EN 55022 (Class A) Radiated & Conducted Emissions (European Union)
- EN 55024 (Immunity) (European Union)
- CE EMC Directive (89/336/EEC) (European Union)

Product Regulatory Compliance Markings

This product is marked with the following Product Certification Markings:

Table 16. Product Certification Markings

CE Mark	CE
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Electromagnetic Compatibility Notices

Europe (CE Declaration of Conformity)

This product has been tested in accordance to, and complies with the Low Voltage Directive (73/23/ EEC) and EMC Directive (89/336/EEC). The product has been marked with the CE Mark to illustrate its compliance.

Appendix A: POST Codes

The system BIOS displays error messages on the video screen. Before video initialization, beep codes inform you of errors. POST error codes are logged in the event log. The BIOS displays POST error codes on the video monitor.

Eight light-emitting diodes indicate the raw binary output of port 80 values. These LEDs are arranged so you can see a direct correlation to the binary equivalent. The table shows the correlation of port 80 post code bit to LED reference designator.

Port 80 POST Code Bit	LED Reference Designator
7 (MSB)	DS4E8
6	DS4E7
5	DS4E6
4	DS4E5
3	DS4E4
2	DS4E3
1	DS4E2
0 (LSB)	DS4E1

Table 17. Port 80 POST Code LEDs

POST Progress Codes and Messages

The system BIOS complies with the EFI Framework POST Progress Code specification by reporting 32bit status codes at various points during POST that contain class, subclass, and operation information. The class and subclass fields describe the type of hardware that is being initialized. The operation field represents the specific initialization activity.

The system BIOS truncates 32-bit EFI POST Progress Codes to 8-bit values for display on the system board Diagnostic LED array. The resulting 8-bit POST code is displayed on the system board POST Code Diagnostic LED array at the start of each configuration process. This information can be used to assist with debugging system hangs during POST by identifying the last POST process initiated by the BIOS.

Progress Code	Progress Code Meaning		
Host Processor			
0x10	Power-on initialization of the host processor (Boot Strap Processor)		
0x11	Host processor cache initialization (including AP)		
0x12	Starting Application processor initialization		
0x13	SMM initialization		
Chipset			
0x21	Initializing a chipset component		
Memory			
0xE1	No memory available (system halted)		
0xE4	BIOS cannot communicate with FBDIMM (serial channel hardware failure)		
0xE6	FBDIMM(s) failed Memory iBIST or Memory LinkTraining failure		
0xEB	FBDIMM with corrupted SPD data detected (system halted)		
0x22	Reading configuration data from memory (SPD on DIMM)		
0x23	Detecting presence of memory		
0x24	Programming timing parameters in the memory controller		
0x25	Configuring memory parameters in the memory controller		
0x26	Optimizing memory controller settings		
0x27	Initializing memory, such as ECC init		
0x28	Testing memory		
PCI Bus			
0x50	Enumerating PCI buses		
0x51	Allocating resources to PCI buses		
0x52	Hot Plug PCI controller initialization		
0x53-0x57	Reserved for PCI Bus		
USB			
0x58	Resetting USB bus		
0x59	Reserved for USB devices		
ATA / ATAPI / SATA			
0x5A	Resetting PATA / SATA bus and all devices		
0x5B	Reserved for ATA		
SMBUS			
0x5C	Resetting SMBUS		
0x5D	Reserved for SMBUS		
Local Console			
0x70	Resetting the video controller (VGA)		
0x71	Disabling the video controller (VGA)		
0x72	Enabling the video controller (VGA)		

Table 18. POST Progress Codes and Messages

Table 18. POST Progress Codes and Messages (continued)

Progress Code	Progress Code Meaning		
Remote Console			
0x78	Resetting the console controller		
0x79	Disabling the console controller		
0x7A	Enabling the console controller		
Keyboard (USB on	ly)		
0x90	Resetting the keyboard		
0x91	Disabling the keyboard		
0x92	Detecting the presence of the keyboard		
0x93	Enabling the keyboard		
0x94	Clearing keyboard input buffer		
0x95	Instructing keyboard controller to run self-test (PS2 only)		
Mouse (USB only)			
0x98	Resetting the mouse		
0x99	Detecting the mouse		
0x9A	Detecting the presence of mouse		
0x9B	Enabling the mouse		
Fixed Media			
0xB0	Resetting fixed media device		
0xB1	Disabling fixed media device		
0xB2	Detecting presence of a fixed media device (IDE hard drive detection, etc.)		
0xB3	Enabling / configuring a fixed media device		
Removable Media			
0xB8	Resetting removable media device		
0xB9	Disabling removable media device		
0xBA	Detecting presence of a removable media device (IDE CDROM detection, etc.)		
0xBC	Enabling / configuring a removable media device		
Boot Device Select	ion		
0xDy	Trying boot selection y (where $y = 0$ to F)		
Pre-EFI Initializatio	n (PEI) Core		
0xE0	Started dispatching early initialization modules (PEIM)		
0xE2	Initial memory found, configured, and installed correctly		
0xE1,0xE3	Reserved for initialization module use (PEIM)		

Table 18. POST Progress Codes and Messages (continued)

Progress Code	Progress Code Meaning		
Driver Execution Environment (DXE) Core			
0xE4	Entered EFI driver execution phase (DXE)		
0xE5	Started dispatching drivers		
0xE6	Started connecting drivers		
DXE Drivers			
0xE7	Waiting for user input		
0xE8	Checking password		
0xE9	Entering BIOS setup		
0xEA	Flash Update		
0xEE	Calling Int 19. One beep unless silent boot is enabled.		
0xEF	Unrecoverable boot failure		
Runtime Phase / E	FI Operating System Boot		
0xF4	Entering sleep state		
0xF5	Exiting sleep state		
0xF8	Operating system has requested EFI to close boot services (ExitBootServ- ices () has been called)		
0xF9	Operating system has switched to virtual address mode (SetVirtualAd- dressMap () has been called)		
0xFA	Operating system has requested a system reset (ResetSystem () has been called)		
Pre-EFI Initialization Module (PEIM) / Recovery			
0x30	Crisis recovery has been initiated because of a user request		
0x31	Crisis recovery has been initiated by software (corrupt flash)		
0x34	Loading crisis recovery capsule		
0x35	Handing off control to the crisis recovery capsule		
0x3F	Unable to complete crisis recovery.		

POST Error Messages and Handling

The POST Error Manager displays error messages reported by the system BIOS during POST. The system BIOS truncates the 32-bit EFI POST Progress Code associated with the error to 16-bit values for display in the POST Error Manager.

The POST Error Manager behavior in response to the error is defined by the error severity reported by the BIOS. Errors are categorized in one of three severity levels. The system behavior in response to severity level of:

- Fatal
 - The BIOS logs an error to the POST Error Manager.
 - The BIOS logs an error message to the BMC System Event Log (SEL).
 - The BIOS unconditionally enters POST Error Manager to display error message.
 - The BIOS halts the system to prevent boot.
 - The user needs to replace the faulty part and restart the system.
- Major
 - The BIOS logs an error to the POST Error Manager.
 - The BIOS logs an error message to the BMC System Event Log (SEL).
 - The BIOS continues booting in a degraded state by default (i.e. BIOS does not automatically enter the POST Error Manager to display the error message).
 - The user can override this default behavior by configuring the BIOS Setup POST Error Pause option to Enabled. This forces the system to enter the POST Error Manager and display the error message before booting.
 - The user can choose to take immediate corrective action or continue booting.
- Minor
 - The BIOS logs an error to the POST Error Manager.
 - The BIOS continues booting with a degraded state (i.e. BIOS does not automatically enter the POST Error Manager to display the error message).
 - The user may want to replace the erroneous unit.

The POST Error Manager reports a maximum of 500 errors on any single boot cycle. Errors are automatically cleared from the Error Manager on each boot.

Table 19. POST Error Manager Messages and Handling

POST Error Code	POST Error Manager Message	Severity
0012	CMOS date / time not set	Major
004C	Keyboard / interface error	Major
0108	Keyboard component encountered a locked error.	Minor
0109	Keyboard component encountered a stuck key error.	Minor
0113	Fixed Media: The SAS RAID firmware can not run properly. The user should attempt to reflash the firmware.	Major
0140	PCI component encountered a PERR error.	Major
0141	PCI resource conflict	Major
0146	PXI out of resources error	Major
0192	Cache size mismatch	Fatal
0194	CPUID, processor family are different	Fatal
0195	Front side bus mismatch	Fatal
0196	Processor Model mismatch	Major
0197	Processor speeds mismatched	Fatal
0198	Processor family is unsupported	Major
019A	Processor voltage mismatch detected	Fatal
5220	CMOS / NVRAM configuration cleared	Major
5221	Passwords cleared by jumper	Major
5224	Password clear jumper is set	Major
8110	Processor 01 internal error (IERR) on last boot	Major

POST Error Code	POST Error Manager Message	Severity
8111	Processor 02 internal error (IERR) on last boot	Major
8112	Processor 03 internal error (IERR) on last boot	Major
8113	Processor 04 internal error (IERR) on last boot	Major
8120	Processor 01 thermal trip error on last boot	Major
8121	Processor 02 thermal trip error on last boot	Major
8122	Processor 03 thermal trip error on last boot	Major
8123	Processor 04 thermal trip error on last boot	Major
8130	Processor 01 disabled	Minor
8131	Processor 02 disabled	Minor
8132	Processor 03 disabled	Minor
8133	Processor 04 disabled	Minor
8160	Processor 01 unable to apply microcode update	Major
8161	Processor 02 unable to apply microcode update	Major
8162	Processor 03 unable to apply microcode update	Major
8163	Processor 04 unable to apply microcode update	Major
8180	Processor 01 microcode update not found	Minor
8181	Processor 02 microcode update not found	Minor
8182	Processor 03 microcode update not found	Minor
8183	Processor 04 microcode update not found	Minor
8190	Watchdog timer failed on last boot	Major
8198	Operating system boot watchdog timer expired on last boot	Major
8300	Baseboard management controller failed self-test	Major
8305	Hot-swap controller failed	Major
84F2	Baseboard management controller failed to respond	Major
84F3	Baseboard management controller in update mode	Major
84F4	Sensor data record empty	Major
84FF	System event log full	Minor
8500	Memory component could not be configured in the selected RAS mode	Major

Table 19. POST Error Manager Messages and Handling (continued)

Table 19. POST Error Manage	r Messages and Handling	(continued)
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POST Error Code	POST Error Manager Message	Severity
8520	Memory failed SelfTest (BIST). Memory Board A, DIMM_1.	Major
8521	Memory failed SelfTest (BIST). Memory Board A, DIMM_2.	Major
8522	Memory failed SelfTest (BIST). Memory Board A, DIMM_3.	Major
8523	Memory failed SelfTest (BIST). Memory Board A, DIMM_4.	Major
8524	Memory failed SelfTest (BIST). Memory Board A, DIMM_5.	Major
8525	Memory failed SelfTest (BIST). Memory Board A, DIMM_6.	Major
8526	Memory failed SelfTest (BIST). Memory Board A, DIMM_7.	Major
8527	Memory failed SelfTest (BIST). Memory Board A, DIMM_8.	Major
8528	Memory failed SelfTest (BIST). Memory Board B, DIMM_1.	Major
8529	Memory failed SelfTest (BIST). Memory Board B, DIMM_2.	Major
852A	Memory failed SelfTest (BIST). Memory Board B, DIMM_3.	Major
852B	Memory failed SelfTest (BIST). Memory Board B, DIMM_4.	Major
852C	Memory failed SelfTest (BIST). Memory Board B, DIMM_5.	Major
852D	Memory failed SelfTest (BIST). Memory Board B, DIMM_6.	Major
852E	Memory failed SelfTest (BIST). Memory Board B, DIMM_7.	Major
852F	Memory failed SelfTest (BIST). Memory Board B, DIMM_8.	Major
8530	Memory failed SelfTest (BIST). Memory Board C, DIMM_1.	Major
8531	Memory failed SelfTest (BIST). Memory Board C, DIMM_2.	Major
8532	Memory failed SelfTest (BIST). Memory Board C, DIMM_3.	Major
8533	Memory failed SelfTest (BIST). Memory Board C, DIMM_4.	Major
8534	Memory failed SelfTest (BIST). Memory Board C, DIMM_5.	Major
8535	Memory failed SelfTest (BIST). Memory Board C, DIMM_6.	Major
8536	Memory failed SelfTest (BIST). Memory Board C, DIMM_7.	Major
8537	Memory failed SelfTest (BIST). Memory Board C, DIMM_8.	Major
8538	Memory failed SelfTest (BIST). Memory Board D, DIMM_1.	Major
8539	Memory failed SelfTest (BIST). Memory Board D, DIMM_2.	Major
853A	Memory failed SelfTest (BIST). Memory Board D, DIMM_3.	Major
853B	Memory failed SelfTest (BIST). Memory Board D, DIMM_4.	Major
853C	Memory failed SelfTest (BIST). Memory Board D, DIMM_5.	Major
853D	Memory failed SelfTest (BIST). Memory Board D, DIMM_6.	Major
853E	Memory failed SelfTest (BIST). Memory Board D, DIMM_7.	Major
853F	Memory failed SelfTest (BIST). Memory Board D, DIMM_8.	Major
8540	Memory Board A, DIMM_1 Disabled	Major
8541	Memory Board A, DIMM_2 Disabled	Major
8542	Memory Board A, DIMM_3 Disabled	Major
8543	Memory Board A, DIMM_4 Disabled	Major
8544	Memory Board A, DIMM_5 Disabled	Major
8545	Memory Board A, DIMM_6 Disabled	Major
8546	Memory Board A, DIMM_7 Disabled	Major
8547	Memory Board A, DIMM_8 Disabled	Major
8548	Memory Board B, DIMM_1 Disabled	Major
8549	Memory Board B, DIMM_2 Disabled	Major
854A	Memory Board B, DIMM_3 Disabled	Major
854B	Memory Board B, DIMM_4 Disabled	Major

POST Error Code	POST Error Manager Message	Severity
854C	Memory Board B, DIMM_5 Disabled	Major
854D	Memory Board B, DIMM_6 Disabled	Major
854E	Memory Board B, DIMM_7 Disabled	Major
854F	Memory Board B, DIMM_8 Disabled	Major
8550	Memory Board C, DIMM_1 Disabled	Major
8551	Memory Board C, DIMM_2 Disabled	Major
8552	Memory Board C, DIMM_3 Disabled	Major
8553	Memory Board C, DIMM_4 Disabled	Major
8554	Memory Board C, DIMM_5 Disabled	Major
8555	Memory Board C, DIMM_6 Disabled	Major
8556	Memory Board C, DIMM_7 Disabled	Major
8557	Memory Board C, DIMM_8 Disabled	Major
8558	Memory Board D, DIMM_1 Disabled	Major
8559	Memory Board D, DIMM_2 Disabled	Major
855A	Memory Board D, DIMM_3 Disabled	Major
855B	Memory Board D, DIMM_4 Disabled	Major
855C	Memory Board D, DIMM_5 Disabled	Major
855D	Memory Board D, DIMM_6 Disabled	Major
855E	Memory Board D, DIMM_7 Disabled	Major
855F	Memory Board D, DIMM_8 Disabled	Major
8560	Memory Board A, DIMM_1 Component encountered a Serial Presence Detection (SPD) fail error	Major
8561	Memory Board A, DIMM_2 Component encountered a Serial Presence Detection (SPD) fail error	Major
8562	Memory Board A, DIMM_3 Component encountered a Serial Presence Detection (SPD) fail error	Major
8563	Memory Board A, DIMM_4 Component encountered a Serial Presence Detection (SPD) fail error	Major
8564	Memory Board A, DIMM_5 Component encountered a Serial Presence Detection (SPD) fail error	Major
8565	Memory Board A, DIMM_6 Component encountered a Serial Presence Detection (SPD) fail error	Major

Table 19. POST Error Manager Messages and Handling (continued)

Table 19. POST Error Manager Messages and Handling (continued)

POST Error Code	POST Error Manager Message	Severity			
8566	Memory Board A, DIMM_7 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8567	Memory Board A, DIMM_8 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8568	Memory Board B, DIMM_1 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8569	Memory Board B, DIMM_2 Component encountered a Serial Presence Detection (SPD) fail error	Major			
856A	Memory Board B, DIMM_3 Component encountered a Serial Presence Detection (SPD) fail error	Major			
856B	Memory Board B, DIMM_4 Component encountered a Serial Presence Detection (SPD) fail error	Major			
856C	Memory Board B, DIMM_5 Component encountered a Serial Presence Detection (SPD) fail error	Major			
856D	Memory Board B, DIMM_6 Component encountered a Serial Presence Detection (SPD) fail error	Major			
856E	Memory Board B, DIMM_7 Component encountered a Serial Presence Detection (SPD) fail error	Major			
856F	Memory Board B, DIMM_8 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8570	Memory Board C, DIMM_1 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8571	Memory Board C, DIMM_2 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8572	Memory Board C, DIMM_3 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8573	Memory Board C, DIMM_4 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8574	Memory Board C, DIMM_5 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8575	Memory Board C, DIMM_6 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8576	Memory Board C, DIMM_7 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8577	Memory Board C, DIMM_8 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8578	Memory Board D, DIMM_1 Component encountered a Serial Presence Detection (SPD) fail error	Major			
8579	Memory Board D, DIMM_2 Component encountered a Serial Presence Detection (SPD) fail error	Major			
Table	19. POST	Error Manage	r Messages and	Handling	(continued)
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POST Error Code	POST Error Manager Message	Severity
857A	Memory Board D, DIMM_3 Component encountered a Serial Presence Detection (SPD) fail error	Major
857B	Memory Board D, DIMM_4 Component encountered a Serial Presence Detection (SPD) fail error	Major
857C	Memory Board D, DIMM_5 Component encountered a Serial Presence Detection (SPD) fail error	Major
857D	Memory Board D, DIMM_6 Component encountered a Serial Presence Detection (SPD) fail error	Major
857E	Memory Board D, DIMM_7 Component encountered a Serial Presence Detection (SPD) fail error	Major
857F	Memory Board D, DIMM_8 Component encountered a Serial Presence Detection (SPD) fail error	Major
8580	Memory Board A, DIMM_1 Correctable ECC error encountered	Minor, Major after 10
8581	Memory Board A, DIMM_2 Correctable ECC error encountered	Minor, Major after 10
8582	Memory Board A, DIMM_3 Correctable ECC error encountered	Minor, Major after 10
8583	Memory Board A, DIMM_4 Correctable ECC error encountered	Minor, Major after 10
8584	Memory Board A, DIMM_5 Correctable ECC error encountered	Minor, Major after 10
8585	Memory Board A, DIMM_6 Correctable ECC error encountered	Minor, Major after 10
8586	Memory Board A, DIMM_7 Correctable ECC error encountered	Minor, Major after 10
8587	Memory Board A, DIMM_8 Correctable ECC error encountered	Minor, Major after 10
8588	Memory Board B, DIMM_1 Correctable ECC error encountered	Minor, Major after 10
8589	Memory Board B, DIMM_2 Correctable ECC error encountered	Minor, Major after 10
858A	Memory Board B, DIMM_3 Correctable ECC error encountered	Minor, Major after 10
858B	Memory Board B, DIMM_4 Correctable ECC error encountered	Minor, Major after 10
858C	Memory Board B, DIMM_5 Correctable ECC error encountered	Minor, Major after 10
858D	Memory Board B, DIMM_6 Correctable ECC error encountered	Minor, Major after 10

Table 19. POST Error	Manager Message	es and Handling	(continued)
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POST Error Code	POST Error Manager Message	Severity
858E	Memory Board B, DIMM_7 Correctable ECC error encountered	Minor, Major after 10
858F	Memory Board B, DIMM_8 Correctable ECC error encountered	Minor, Major after 10
8590	Memory Board C, DIMM_1 Correctable ECC error encountered	Minor, Major after 10
8591	Memory Board C, DIMM_2 Correctable ECC error encountered	Minor, Major after 10
8592	Memory Board C, DIMM_3 Correctable ECC error encountered	Minor, Major after 10
8593	Memory Board C, DIMM_4 Correctable ECC error encountered	Minor, Major after 10
8594	Memory Board C, DIMM_5 Correctable ECC error encountered	Minor, Major after 10
8595	Memory Board C, DIMM_6 Correctable ECC error encountered	Minor, Major after 10
8596	Memory Board C, DIMM_7 Correctable ECC error encountered	Minor, Major after 10
8597	Memory Board C, DIMM_8 Correctable ECC error encountered	Minor, Major after 10
8598	Memory Board D, DIMM_1 Correctable ECC error encountered	Minor, Major after 10
8599	Memory Board D, DIMM_2 Correctable ECC error encountered	Minor, Major after 10
859A	Memory Board D, DIMM_3 Correctable ECC error encountered	Minor, Major after 10
859B	Memory Board D, DIMM_4 Correctable ECC error encountered	Minor, Major after 10
859C	Memory Board D, DIMM_5 Correctable ECC error encountered	Minor, Major after 10
859D	Memory Board D, DIMM_6 Correctable ECC error encountered	Minor, Major after 10
859E	Memory Board D, DIMM_7 Correctable ECC error encountered	Minor, Major after 10
859F	Memory Board D, DIMM_8 Correctable ECC error encountered	Minor, Major after 10
85A0	Memory Board A, DIMM_1 Uncorrectable ECC error encountered	Major
85A1	Memory Board A, DIMM_2 Uncorrectable ECC error encountered	Major

POST Error Code	POST Error Manager Message	Severity
85A2	Memory Board A, DIMM_3 Uncorrectable ECC error encountered	Major
85A3	Memory Board A, DIMM_4 Uncorrectable ECC error encountered	Major
85A4	Memory Board A, DIMM_5 Uncorrectable ECC error encountered	Major
85A5	Memory Board A, DIMM_6 Uncorrectable ECC error encountered	Major
85A6	Memory Board A, DIMM_7 Uncorrectable ECC error encountered	Major
85A7	Memory Board A, DIMM_8 Uncorrectable ECC error encountered	Major
85A8	Memory Board B, DIMM_1 Uncorrectable ECC error encountered	Major
85A9	Memory Board B, DIMM_2 Uncorrectable ECC error encountered	Major
85AA	Memory Board B, DIMM_3 Uncorrectable ECC error encountered	Major
85AB	Memory Board B, DIMM_4 Uncorrectable ECC error encountered	Major
85AC	Memory Board B, DIMM_5 Uncorrectable ECC error encountered	Major
85AD	Memory Board B, DIMM_6 Uncorrectable ECC error encountered	Major
85AE	Memory Board B, DIMM_7 Uncorrectable ECC error encountered	Major
85AF	Memory Board B, DIMM_8 Uncorrectable ECC error encountered	Major
85B0	Memory Board C, DIMM_1 Uncorrectable ECC error encountered	Major
85B1	Memory Board C, DIMM_2 Uncorrectable ECC error encountered	Major
85B2	Memory Board C, DIMM_3 Uncorrectable ECC error encountered	Major
85B3	Memory Board C, DIMM_4 Uncorrectable ECC error encountered	Major
85B4	Memory Board C, DIMM_5 Uncorrectable ECC error encountered	Major
85B5	Memory Board C, DIMM_6 Uncorrectable ECC error encountered	Major
85B6	Memory Board C, DIMM_7 Uncorrectable ECC error encountered	Major
85B7	Memory Board C, DIMM_8 Uncorrectable ECC error encountered	Major
85B8	Memory Board D, DIMM_1 Uncorrectable ECC error encountered	Major
85B9	Memory Board D, DIMM_2 Uncorrectable ECC error encountered	Major
85BA	Memory Board D, DIMM_3 Uncorrectable ECC error encountered	Major
85BB	Memory Board D, DIMM_4 Uncorrectable ECC error encountered	Major
85BC	Memory Board D, DIMM_5 Uncorrectable ECC error encountered	Major
85BD	Memory Board D, DIMM_6 Uncorrectable ECC error encountered	Major
85BE	Memory Board D, DIMM_7 Uncorrectable ECC error encountered	Major
85BF	Memory Board D, DIMM_8 Uncorrectable ECC error encountered	Major

Table 19. POST Error Manager Messages and Handling (continued)

Table 19. POST Error Manager Messages and Handling (continued)

POST Error Code	POST Error Manager Message	Severity
85FC	Closed LoopThermalThrottling could not be configured, defaulting to Open Loop	Major
85FD	Memory was not configured for the selected Memory RAS Configuration	Minor
8601	System booting from the other bank. Recovery jumper is set to recovery mode	Minor
8602	WatchDog timer expired (secondary BIOS may be bad!)	Minor
8603	Secondary BIOS checksum fail	Minor
9000	Unspecified processor component has encountered a non specific error	Major
9223	Keyboard component was not detected	Minor
9226	Keyboard component encountered a controller error	Minor
9243	Mouse component was not detected	Minor
9246	Mouse component encountered a controller error	Minor
9266	Local Console component encountered a controller error	Minor
9268	Local Console component encountered an output error	Minor
9269	Local Console component encountered a resource conflict error	Minor
9286	Remote Console component encountered a controller error	Minor
9287	Remote Console component encountered an input error	Minor
9288	Remote Console component encountered an output error	Minor
92A3	Serial port component was not detected	Major
92A9	Serial port component encountered a resource conflict error	Major
92C6	Serial port controller error	Minor
92C7	Serial port component encountered an input error	Minor
92C8	Serial port component encountered an output error	Minor
94C6	LPC component encountered a controller error	Minor
94C9	LPC component encountered a resource conflict error	Minor
9506	ATA/ATPI component encountered a controller error	Minor
95A6	PCI component encountered a controller error	Minor
95A7	PCI component encountered a read error	Minor
95A8	PCI component encountered a write error	Minor

Table 19. POST	Error Manager	Messages and	Handling	(continued)
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POST Error Code	POST Error Manager Message	Severity
9609	Unspecified software component encountered a start error	Minor
9641	PEI Core component encountered a load error	Minor
9667	PEI module component encountered a illegal software state error	Fatal
9687	DXE core component encountered a illegal software state error	Fatal
96A7	DXE boot services driver component encountered a illegal soft- ware state error	Fatal
96AB	DXE boot services driver component encountered invalid configuration	Minor
96E7	SMM driver component encountered a illegal software state error	Fatal
A000	TPM device not detected	Minor
A001	TPM device missing or not responding	Minor
A002	TPM device failure	Minor
A003	TPM device failed self test	Minor
A022	Processor component encountered a mismatch error	Major
A027	Processor component encountered a low voltage error	Minor
A028	Processor component encountered a high voltage error	Minor
A421	PCI component encountered a SERR error	Fatal
A500	ATA/ATPI ATA bus SMART not supported	Minor
A501	ATA/ATPI ATA SMART is disabled	Minor
A5A0	PCI Express component encountered a PERR error	Minor
A5A1	PCI Express component encountered a SERR error	Fatal
A5A4	PCI Express IBIST error	Major
A6A0	DXE boot services driver: Not enough memory available to shadow a legacy option ROM	Minor

POST Error Beep Codes

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

Table 20. Beep Codes

Beeps	Error Message	Description
3	Memory error	System halted because a fatal error related to the memory was detected.
6	BIOS rolling back error	The system has detected a corrupted BIOS in the flash part, and is rolling back to the last good BIOS.
1-5-2-1		CPU: Empty slot / population error.
1-5-4-2		Power fault: DC power unexpectedly lost (power good dropout)
1-5-4-4		Power control fault (Power good assertion timeout)