IBM System x3500 M4 Type 7383

IBM

Problem Determination and Service Guide

IBM System x3500 M4 Type 7383

Problem Determination and Service Guide

Note: Before using this information and the product it supports, read the information in Appendix B, "Notices," on page 345, the *IBM Safety Information* and *Environmental Notices and User Guide* documents on the IBM *Documentation* CD, and the *Warranty Information* document.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

ᠲᠤᠰ ᠵᠢᠭᠠᠪᠤᠷᠢ ᠶᠢ ᠬᠡᠷᠡᠭᠯᠡᠬᠦ ᠡᠴᠡ ᠡᠮᠦᠨᠡ᠂ ᠡᠷᠬᠡᠪᠰᠢ ᠡᠨᠡ ᠵᠢᠭᠠᠪᠤᠷᠢ ᠳᠠᠬᠢ ᠲᠤᠰᠬᠠᠢ ᠠᠶᠤᠯᠭᠦᠢ ᠶᠢᠨ ᠮᠡᠳᠡᠭᠳᠡᠯ ᠢ ᠤᠩᠰᠢᠭᠲᠤᠨ

ཐོན་ཟོག་འདི་བེད་སྤྱོད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྐྱེར་བླུ་དགོས།

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

Guidelines for trained technicians

This section contains information for trained technicians.

Inspecting for unsafe conditions

Use the information in this section to help you identify potential unsafe conditions in an IBM product that you are working on. Each IBM product, as it was designed and manufactured, has required safety items to protect users and service technicians from injury. The information in this section addresses only those items. Use good judgment to identify potential unsafe conditions that might be caused by non-IBM alterations or attachment of non-IBM features or options that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

Consider the following conditions and the safety hazards that they present:

- Electrical hazards, especially primary power. Primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or a bulging capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following steps:

1. Make sure that the power is off and the power cord is disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cord:
    - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
    - Make sure that the power cord is the correct type, as specified in "Power cords" on page 174.
    - Make sure that the insulation is not frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, power surges, and missing safety grounds.
- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical currents.
- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.
- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.
- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.
- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected.
- If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
  - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
  - When you are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
  - When you use a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.
- Use extreme care when you measure high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Safety statements

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Attention: Use No. 26 AWG or larger UL-listed or CSA certified telecommunication line cord.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

≥ 18 kg (39.7 lb) ≥ 32 kg (70.5 lb) ≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
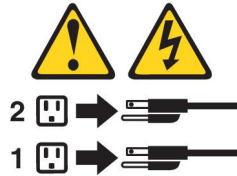
Statement 6:

CAUTION:
Do not place any objects on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf.

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

> **Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.**

Statement 15:

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

Statement 26:

CAUTION:
Do not place any object on top of rack-mounted devices.

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

Statement 35:

CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metall, burns, or both.

>240VA

Attention: This server is suitable for use on an IT power distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

Chapter 1. Start here

You can solve many problems without outside assistance by following the troubleshooting procedures in this *Problem Determination and Service Guide* and on the IBM website. This document describes the diagnostic tests that you can perform, troubleshooting procedures, and explanations of error messages and error codes. The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a problem

Before you contact IBM or an approved warranty service provider, follow these procedures in the order in which they are presented to diagnose a problem with your server:

1. **Return the server to the condition it was in before the problem occurred.**

   If any hardware, software, or firmware was changed before the problem occurred, if possible, reverse those changes. This might include any of the following items:
   - Hardware components
   - Device drivers and firmware
   - System software
   - UEFI firmware
   - System input power or network connections

2. **View the light path diagnostics LEDs and event logs.**

   The server is designed for ease of diagnosis of hardware and software problems.
   - **Light path diagnostics LEDs:** See "Light path diagnostics" on page 114 for information about using light path diagnostics LEDs.
   - **Event logs:** See "Event logs" on page 23 for information about notification events and diagnosis.
   - **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's website for documentation.

3. **Run IBM Dynamic System Analysis (DSA) and collect system data.**

   Run Dynamic System Analysis (DSA) to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact IBM or an approved warranty service provider. For instructions for running DSA, see the *Dynamic System Analysis Installation and User's Guide*.

   To download the latest version of DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=SERV-DSA.

4. **Check for and apply code updates.**

   Fixes or workarounds for many problems might be available in updated UEFI firmware, device firmware, or device drivers. To display a list of available updates for the server, go to http://www.ibm.com/support/fixcentral/.

   Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

   a. **Install Update***Xpress* **system updates.**

You can install code updates that are packaged as an UpdateXpress System Pack or UpdateXpress CD image. An UpdateXpress System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server. In addition, you can use IBM ToolsCenter Bootable Media Creator to create bootable media that is suitable for applying firmware updates and running preboot diagnostics. For more information about UpdateXpress System Packs, see http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008 &lndocid=SERV-XPRESS and "Updating the firmware" on page 317. For more information about the Bootable Media Creator, see http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008 &lndocid=TOOL-BOMC.

Be sure to separately install any listed critical updates that have release dates that are later than the release date of the Update*Xpress* System Pack or Update*Xpress* image (see step 4b).

b. **Install manual system updates.**

1) **Determine the existing code levels.**

In DSA, click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

2) **Download and install updates of code that is not at the latest level.**
To display a list of available updates for the blade server, go to http://www.ibm.com/support/fixcentral/.

When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

5. **Check for and correct an incorrect configuration.**

If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.

a. **Make sure that all installed hardware and software are supported.**

See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact IBM or an approved warranty service provider for support.

b. **Make sure that the server, operating system, and software are installed and configured correctly.**

Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on. For information about performing the checkout procedure, see "Checkout procedure" on page 97. For information about configuring the server, see "Configuring the server" on page 318.

6. **See controller and management software documentation.**

If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured.

Problem determination information is available for many devices such as RAID and network adapters.

For problems with operating systems or IBM software or devices, go to http://www.ibm.com/supportportal/.

7. **Check for troubleshooting procedures and RETAIN tips.**

Troubleshooting procedures and RETAIN tips document known problems and suggested solutions. To search for troubleshooting procedures and RETAIN tips, go to http://www.ibm.com/supportportal/.

8. **Use the troubleshooting tables.**

See "Troubleshooting tables" on page 99 to find a solution to a problem that has identifiable symptoms.

A single problem might cause multiple symptoms. Follow the troubleshooting procedure for the most obvious symptom. If that procedure does not diagnose the problem, use the procedure for another symptom, if possible.

If the problem remains, contact IBM or an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. To open an online service request, go to the http://www.ibm.com/support/entry/portal/Open_service_request/ call for service. Be prepared to provide information about any error codes and collected data.

Undocumented problems

If you have completed the diagnostic procedure and the problem remains, the problem might not have been previously identified by IBM. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no light path diagnostics LEDs or log entries indicate a hardware component failure, contact IBM or an approved warranty service provider for assistance. To open an online service request, go to http://www.ibm.com/support/entry/portal/Open_service_request/. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Chapter 2. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM® System x3500 M4 Type 7383 server. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components.

The most recent version of this document is available at http://www.ibm.com/supportportal/.

For information about the terms of the warranty, see the *Warranty Information* document that comes with the server. For information about getting service and assistance, see Appendix A, "Getting help and technical assistance," on page 341.

Related documentation

In addition to this document, the following documentation also comes with the server:

- *Environmental Notices and User Guide*

  This document is in PDF format on the IBM *System x Documentation* CD. It contains translated environmental notices.

- *IBM License Agreement for Machine Code*

  This document is in PDF. It contains translated versions of the IBM License Agreement for Machine code for your server.

- *IBM Warranty Information*

  This printed document contains the warranty terms and a pointer to the IBM Statement of Limited Warranty on the IBM website.

- *Installation and User's Guide*

  This document is in Portable Document Format (PDF) on the IBM *System x Documentation* CD. It provides general information about setting up and cabling the server, including information about features, and how to configure the server. It also contains detailed instructions for installing, removing, and connecting some optional devices that the server supports.

- *Licenses and Attributions Documents*

  This document is in PDF. It contains information about the open-source notices.

- *Safety Information*

  This document is in PDF on the IBM *System x Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.

The System x and xSeries Tools Center is an online information center that contains information about tools for updating, managing, and deploying firmware, device drivers, and operating systems. The System x and xSeries Tools Center is at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp

Depending on the server model, additional documentation might be included on the IBM *Documentation* CD.

The server might have features that are not described in the documentation that comes with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide

additional information that is not included in the server documentation. These updates are available from the IBM website. To check for updated documentation and technical updates, complete the following steps.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **System x3500 M4** and click Continue.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *System x Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might` occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 1. Features and specifications

Microprocessor:
• Support up to two Intel Xeon E5-2600 series multi-core microprocessors with integrated memory controller and Quick Path Interconnect (QPI) architecture
• Up to 2.5M Level-3 cache/core
• Two QuickPath Interconnect (QPI) links speed up to 8.0 GT per second
 	
Note:
• Use the Setup utility to determine the type and speed of the microprocessors.
• For a list of supported microprocessors, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
 	
Memory:
• Slot: 12 DIMM connectors (24 DIMM connectors when the microprocessor 2 expansion board is installed)
• Minimum: 2 GB
• Maximum: 768 GB
  – 32 GB using unbuffered DIMMs (UDIMMs)
  – 384 GB using registered DIMMs (RDIMMs)
  – 768 GB using load reduction DIMMs (LRDIMMs)
• Type:
  – PC3-8500 (DDR3-1066), PC3-10600 (DDR3-1333), or PC3-12800 (DDR3-1600)
  – Single-rank, dual-rank, or quad-rank
  – Registered DIMM (RDIMM), unbuffered DIMM (UDIMM), or load reduced DIMM (LRDIMM)
• Supports (depending on the model):
  – 2 GB unbuffered DIMM (UDIMM)
  – 2 GB, 4 GB, 8 GB, and 16 GB registered DIMMs (RDIMMs)
  – 32 GB load reduction DIMM (LRDIMM)
 	
Drives:
• SATA:
  – DVD-ROM
  – Multi-burner
 	
Note: Maximum of two devices can be installed
• Diskette: External USB hard disk drive
• Supported hard disk drives:
  – Serial Attached SCSI (SAS)
  – Serial ATA (SATA)
	Expansion bays (depending on the model):
	• Up to thirty-two 2.5-inch HDD bays
	• Up to eight 3.5-inch HDD bays
	• Up to two half-high 5.25-inch bays
	Note: Full-high devices such as an optional tape drive will occupy two half-high 5.25-inch bays.
	
	PCI and PCI-X expansion slots:
	• Six PCI expansion slots on the system board:
	  – Slot 1: PCI Express 2.0 x8 (support optional PCI-X interposer card)
	  – Slot 2: PCI Express 3.0 x8
	  – Slot 3: PCI Express 3.0 x8
	  – Slot 4: PCI Express 3.0 x8
	  – Slot 5: PCI Express 3.0 x16 (support 225W GPU)
	  – Slot 6: PCI Express 3.0 x8
	• Two PCI expansion slots on the microprocessor 2 expansion board:
	  – Slot 7: PCI Express 3.0 x16 (support 225W GPU)
	  – Slot 8: PCI Express 3.0 x16
	• PCI-X interposer card (optional):
	  – One PCI-X 64-bit/133 MHz
	
	Video controller (integrated into IMM2):
	• Matrox G200eR2
	Note: The maximum video resolution is 1600 x 1200 at 75 Hz.
	  – SVGA compatible video controller
	  – DDR3 528 MHz SDRAM video memory controller
	  – Avocent Digital Video Compression
	  – 16 MB of video memory (not expandable)
	
	Power supply:
	• Up to two hot-swap power supplies for redundancy support.
	  – 550-watt ac
	    1. Support up to 95-watt processor.
	    2. Support up to eight HDDs.
	    3. GPU not supported.
	    4. Support up to sixteen 1R/2R RDIMMs or UDIMMs. 4R RDIMMs and LRDIMMs are not supported.
		• Up to two hot-swap power supplies for redundancy support.
		  – 750-watt ac
		    1. Support up to sixteen HDDs.
		    2. GPU not supported.
		    3. Support up to sixteen LRDIMMs, UDIMMs, or twenty-four RDIMMs.
		  – 900-watt ac
		    1. No GPU installed:
		      a. Hard disk drive:
		        - Support up to thirty-two HDDs, or,
		        - Support up to sixteen HDDs if more than sixteen LRDIMMs are installed.
		      b. Memory:
		        - Support up to sixteen UDIMMs, or,
		        - Support up to twenty-four RDIMMs/LRDIMMs, or,
		        - Support up to sixteen LRDIMMs if more than sixteen HDDs are installed.
		    2. One GPU installed:
		      a. Hard disk drive:
		        - Support up to eight HDDs.
		      b. Memory:
		        - Support up to sixteen LRDIMMs/UDIMMs, or,
		        - Support up to twenty-four RDIMMs.
		Two 900-watt ac are required and used in non-redundant mode in the following scenarios:
		1. Two GPUs are installed.
		2. One GPU is installed and more than eight HDDs are installed.
		3. One GPU is installed and more than sixteen LRDIMMs are installed.
		4. More than sixteen HDDs are installed and more than sixteen LRDIMMs are installed.
		
		Note: Power supplies in the server must be with the same power rating or wattage.

Table 1. Features and specifications (continued)

Simple-swap fans:	**RAID controllers (depending on the model):**	**Heat output:**

• Two (one microprocessor installed)
• Three (two microprocessors installed)
• Three additional fans (for optional redundant cooling)
 	
Size:
• Tower
  – Height: 440 mm (17.3 in.)
  – Depth: 750 mm (29.5 in.)
  – Width: 218 mm (8.6 in.)
  – Weight: approximately 39.8 kg (87.7 lb) when fully configured or 25.0 kg (55.1 lb) minimum
• Rack
  – 5 U
  – Height: 218 mm (8.6 in.)
  – Depth: 702 mm (27.6 in.)
  – Width: 424 mm (16.7 in.)
  – Weight: approximately 39.3 kg (86.6 lb) when fully configured or 24.5 kg (54.0 lb) minimum
 	
Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or "U." A 1-U-high device is 4.45 cm (1.75 inches) tall.
 	
Integrated functions:
• Integrated Management Module II (IMM2), which consolidates multiple management functions in a single chip.
• Intel I350AM4 Quad Port Gigabit Ethernet controller with Wake on LAN support
• Serial over LAN (SOL) and serial redirection over Telnet or Secure Shell (SSH)
• One systems-management 1 Gb Ethernet port for connection to a dedicated systems-management network. This system management connector is dedicated to the IMM2 functions.
• Light path diagnostics
• Six Universal Serial Bus (USB) ports
  – Two on front of server
  – Four on rear of server
• One internal USB port for optional USB flash device with embedded hypervisor
• One internal USB tape connector
• One serial connector
	• A ServeRAID M1115 SAS/SATA adapter that provides RAID 0, 1, and 10 with optional FoD RAID 5/50 and SED (Self Encrypting Drive) upgrade.
	• A ServeRAID M5110 SAS/SATA adapter that provides RAID 0, 1, and 10.
	  Optional upgrade:
	  – RAID 5/50 (512 MB Cache) with optional FoD RAID 6/60 and SED upgrade
	  – RAID 5/50 (512 MB Flash) with optional FoD RAID 6/60 and SED upgrade
	  – RAID 5/50 (1 GB Flash) with optional FoD RAID 6/60 and SED upgrade
	  – RAID 5/50 and SED (Zero Cache)
	
	Acoustical noise emissions:
	• Sound power, idling: 6.0 bels
	• Sound power, operating: 6.0 bels
	
	Environment:
	• Air temperature:
	  – Server on: 10°C to 35°C (50.0°F to 95.0°F); altitude: 0 to 915 m (3000 ft)
	  – Server on: 10°C to 32°C (50.0°F to 90.0°F); altitude: 915 m (3000 ft) to 2134 m (7000 ft)
	  – Server on: 10°C to 28°C (50.0°F to 83.0°F); altitude: 2134 m (7000 ft) to 3050 m (10000 ft)
	  – Server off (with standby power): 5°C to 45°C (41°F to 113°F)
	  – Shipment: -40°C to 60°C (-40°F to 140°F)
	• Humidity:
	  – Server on: 20% to 80%; maximum dew point 21°C; maximum rate of change: 5°C/hour
	  – Server off (with standby power): 8% to 80%; maximum dew point: 27°C
	• Particulate contamination:
	
	Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 347.
		Approximate heat output:
		• Minimum configuration: 2013 Btu per hour (590 watts)
		• Maximum configuration: 3610 Btu per hour (1058 watts)
		
		Electrical input:
		• Sine-wave input (50-60 Hz) required
		• Input voltage low range:
		  – Minimum: 100 V AC
		  – Maximum: 127 V AC
		• Input voltage high range:
		  – Minimum: 200 V AC
		  – Maximum: 240 V AC
		• Input kilovolt-amperes (kVA), approximately:
		  – Minimum: 0.60 kVA
		  – Maximum: 1.10 kVA
		
		Notes:
		1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
		2. The noise emission level stated is the declared (upper limit) sound power level, in bels, for a random sample of machines. All measurements are made in accordance with ISO 7779 and reported in conformance with ISO 9296.

Server controls, LEDs, and connectors

This section describes the controls, light-emitting diodes (LEDs), and connectors on the front and rear of the server.

Front view

The following illustration shows the controls and LEDs on the front of the server.
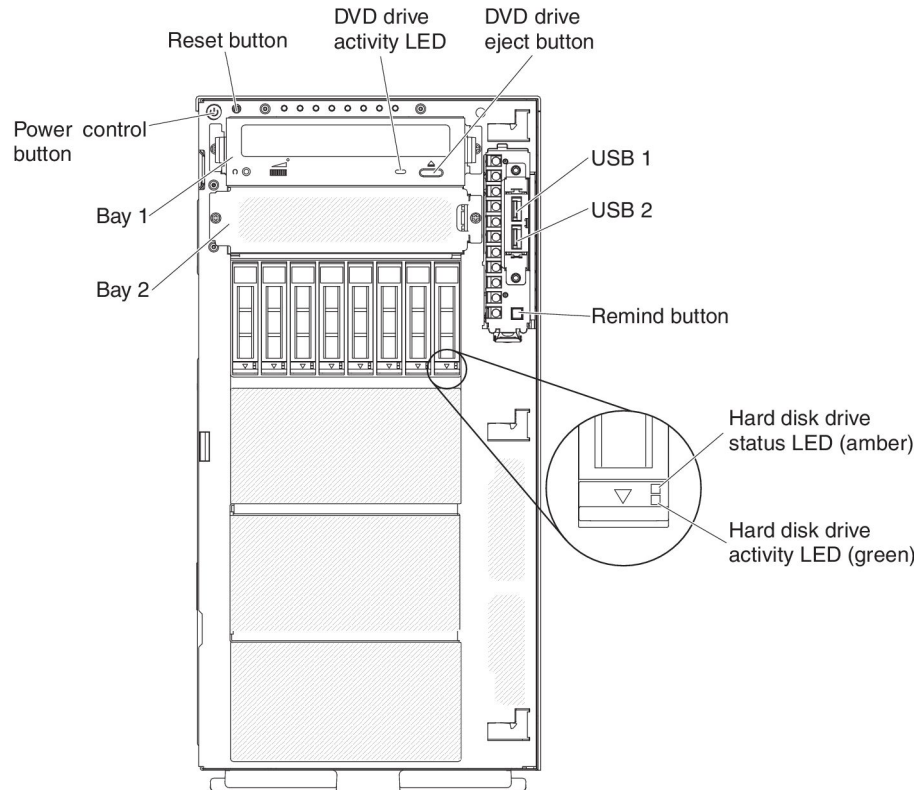
Note: The front bezel is not shown so that the drive bays are visible.

- **Power-control button:** Press this button to turn the server on and off manually.

- **Hard disk drive activity LEDs:** This LED is used on hot-swap SAS or SATA hard disk drives. Each hot-swap hard disk drive has an activity LED, and when this LED is flashing, it indicates that the drive is in use.

- **Hard disk drive status LEDs:** This LED is used on hot-swap SAS or SATA hard disk drives. When this LED is lit, it indicates that the drive has failed. If an optional IBM ServeRAID controller is installed in the server, when this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

- **DVD drive activity LED:** When this LED is lit, it indicates that the DVD drive is in use.

- **DVD eject button:** Press this button to release a DVD or CD from the DVD drive.

- **Light path diagnostics panel:** Light path diagnostics is a system of LEDs on various external and internal components of the server. When an error occurs, LEDs are lit throughout the server. By viewing the LEDs in a particular order, you can often identify the source of the error. See "Light path diagnostics panel" on page 11for more information about the light path diagnostics.

- **Operator information panel:** This panel contains controls and LEDs that provide information about the status of the server. For information about the controls and LEDs on the operator information panel, see "Operator information panel."
- **Remind button:** This button places the system-error LED/check log LED on the operator information panel into Remind mode. In Remind mode, the system-error LED flashes once every 2 seconds until the problem is corrected, the server is restarted, or a new problem occurs.

  By placing the system-error LED indicator in Remind mode, you acknowledge that you are aware of the last failure but will not take immediate action to correct the problem. The remind function is controlled by the IMM2.
- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The Reset button is in the lower-right corner of the light path diagnostics panel.
- **USB connectors:** Connect a USB device, such as a USB mouse or keyboard to any of these connectors.

Operator information panel

The following illustration shows the controls and LEDs on the operator information panel.
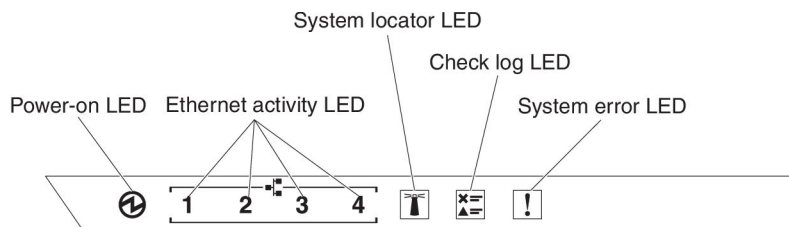
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. The states of the power-on LED are as follows:

  Off: Power is not present or the power supply, or the LED itself has failed.

  Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 5 to 10 seconds.

  Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

  Lit: The server is turned on.
- **Ethernet activity LEDs:** When any of these LEDs is flashing, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port that corresponds to that LED.
- **System-locator LED:** Use this blue LED to visually locate the server among other servers. You can use IBM Systems Director to light this LED remotely. This LED is controlled by the IMM2. When you light the system-locator LED, the LED will blink and it will continue to blink until you turn it off.
- **Check log LED:** When this yellow LED is lit, it indicates that a system error has occurred. Check the error log for additional information. See "Event logs" on page 23 for information about the error logs.
- **System-error LED:** When this yellow LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is lit to help isolate the error. This LED is controlled by the IMM2.

Light path diagnostics panel

The following illustration shows the front LEDs on the light path diagnostics panel. The light path diagnostic panel can be seen from the front bezel.

Note: The light path diagnostics LEDs remain lit only while the server is connected to power.

For more information about the LEDs on the light path diagnostics panel, see "Light path diagnostics" on page 114.

The following illustration shows the LEDs on the light path diagnostics panel.
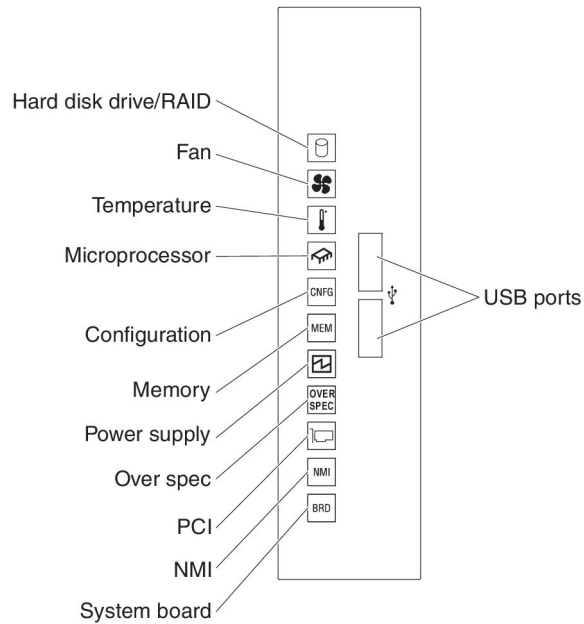
Rear view

The following illustration shows the connectors on the rear of the server.
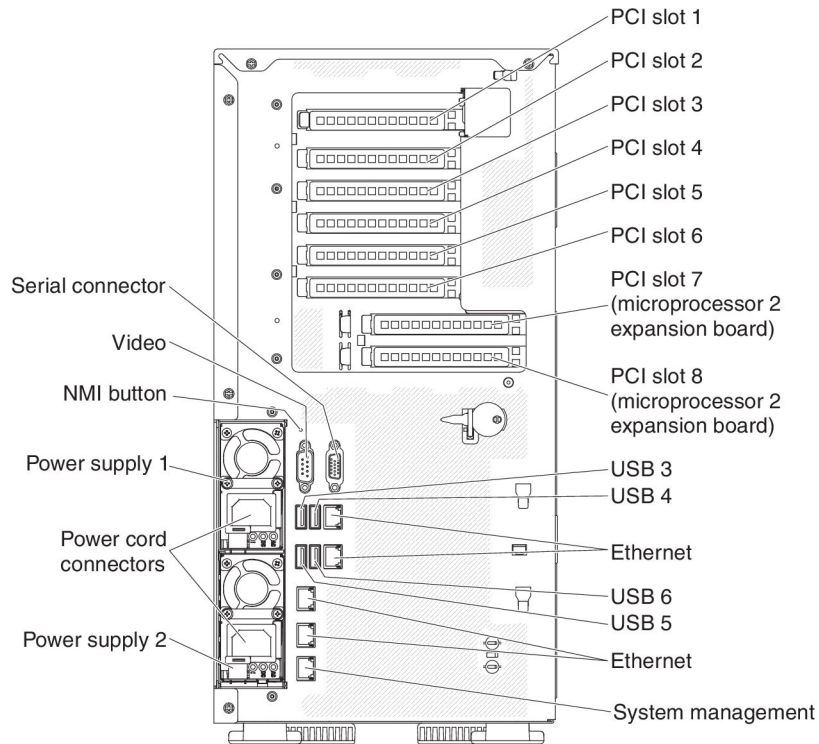
- **NMI button:** Press this button to force a nonmaskable interrupt to the microprocessor. It allows you to blue screen the server and take a memory dump (use this button only when directed by the IBM service support). You might have to use a pen or the end of a straightened paper clip to press the button.
- **PCI slot 1:** Insert a half-length, full-height PCI Express adapter or a PCI-X interposer card into this slot.
- **PCI slot 2:** Insert a half-length, full-height PCI Express adapter into this slot.
- **PCI slot 3:** Insert a full-length, full-height PCI Express adapter into this slot.
- **PCI slot 4:** Insert a full-length, full-height PCI Express adapter into this slot.
- **PCI slot 5:** Insert a full-length, full-height PCI Express adapter into this slot (support 225W GPU).
- **PCI slot 6:** Insert a full-length, full-height PCI Express adapter into this slot.
- **PCI slot 7:** Insert a full-length, full-height PCI Express adapter into this slot (support 225W GPU).
- **PCI slot 8:** Insert a full-length, full-height PCI Express adapter into this slot.
- **Power connector:** Connect the power cord to this connector.

  Note: Power supply 1 is the default/primary power supply. If power supply 1 fails, you must replace it immediately.
- **Video connector:** Connect a monitor to this connector.

  Note: The maximum video resolution is 1600 x 1200 at 75 Hz.
- **Serial connector:** Connect a 9-pin serial device to this connector. The serial port is shared with the integrated management module II (IMM2). The IMM2 can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

- **USB connectors:** Connect a USB device, such as a USB mouse or keyboard to any of these connectors.
- **Systems-management Ethernet connector:** Use this connector to connect the server to a network for full systems-management information control. This connector is used only by the integrated management module II (IMM2). A dedicated management network provides additional security by physically separating the management network traffic from the production network. You can use the Setup utility to configure the server to use a dedicated systems management network or a shared network.
- **Ethernet connectors:** Use either of these connectors to connect the server to a network. When you enable shared Ethernet for IMM2 in the Setup utility, you can access the IMM2 using either the Ethernet 1 or the system-management Ethernet connector.

The following illustration shows the LEDs on the rear of the server.
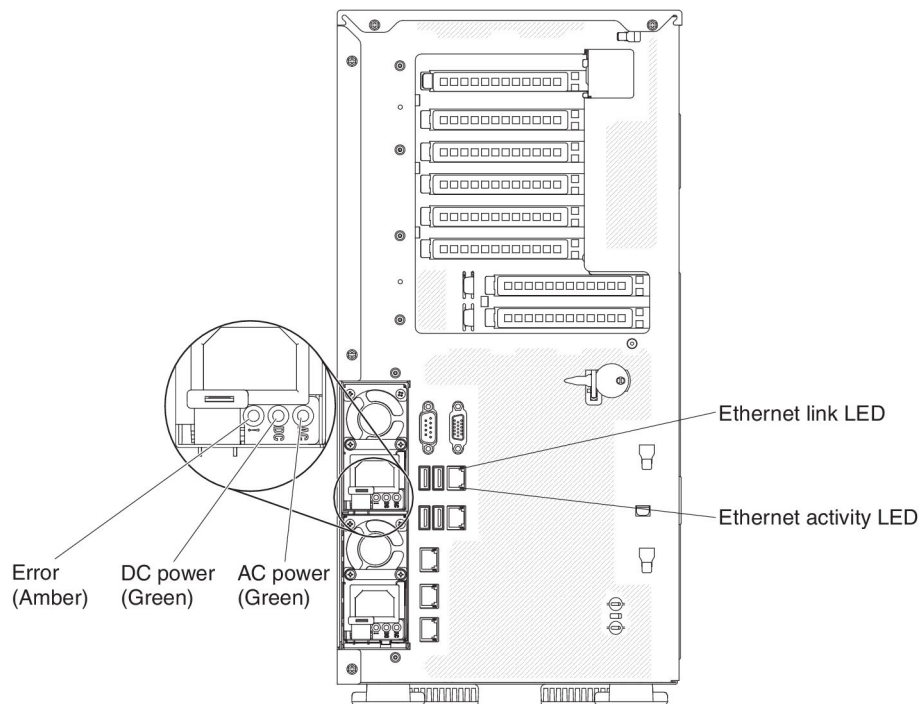
- **Ethernet activity LEDs:** When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.
- **Ethernet link LEDs:** When these LEDs are lit, they indicate that there is an active link connection on the Ethernet port.
- **AC power LED:** Each hot-swap power supply has an ac power LED. When the ac power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, the ac power LED is lit.
- **DC power LED:** Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During typical operation, both the ac and dc power LEDs are lit.
- **Power-supply error LED:** When the power-supply error LED is lit, it indicates that the power supply has failed.

Note: Power supply 1 is the default/primary power supply. If power supply 1 fails, you must replace the power supply immediately.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the integrated management module II (IMM2) is shut down; however, the server can respond to requests from IMM2, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to an ac power source but is not turned on.

Turning on the server

Approximately 5 seconds after the server is connected to power, one or more fans might start running to provide cooling while the server is connected to power and the power-on button LED will blink quickly. Approximately 5 to 10 seconds after the server is connected to power, the power-control button becomes active (the power-on LED will blink slowly), and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

Notes:

1. When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

2. When you turn on the server with external graphical adapters installed, the IBM logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.

3. Make sure the left-side cover is closed.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from IMM2, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
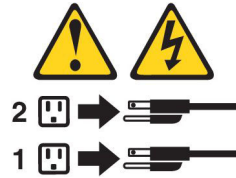
The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will turn off automatically.

- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.

- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.

- The server can be turned off by Wake on LAN feature with the following limitation:

  Note: When you install any PCI adapter, the power cords must be disconnected from the power source before you remove the PCI Express assembly and the PCI-X assembly. Otherwise, the Wake on LAN feature might not work.

- The integrated management module II (IMM2) can turn off the server as an automatic response to a critical system failure.

- The server turns off when the left-side cover is opened.

Internal LEDs, connectors, and jumpers

The illustrations in this section show the LEDs, connectors, and jumpers on the internal boards. The illustrations might differ slightly from your hardware.

System-board internal connectors

The following illustration shows the internal connectors on the system board.
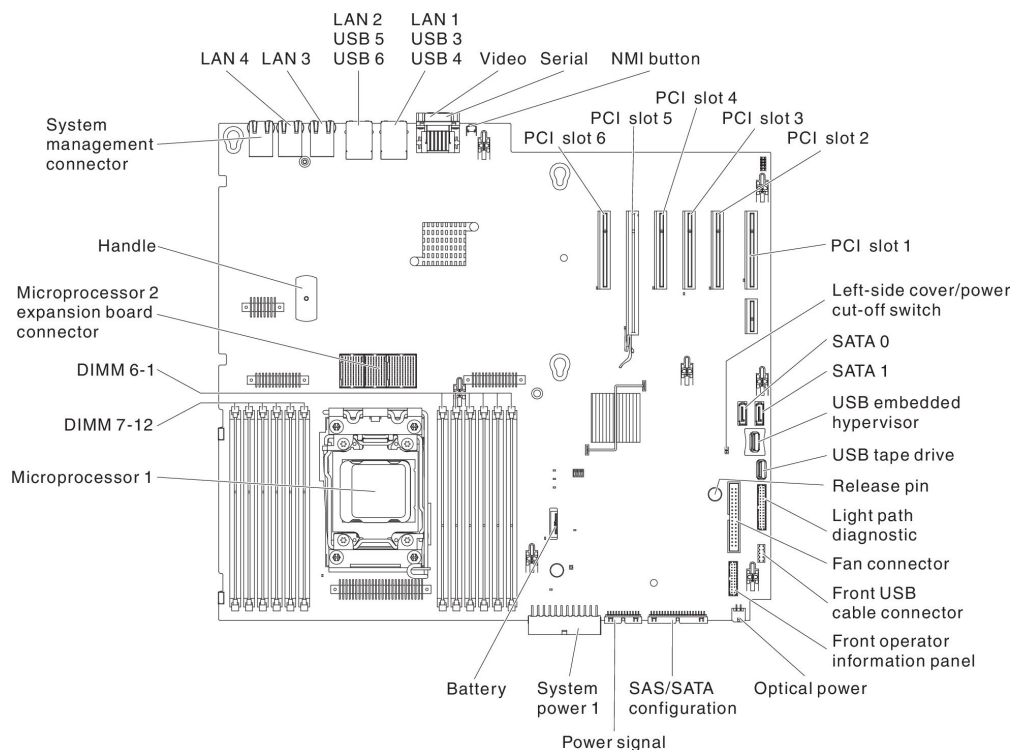
The following illustration shows the internal connectors on the microprocessor 2 expansion board.
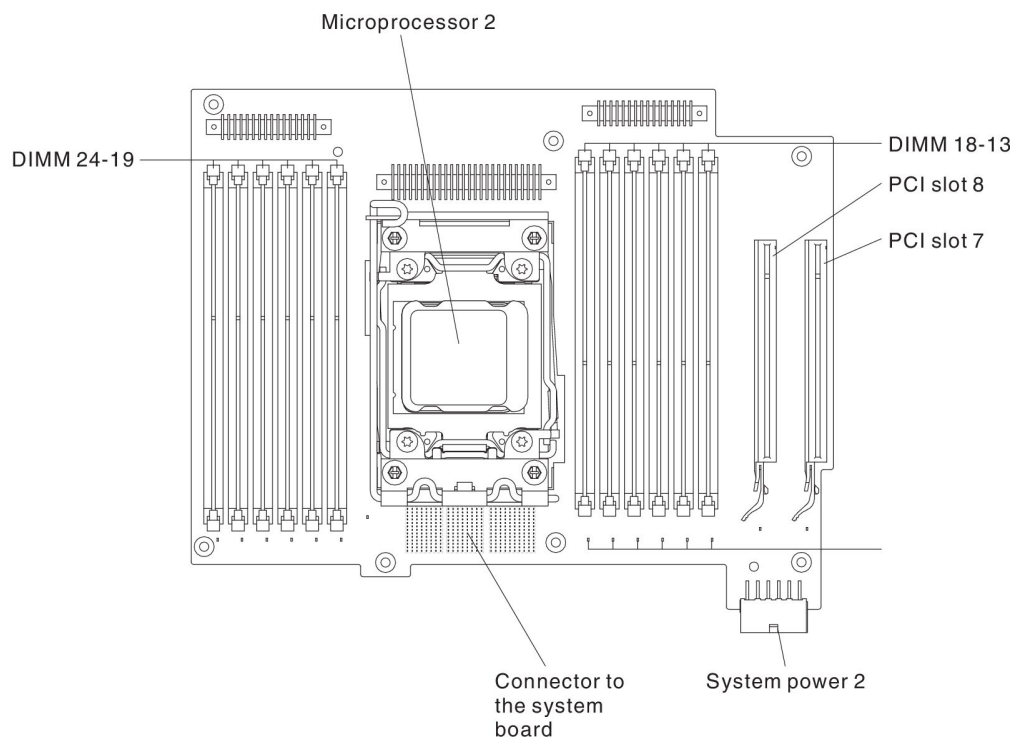
System-board external connectors

The following illustration shows the external connectors on the system board.
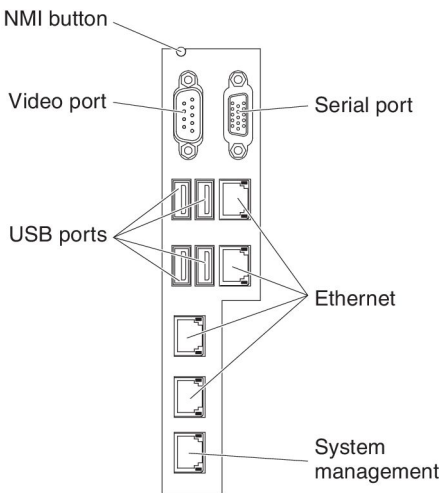
System-board switches and jumpers

The following illustration shows the location and description of the switches and jumpers.
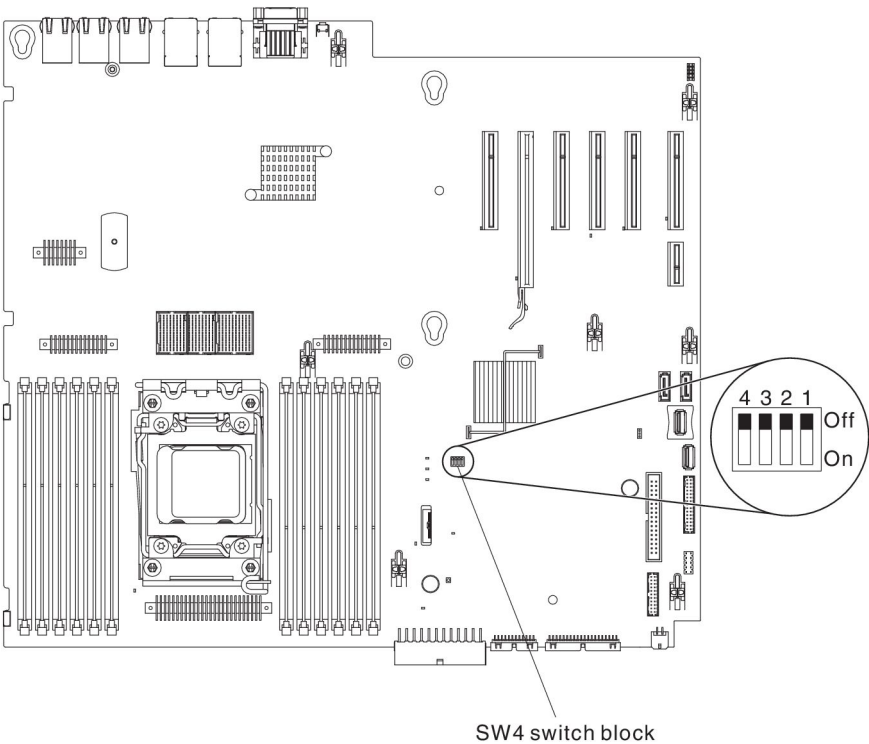
SW4 switch block

Note: If there is a clear protective sticker on the top of the switch blocks, you must remove and discard it to access the switches.

The following table describes the functions of the SW4 switch block on the system board.

Table 2. System board SW4 switch block definition

Switch number	Switch name	Default position	Description
1	UEFI boot backup	Off	When this switch is off, the primary firmware ROM page is loaded. When this switch is on, the secondary (backup) firmware ROM page is loaded. **Note:** Changing the position of the UEFI boot back switch before the server is turned on alters which flash ROM page is loaded. Do not move the switch after the server is turned on. This can cause an unpredictable problem.
2	System TPM physical presence	Off	Indicates a physical presence to the system TPM when on.
3	Power-on password override	Off	Bypasses the power-on password check the next time the server is turned on and starts the Setup utility so that you can change or delete the power-on password when on. **Notes:** 1. You do not have to move the switch back to the default position after the power-on password in overridden. 2. Changing the position of this switch does not affect the administrator password check if an administrator password is set. See "Passwords" on page 326 for additional information about passwords.
4	CMOS clear	Off	Clears CMOS memory when on.

Notes:

1. Before you change any switch settings or move any jumpers, turn off the server. Review the information in "Safety" on page vii, "Installation guidelines" on page 177, "Handling static-sensitive devices" on page 179, and "Turning off the server" on page 14.

2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

System-board LEDs and controls

Any error LED can be lit after ac power has been removed from the system-board tray so that you can isolate a problem. After ac power has been removed from the system-board tray, power remains available to these LEDs for up to 90 seconds. To view the error LEDs, press and hold the light path button on the system board to light the error LEDs. The error LEDs that were lit while the system-board tray was running will be lit again while the button is pressed.

The following illustration shows the LEDs and controls on the system board.
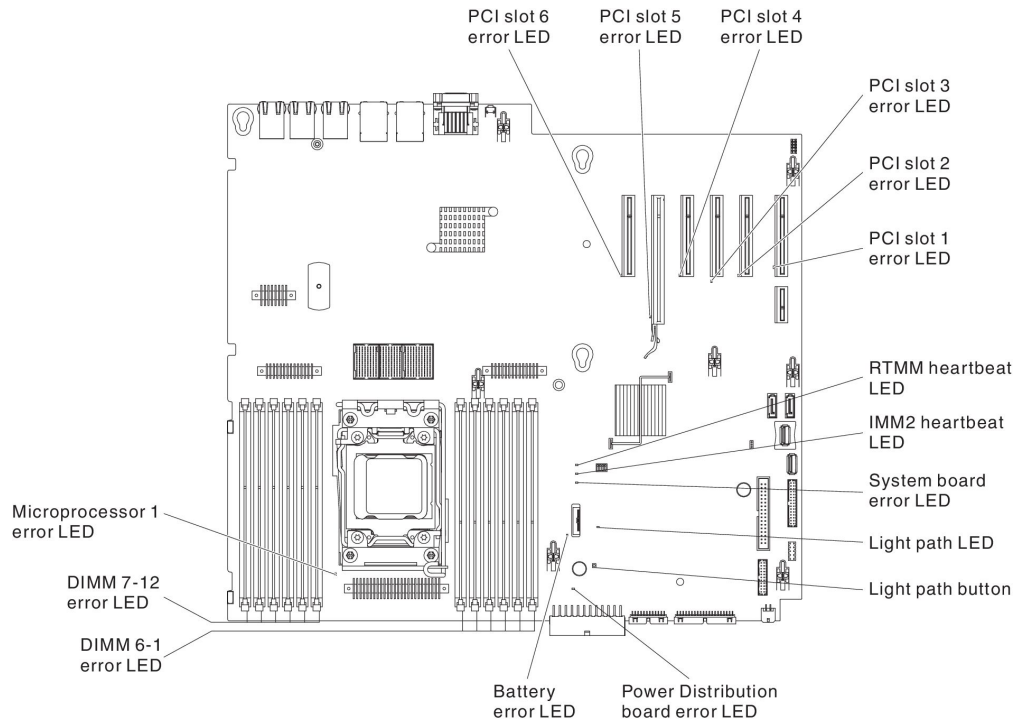
The following illustration shows the LEDs on the microprocessor 2 expansion board.
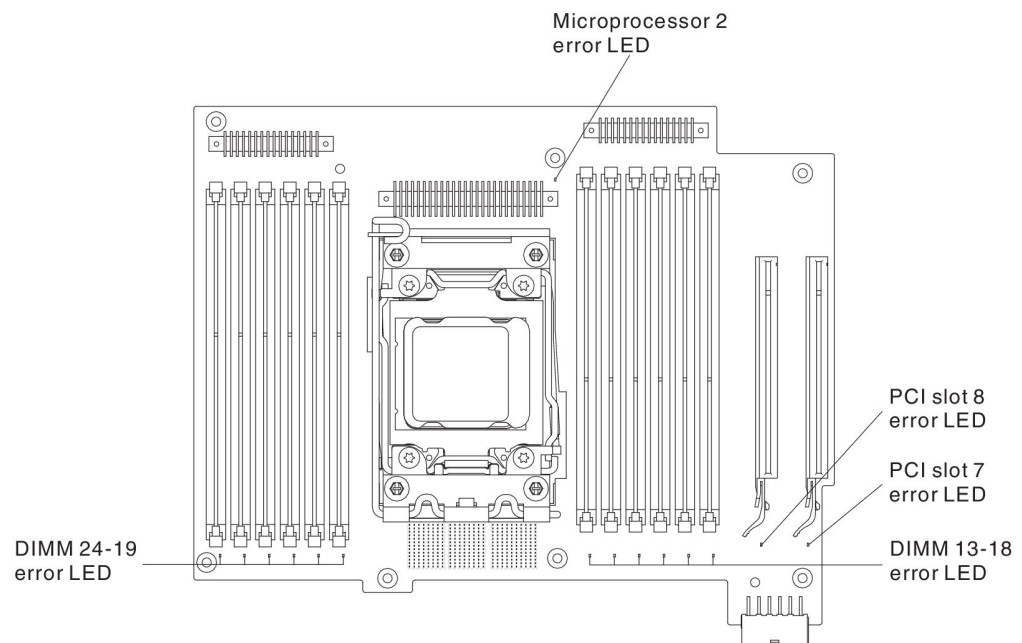
Hard disk drive backplane connectors

The following illustrations show the connectors on the 2.5-inch and 3.5-inch hard disk drive backplanes and the backplate assembly.
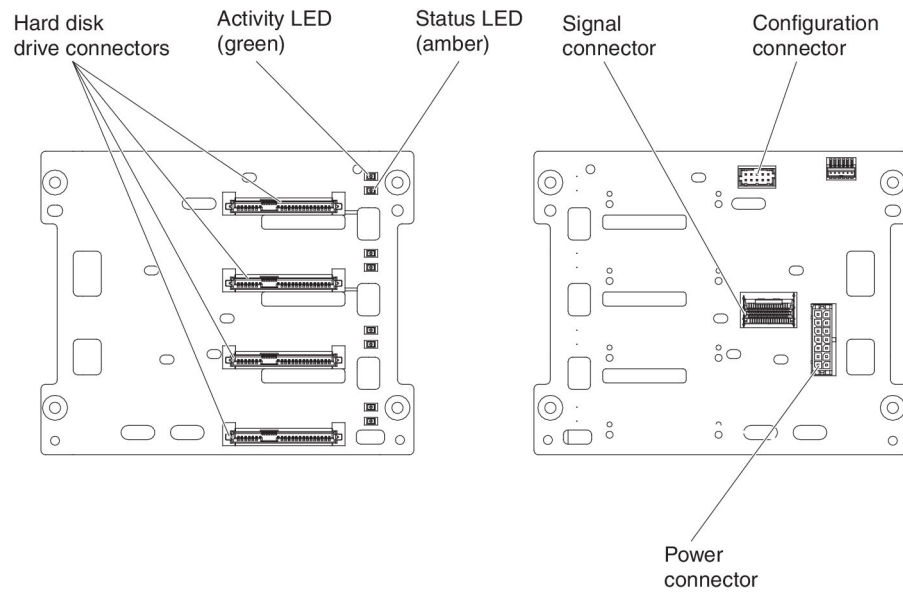
Figure 1. Connectors on the 3.5-inch hard disk drive backplane
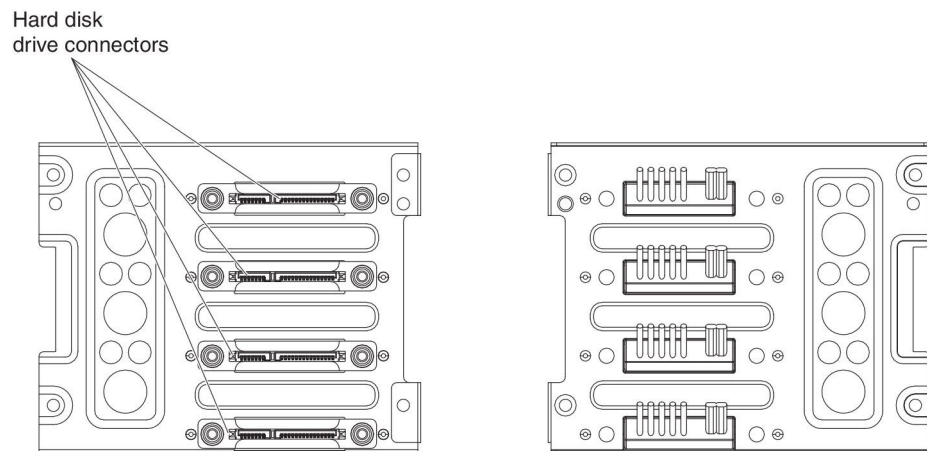
Figure 2. Connectors on the 3.5-inch hard disk drive backplate assembly
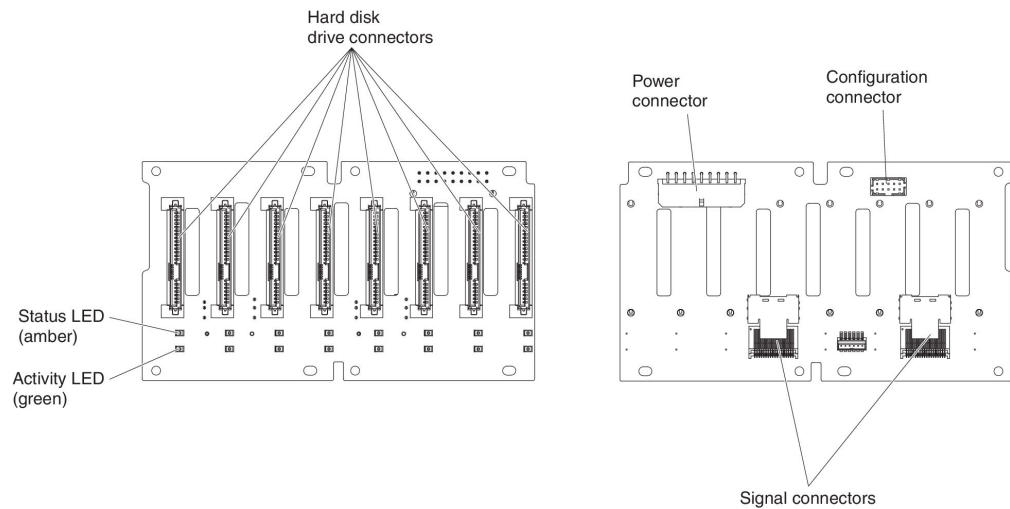
Figure 3. Connectors on the 2.5-inch hard disk drive backplane
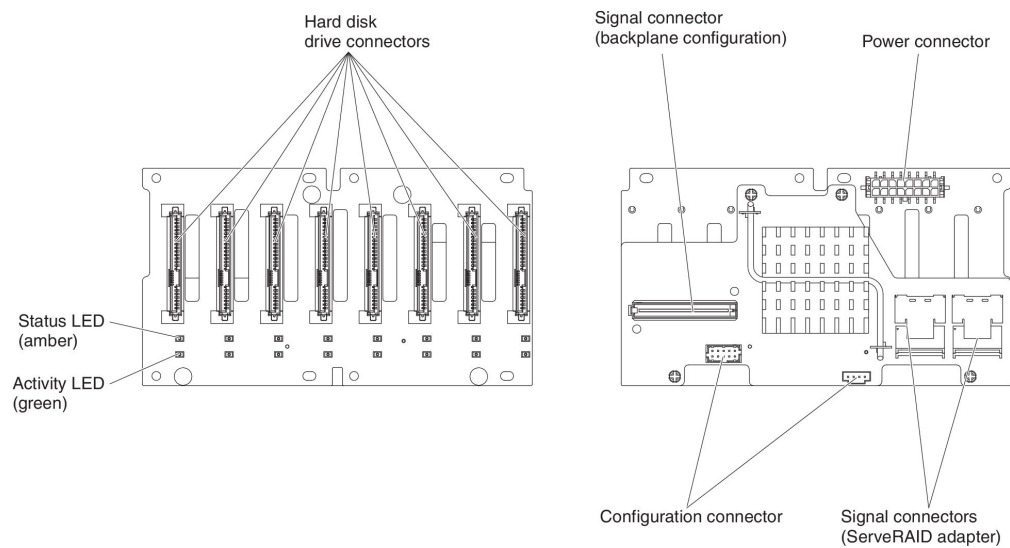
Figure 4. Connectors on the 2.5-inch hard disk drive backplane with the expander

Chapter 3. Diagnostics

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the server.

If you cannot diagnose and correct a problem by using the information in this chapter, see Appendix A, "Getting help and technical assistance," on page 341 for more information.

Diagnostic tools

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST error messages**

  The power-on self-test (POST) generates messages to indicate successful test completion or the detection of a problem. See "POST/UEFI diagnostic codes" on page 26 for more information.

- **Event logs**

  For information about the POST event log, the system-event log, the integrated management module 2 (IMM2) event log, and the DSA log, see "Event logs" and "System-event log" on page 45.

- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting tables" on page 99.

- **Light path diagnostics**

  Use the light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 114 for more information.

- **Diagnostic programs, messages, and error codes**

  The diagnostic programs are the primary method of testing the major components of the server. See "Diagnostic programs, messages, and error codes" on page 124 for more information.

Event logs

Error codes and messages are displayed in the following types of event logs:

- **POST event log:** This log contains the three most recent error codes and messages that were generated during POST. You can view the POST event log through the Setup utility.

- **System-event log:** This log contains all IMM2, POST, and system management interrupt (SMI) events. You can view the system-event log through the Setup utility and through the Dynamic System Analysis (DSA) program (as the IPMI event log).

  The system-event log is limited in size. When it is full, new entries will not overwrite existing entries; therefore, you must periodically save and then clear the system-event log through the Setup utility when the IMM2 logs an event that indicates that the log is more than 75% full. When you are troubleshooting, you might have to save and then clear the system-event log to make the most recent events available for analysis.

  Messages are listed on the left side of the screen, and details about the selected message are displayed on the right side of the screen. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

Some IMM2 sensors cause assertion events to be logged when their setpoints are reached. When a setpoint condition no longer exists, a corresponding deassertion event is logged. However, not all events are assertion-type events.

- **Integrated management module 2 (IMM2) event log:** This log contains a filtered subset of all IMM2, POST, and system management interrupt (SMI) events. You can view the IMM2 event log through the IMM2 web interface and through the Dynamic System Analysis (DSA) program (as the ASM event log).
- **DSA log:** This log is generated by the Dynamic System Analysis (DSA) program, and it is a chronologically ordered merge of the system-event log (as the IPMI event log), the IMM2 event log (as the ASM event log), and the operating-system event logs. You can view the DSA log through the DSA program.

Viewing event logs through the Setup utility

To view the POST event log or system-event log, complete the following steps:

1. Turn on the server.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the event logs.
3. Select **System Event Logs** and use one of the following procedures:
   - To view the POST event log, select **POST Event Viewer**.
   - To view the system-event log, select **System Event Log**.

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Viewing event logs without restarting the server

If the server is not hung, methods are available for you to view one or more event logs without having to restart the server.

If you have installed Dynamic System Analysis (DSA) Portable, you can use it to view the system-event log (as the IPMI event log), the IMM2 event log (as the ASM event log), the operating-system event logs, or the merged DSA log. You can also use DSA Preboot to view these logs, although you must restart the server to use DSA Preboot.

To install DSA Portable, DSA Preboot or to download a DSA Preboot CD image, go to http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008 &lndocid=SERV-DSA.

If IPMItool is installed in the server, you can use it to view the system-event log. Most recent versions of the Linux operating system come with a current version of IPMItool.

For an overview of IPMI, go to http://www.ibm.com/developerworks/linux/blueprints/ and click **Using Intelligent Platform Management Interface (IPMI) on IBM Linux platforms**.

You can view the IMM2 system event log through the **Event Log** link in the integrated management module II (IMM2) web interface. For more information, see "Logging on to the web interface" on page 330.

The following table describes the methods that you can use to view the event logs, depending on the condition of the server. The first three conditions generally do not require that you restart the server.

Table 3. Methods for viewing event logs

Condition	Action
The server is not hung and is connected to a network.	Use any of the following methods: • Run Portable or Installable DSA to view the event logs or create an output file that you can send to IBM service and support. • Type the IP address of the IMM2 and go to the Event Log page. • Use IPMItool to view the system-event log.
The server is not hung and is not connected to a network.	Use IPMItool locally to view the system-event log.
The server is hung.	• If DSA Preboot is installed, restart the server and press **F2** to start **DSA** Preboot and view the event logs. • If DSA Preboot is not installed, insert the DSA Preboot CD and restart the server to start DSA Preboot and view the event logs. • Alternatively, you can restart the server and press F1 to start the Setup utility and view the POST event log or system-event log. For more information, see "Viewing event logs through the Setup utility" on page 24.

POST/UEFI diagnostic codes

When you turn on the server, it performs a series of tests to check the operation of the server components and some optional devices in the server. This series of tests is called the power-on self-test, or POST.

If a power-on password is set, you must type the password and press Enter, when you are prompted, for POST to run.

If POST is completed without detecting any problems, the server startup is completed.

If POST detects a problem, an error message is sent to the POST event log.

The following table describes the POST/UEFI diagnostic codes and suggested actions to correct the detected problems. These diagnostic codes can appear as severe, warning, or informational.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
I.11002	[I.11002] A processor mismatch has been detected between one or more processors in the system.	One or More Mismatched Processors Detected.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
W.11004	[W.11004] A processor within the system has failed the BIST.	Processor Self Test Failure Detected.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. (Trained technician only) If there are more than one microprocessor installed, swap the microprocessors. If the problem follows the affected microprocessor or there is only one microprocessor installed, replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.1100B	[S.1100B] CATERR(IERR) has asserted on processor %.	Processor CATERR(IERR) has asserted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Restart the server. 3. Contact your IBM service representative for support. (% = microprocessor number)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.1100C	[S.1100C] An uncorrectable error has been detected on processor %.	Uncorrectable microprocessor error detected.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Restart the server. 3. Contact your IBM service representative for support. (% = microprocessor number)
I.18005	[I.18005] A discrepancy has been detected in the number of cores reported by one or more processor packages within the system.	Processors have mismatched number of cores.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
I.18006	[I.18006] A mismatch between the maximum allowed QPI link speed has been detected for one or more processor packages.	Processors have mismatched QPI Speed.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
I.18007	[I.18007] A power segment mismatch has been detected for one or more processor packages.	Processors have mismatched Power Segments.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Ensure that all microprocessors have matching power requirements (such as 65, 95, or 130 Watts). 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
I.18008	[I.18008] Currently, there is no additional information for this event.	Processors have mismatched Internal DDR3 Frequency.	1. Verify that matching DIMMs are installed in the correct population sequence for the server (see "DIMM installation sequence" on page 277). Correct any configuration issues found (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 2. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). Inspect microprocessor socket and replace the system board first (see "Removing the system board" on page 310 and "Installing the system board" on page 312) if socket is damaged.
I.18009	[I.18009] A core speed mismatch has been detected for one or more processor packages.	Processors have mismatched Core Speed.	1. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 2. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). Inspect microprocessor socket and replace the system board first (see "Removing the system board" on page 310 and "Installing the system board" on page 312) if socket is damaged.
I.1800A	[I.1800A] A mismatch has been detected between the speed at which a QPI link has trained between two or more processor packages.	Processors have mismatched Bus Speed.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). Inspect microprocessor socket and replace the system board first (see "Removing the system board" on page 310 and "Installing the system board" on page 312) if socket is damaged.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
I.1800B	[I.1800B] A cache size mismatch has been detected for one or more processor packages.	Processors have one or more cache levels with mismatched size.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
I.1800C	[I.1800C] A cache type mismatch has been detected for one or more processor packages.	Processors have one or more cache levels with mismatched type.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
I.1800D	[I.1800D] A cache associativity mismatch has been detected for one or more processor packages.	Processors have one or more cache levels with mismatched associativity.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
I.1800E	[I.1800E] A processor model mismatch has been detected for one or more processor packages.	Processors have mismatched Model Number.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
I.1800F	[I.1800F] A processor family mismatch has been detected for one or more processor packages.	Processors have mismatched Family.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).
I.18010	[I.18010] A processor stepping mismatch has been detected for one or more processor packages.	Processors of the same model have mismatched Stepping ID.	1. Make sure that the microprocessor is on the ServerProven website at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Verify that matching processors are installed in the correct processor sockets for the server. Correct any mismatch issues found. 3. Check the IBM support website for a firmware update and update the server firmware to the latest level (see "Updating the firmware" on page 317). 4. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Installing a microprocessor and heat sink" on page 295).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.50001	[W.50001] A DIMM has been disabled due to an error detected during POST.	DIMM Disabled.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. 1. Make sure the DIMM is installed correctly (see "Installing a memory module" on page 274). 2. If the DIMM was disabled because of a memory fault, follow the suggested actions for that error event. 3. If no memory fault is recorded in the logs and no DIMM connector error LED is lit, you can re-enable the DIMM through the Setup utility or the Advanced Settings Utility (ASU).
S.51003	[S.51003] An uncorrectable memory error was detected in DIMM slot % on rank %. [S.51003] An uncorrectable memory error was detected on processor % channel %. The failing DIMM within the channel could not be determined. [S.51003] An uncorrectable memory error has been detected during POST.	Fatal Memory Error Occurred.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. If the problem remains, replace the affected DIMMs. 3. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 4. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board. 5. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.51006	[S.51006] A memory mismatch has been detected. Please verify that the memory configuration is valid.	One or More Mismatched DIMMs Detected.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. 1. This could be an uncorrectable memory error or failed memory test. Check the error log. DIMMs disabled by other errors or actions could cause this event too. 2. Make sure that the DIMMs have been installed in the correct sequence (see "Installing a memory module" on page 274). 3. Disable memory mirroring and sparing. If this action eliminates the mismatch, check IBM support website for information related to this problem. 4. Refresh the UEFI firmware. 5. Replace the DIMM (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 6. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).
S.51009	[S.51009] No system memory has been detected.	No Memory Detected.	1. Make sure that there is at least one DIMM installed in the server. 2. If there are no memory fault recorded in the logs and no DIMM connector error LEDs are lit, make sure that all DIMM connectors are enabled by using the Setup utility or the Advance Settings Utility (ASU). 3. Reinstall all DIMMs in the correct population sequence (see "Installing a memory module" on page 274 for more information). 4. Replace the processor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 5. Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.58001	[W.58001] The PFA Threshold limit (correctable error logging limit) has been exceeded on DIMM number % at address %. MC5 Status contains % and MC5 Misc contains %.	DIMM PFA Threshold Exceeded.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. 1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel (see "Installing a memory module" on page 274 for memory population sequence). 3. If the error still occurs on the same DIMM, replace the affected DIMM (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 4. If the problem occurs on the same DIMM connector, swap other DIMMs (in the same memory channel) to a different memory channel or microprocessor (see "Installing a memory module" on page 274 for memory population sequence). If the problem follows a moved DIMM to a different memory channel, replace the affected DIMM. 5. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. Remove any foreign material on the DIMM connector, if found. If the connector is damaged, replace the system board (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 6. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found or the microprocessor is an upgrade part, replace the system board. 7. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 8. (Trained technician only) Replace the system board.
W.58007	[W.58007] Invalid memory configuration (Unsupported DIMM Population) detected. Please verify memory configuration is valid.	Unsupported DIMM Population.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. 1. Reseat the DIMMs and restart the server (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 2. Make sure that the DIMMs are installed in the proper sequence (see "Installing a memory module" on page 274).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.58008	[S.58008] A DIMM has failed the POST memory test.	DIMM Failed Memory Test.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. 1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Make sure that the DIMMs are firmly seated and no foreign material is found in the DIMM connector. Then, retry with the same DIMM. 3. If the problem is related to a DIMM, replace the failing DIMM indicated by the error LEDs (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 4. If the problem occurs on the same DIMM connector, swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel or microprocessor (see "Installing a memory module" on page 274). 5. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 6. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 7. (Trained technician only) Swap the affected microprocessor, if there are more than one microprocessor installed. If the problem follows the microprocessor, replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 8. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.580A1	[W.580A1] Invalid memory configuration for Mirror Mode. Please correct memory configuration.	Unsupported DIMM Population for Mirror Mode.	1. If a DIMM connector error LED is lit on the system board, check the event logs and follow the procedure for that event and restart the server. 2. Make sure that the DIMMs have been installed in the correct sequence for mirrored mode (see "Memory mirrored channel" on page 277).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.580A2	[W.580A2] Invalid memory configuration for Sparing Mode. Please correct memory configuration.	Unsupported DIMM Population for Spare Mode.	Make sure that the DIMMs have been installed in the correct sequence for rank sparing mode (see "Memory rank sparing" on page 279).
I.580A4	[I.580A4] Memory population change detected.	DIMM Population Change Detected.	Information only. Memory has been added, moved, or changed. Check system event log for uncorrected DIMM failures and replace those DIMMs.
I.580A5	[I.580A5] Mirror Fail-over complete. DIMM number % has failed over to to the mirrored copy.	DIMM Mirror Fail-over Detected.	Information only. Memory redundancy has been lost. Check the event log for uncorrected DIMM failure events (see "Event logs" on page 23).
I.580A6	[I.580A6] Memory spare copy has completed successfully.	Spare Copy Complete.	Information only. Memory redundancy or spare rank has been lost. Check the event log for uncorrected DIMM failure events (see "Event logs" on page 23) and replace those DIMMs.
I.58015	[I.58015] Memory spare copy initiated.	Spare Copy Started.	No action; information only.
W.68002	[W.68002] A CMOS battery error has been detected.	CMOS Battery Fault.	1. If the system was recently installed, moved, or serviced, make sure the battery is properly seated. 2. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 3. Replace the CMOS battery (see "Removing the system battery" on page 248 and "Installing the system battery" on page 249). 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.68005	[S.68005] An error has been detected by the IIO core logic on Bus %. The Global Fatal Error Status register contains %. The Global Non-Fatal Error Status register contains %. Please check error logs for the presence of additional downstream device error data.	Critical IOH-PCI Error.	1. Check the system-error logs for information about the error. Replace any component that is identified in the error log. 2. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 3. Replace the following components one at a time in the order shown, restarting the server each time: • PCI express adapter (see "Removing an adapter" on page 229 and "Installing an adapter" on page 231). • (Trained technician only) System board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.680B8	[S.680B8] Internal QPI Link Failure Detected.	Internal QPI Link Failure Detected.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Inspect the microprocessor socket for foreign material, if the microprocessor socket contains any foreign material, remove the foreign material. If it is found damaged, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312) or the microprocessor 2 expansion board (see "Removing the microprocessor 2 expansion board" on page 302 and "Installing the microprocessor 2 expansion board" on page 303). 3. Make sure the microprocessor 2 expansion board is installed correctly (see "Installing the microprocessor 2 expansion board" on page 303). 4. (Trained technician only) Reseat the microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 5. (Trained technician only) Replace the microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).
S.680B9	[S.680B9] External QPI Link Failure Detected.	External QPI Link Failure Detected.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Inspect the microprocessor socket for foreign material, if the microprocessor socket contains any foreign material, remove the foreign material. If it is found damaged, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312) or the microprocessor 2 expansion board (see "Removing the microprocessor 2 expansion board" on page 302 and "Installing the microprocessor 2 expansion board" on page 303). 3. Make sure the microprocessor 2 expansion board is installed correctly (see "Installing the microprocessor 2 expansion board" on page 303). 4. (Trained technician only) Reseat the microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 5. (Trained technician only) Replace the microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.2011001	[S.2011001] An Uncorrected PCIe Error has Occurred at Bus % Device % Function %. The Vendor ID for the device is % and the Device ID is %.	PCI SERR Detected.	1. Check the PCI LEDs. 2. Reseat all affected adapters and the PCI-X interposer card. 3. Update the PCI adapter firmware. 4. Replace the affected adapters (see "Removing an adapter" on page 229 and "Installing an adapter" on page 231). 5. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.2018001	[S.2018001] An Uncorrected PCIe Error has Occurred at Bus % Device % Function %. The Vendor ID for the device is % and the Device ID is %.	PCIe Uncorrected Error Detected.	1. Check the PCI LEDs. 2. Reseat all affected adapters and the PCI-X interposer card. 3. Update the PCI adapter firmware. 4. Replace the affected adapters and (see "Removing an adapter" on page 229 and "Installing an adapter" on page 231). 5. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
I.2018002	[I.2018002] The device found at Bus % Device % Function % could not be configured due to resource constraints. The Vendor ID for the device is % and the Device ID is %.	OUT_OF_RESOURCES (PCI Option ROM).	1. If this PCIe device and/or any attached cables were recently installed, moved, serviced or upgraded, reseat adapter and any attached cables. 2. Update the PCI adapter firmware. 3. Move card to a different slot. If the slot is not available or error re-occurs, replace the adapter (see "Removing an adapter" on page 229 and "Installing an adapter" on page 231). 4. (Trained technician only) If adapter was moved to a different slot and error did not re-occur, verify that this is not a system limitation and then replace the system board. Also, if this is not the initial installation and the error persists after adapter replacement, replace system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 5. Run the Setup utility (see "Using the Setup utility" on page 321). Select **Startup Options** from the menu and modify the boot sequence to change the load order of the optional-device ROM code. 6. Informational message that some devices might not be initialized. 7. See retain tip H197144 http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5084743 for more information.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
I.2018003	[I.2018003] A bad option ROM checksum was detected for the device found at Bus % Device % Function %. The Vendor ID for the device is % and the Device ID is %.	ROM CHECKSUM ERROR.	1. Check the PCI LEDs. 2. Reseat all affected adapters and the PCI-X interposer card. 3. Move the affected adapter to a different slot. 4. Update the PCI adapter firmware. 5. Replace the affected adapters and (see "Removing an adapter" on page 229 and "Installing an adapter" on page 231).
S.3020007	[S.3020007] A firmware fault has been detected in the UEFI image.	Internal UEFI Firmware Fault Detected, System halted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. (Trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3028002	[S.3028002] Boot permission timeout detected.	Boot Permission Negotiation Timeout.	1. Check the IMM2 error messages (see "Integrated management module II (IMM2) error messages" on page 45) for communication errors and follow the actions. 2. Restart the server. 3. If the problem remains, contact your IBM service representative for support.
S.3030007	[S.3030007] A firmware fault has been detected in the UEFI image.	Internal UEFI Firmware Fault Detected, System halted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. (Trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3040007	[S.3040007] A firmware fault has been detected in the UEFI image.	Internal UEFI Firmware Fault Detected, System halted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. (Trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
I.3048005	[I.3048005] UEFI has booted from the backup flash bank.	Booting Backup UEFI Image.	Information only. Turn the switch 1 of the SW4 on to allow the server to boot from the backup UEFI (see "System-board switches and jumpers" on page 17).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.3048006	[W.3048006] UEFI has booted from the backup flash bank due to an Automatic Boot Recovery (ABR) event.	Automated Boot Recovery, Booting Backup UEFI Image.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. (Trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3050007	[S.3050007] A firmware fault has been detected in the UEFI image.	Internal UEFI Firmware Fault Detected, System halted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160).
W.305000A	[W.305000A] An invalid date and time have been detected.	RTC Date and Time Incorrect.	1. Check IMM/chassis event log. This event should immediately precede 0068002 error. Service that event or any other battery related errors. 2. Use F1 Setup to reset date and time. If problem returns after a system reset, replace CMOS battery. 3. Check the IBM support website for an applicable firmware update that applies to this error. 4. (Trained technician only) If the problem remains, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3058004	[S.3058004] A Three Strike boot failure has occurred. The system has booted with default UEFI settings.	POST failure has occurred! System booted with default settings..	1. This event resets UEFI to the default settings for the next boot. If successful, user is forced into F1 setup. Original UEFI settings are still present. 2. If user did not intentionally trigger the reboots, check logs for probable cause. 3. Undo recent system changes (settings or devices added). If not recent system changes, remove all options then remove CMOS battery for 30 seconds to clear CMOS contents. Verify that the system boots. Then, re-install options one at a time to locate the problem. 4. Check the IBM support website for an applicable firmware update that applies to this error. 5. Refresh UEFI firmware. 6. Remove and re-install CMOS battery for 30 seconds to clear CMOS contents. 7. (Trained technician only) If the problem remains, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.3058009	[W.3058009] DRIVER HEALTH PROTOCOL: Missing Configuraiton. Requires Change Settings From F1.	DRIVER HEALTH PROTOCOL: Missing Configuration. Requires Change Settings From F1.	1. Select **System Settings → Settings → Driver Health Status List** and find a driver/controller reporting configuration required status. 2. Search for the driver menu from **System Settings** and change the settings appropriately. 3. Save the settings and restart the system.
W.305800A	[W.305800A] DRIVER HEALTH PROTOCOL: Reports 'Failed' Status Controller.	DRIVER HEALTH PROTOCOL: Reports 'Failed' Status Controller.	1. Restart the system. 2. If the problem persists, switch to the backup UEFI image or reload the current UEFI image. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.305800B	[W.305800B] DRIVER HEALTH PROTOCOL: Reports 'Reboot' Required Controller.	DRIVER HEALTH PROTOCOL: Reports 'Reboot' Required Controller.	1. No action required. The system will reboot at the end of POST. 2. If the problem persists, switch to the backup UEFI image or reload the current UEFI image. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.305800C	[W.305800C] DRIVER HEALTH PROTOCOL: Reports 'System Shutdown' Required Controller.	DRIVER HEALTH PROTOCOL: Reports 'System Shutdown' Required Controller.	1. Restart the system. 2. If the problem persists, switch to the backup UEFI image or reload the current UEFI image. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.305800D	[W.305800D] DRIVER HEALTH PROTOCOL: Disconnect Controller Failed. Requires 'Reboot'.	DRIVER HEALTH PROTOCOL: Disconnect Controller Failed. Requires 'Reboot'.	1. Restart the system. 2. If the problem persists, switch to the backup UEFI image or reload the current UEFI image. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.305800E	[W.305800E] DRIVER HEALTH PROTOCOL: Reports Invalid Health Status Driver.	DRIVER HEALTH PROTOCOL: Reports Invalid Health Status Driver.	1. Restart the system. 2. If the problem persists, switch to the backup UEFI image or reload the current UEFI image. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.3060007	[S.3060007] A firmware fault has been detected in the UEFI image.	Internal UEFI Firmware Fault Detected, System halted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3070007	[S.3070007] A firmware fault has been detected in the UEFI image.	Internal UEFI Firmware Fault Detected, System halted.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3108007	[S.3108007] The default system settings have been restored.	System Configuration Restored to Defaults.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. If the settings differ from defaults, run the Setup utility, select **Load Default Settings**, and save the settings.
W.3808000	[W.3808000] An IMM communication failure has occurred.	IMM Communication Failure.	1. Shut down the system and remove the power cords from the server for 30 seconds; then, reconnect the server to power and restart it. 2. Update the IMM firmware to the latest level (see "Updating the firmware" on page 317). 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.3808002	[W.3808002] An error occurred while saving UEFI settings to the IMM.	Error Updating System Configuration to IMM.	1. Run the Setup utility, select **Save Settings**, and restart the server (see "Using the Setup utility" on page 321). 2. Update the IMM firmware to the latest level (see "Updating the firmware" on page 317). 3. Remove and re-install CMOS battery for 30 seconds to clear CMOS contents. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.3808003	[W.3808003] Unable to retrieve the system configuration from the IMM.	Error Retrieving System Configuration from IMM.	1. Run the Setup utility, select **Save Settings**, and restart the server (see "Using the Setup utility" on page 321). 2. Update the IMM firmware to the latest level (see "Updating the firmware" on page 317). 3. Remove and re-install CMOS battery for 30 seconds to clear CMOS contents. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
I.3808004	[I.3808004] The IMM System Event log (SEL) is full.	IPMI System Event Log is Full.	Run the Setup utility to clear IMM logs and restart the server (see "Using the Setup utility" on page 321).
I.3818001	[I.3818001] The firmware image capsule signature for the currently booted flash bank is invalid.	Current Bank CRTM Capsule Update Signature Invalid.	1. Continue booting system. If system does not reset, manually reset the system. 2. If the error is not reported on the subsequent boot, no additional recovery action is required. 3. If the error persists, continue booting system and refresh UEFI image. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
I.3818002	[I.3818002] The firmware image capsule signature for the non-booted flash bank is invalid.	Opposite Bank CRTM Capsule Update Signature Invalid.	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware (see "Recovering the server firmware" on page 160). 3. If error does not persist, no additional recovery action is required. 4. If error persists, or boot is unsuccessful, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
I.3818003	[I.3818003] The CRTM flash driver could not lock the secure flash region.	CRTM Could not lock secure flash region.	1. Continue booting system. If system does not reset, manually reset the system. 2. If the error is not reported on the subsequent boot, no additional recovery action is required. 3. If the error persists, continue booting system and refresh UEFI image. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
S.3818004	[S.3818004] The CRTM flash driver could not successfully flash the staging area. A failure occurred.	CRTM Update Failed.	1. Continue booting system. If system does not reset, manually reset the system. 2. If the error is not reported on the subsequent boot, no additional recovery action is required. 3. If the error persists, continue booting system and refresh UEFI image. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.3818005	[W.3818005] The CRTM flash driver could not successfully flash the staging area. The update was aborted.	CRTM Update Aborted.	1. Continue booting system. If system does not reset, manually reset the system. 2. If the error is not reported on the subsequent boot, no additional recovery action is required. 3. If the error persists, continue booting system and refresh UEFI image. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
S.3818007	[S.3818007] The firmware image capsules for both flash banks could not be verified.	CRTM image capsule could not be verified.	1. Continue booting system. If system does not reset, manually reset the system. 2. If the error is not reported on the subsequent boot, no additional recovery action is required. 3. If the error persists, continue booting system and refresh UEFI image. 4. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
W.381800D	[W.381800D] TPM physical presence is in asserted state	TPM physical presence is in asserted state.	1. Complete the administrative tasks that require the TPM physical presence switch to be in the **ON** position. 2. Restore the physical presence switch to the **OFF** position. 3. Reboot the system. 4. (Trained technician only) If the error continues, replace the system-board assembly (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
I.3868000	[W.3868000] BOFM: System reset performed to reset adapters	BOFM: System reset performed to reset adapters	No user required for this event. This is for informational purposes only.
W.3868001	[W.3868001] BOFM: Reset loop avoided - Multiple resets not allowed	BOFM: Reset loop avoided - Multiple resets not allowed	1. Update all firmware (including adapter firmware) to the latest levels. 2. If problem persists escalate to the next level of support.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Diagnostic code	Message	Description	Action
W.3868002	[W.3868002] BOFM: Error communicating with the IMM - BOFM may not be deployed correctly	BOFM: Error communicating with the IMM - BOFM may not be deployed correctly	1. Update all firmware (including adapter firmware) to the latest levels. 2. If problem persists escalate to the next level of support.
I.3868003	[W.3868000] BOFM: Configuration too large for compatibility mode	BOFM: Configuration too large for compatibility mode	No user required for this event. This is for informational purposes only.
W.3938002	[W.3938002] A boot configuration error has been detected.	Boot Configuration Error.	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware (see "Recovering the server firmware" on page 160).

System-event log

The system-event log contains messages of three types:

Information
> Information messages do not require action; they record significant system-level events, such as when the server is started.

Warning
> Warning messages do not require immediate action; they indicate possible problems, such as when the recommended maximum ambient temperature is exceeded.

Error Error messages might require action; they indicate system errors, such as when a fan is not detected.

Each message contains date and time information, and it indicates the source of the message (POST or the IMM2).

Integrated management module II (IMM2) error messages

The following table describes the IMM2 error messages and suggested actions to correct the detected problems.

For more information about IMM2, see the *Integrated Management Module II User's Guide* at http://www-947.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=MIGR-5086346.

Note: Deassertive events not listed in this table are informational only.

Table 4. IMM2 error messages

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.				
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.				
Event ID	**Message**	**Severity**	**Description**	**Action**
Temperature and fan messages				
80010701-0701xxxx	Numeric sensor Ambient Temp going high (upper non-critical) has asserted.	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-0701xxxx	Numeric sensor Ambient Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-0701xxxx	Numeric sensor Ambient Temp going high (upper non-recoverable) has asserted.	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
81010701-0701xxxx	Numeric sensor Ambient Temp going high (upper non-critical) has deasserted.	Info	An upper non-critical sensor going high has deasserted.	No action; information only.
81010901-0701xxxx	Numeric sensor Ambient Temp going high (upper critical) has deasserted.	Info	An upper critical sensor going high has deasserted.	No action; information only.
81010b01-0701xxxx	Numeric sensor Ambient Temp going high (upper non-recoverable) has deasserted.	Info	An upper non-recoverable sensor going high has deasserted.	No action; information only.
80010701-1401xxxx 80010701-1402xxxx	Sensor CPU *n* VR Temp going high (upper non-critical) has asserted. (*n* = microprocessor number)	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-1401xxxx 80010901-1402xxxx	Sensor CPU *n* VR Temp going high (upper critical) has asserted. (*n* = microprocessor number)	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-1401xxxx 80010b01-1402xxxx	Sensor CPU *n* VR Temp going high (upper non-recoverable) has asserted. (*n* = microprocessor number)	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010701-1403xxxx	Sensor DIMM AB VR Temp going high (upper non-critical) has asserted.	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-1403xxxx	Sensor DIMM AB VR Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-1403xxxx	Sensor DIMM AB VR Temp going high (upper non-recoverable) has asserted.	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80010701-1404xxxx	Sensor DIMM CD VR Temp going high (upper non-critical) has asserted.	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-1404xxxx	Sensor DIMM CD VR Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-1404xxxx	Sensor DIMM CD VR Temp going high (upper non-recoverable) has asserted.	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010701-1405xxxx	Sensor DIMM EF VR Temp going high (upper non-critical) has asserted.	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-1405xxxx	Sensor DIMM EF VR Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-1405xxxx	Sensor DIMM EF VR Temp going high (upper non-recoverable) has asserted.	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010701-1406xxxx	Sensor DIMM GH VR Temp going high (upper non-critical) has asserted.	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-1406xxxx	Sensor DIMM GH VR Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-1406xxxx	Sensor DIMM GH VR Temp going high (upper non-recoverable) has asserted.	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80010701-2d01xxxx	Numeric sensor PCH Temp going high (upper non-critical) has asserted.	Warning	An upper non-critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010901-2d01xxxx	Numeric sensor PCH Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Reduce the ambient temperature. 2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
80010b01-2d01xxxx	Numeric sensor PCH Temp going high (upper non-recoverable) has asserted.	Error	An upper non-recoverable sensor going high has asserted.	Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server.
81010701-2d01xxxx	Numeric sensor PCH Temp going high (upper non-critical) has deasserted.	Info	An upper non-critical sensor going high has deasserted.	No action; information only.
81010901-2d01xxxx	Numeric sensor PCH Temp going high (upper critical) has deasserted.	Info	An upper critical sensor going high has deasserted.	No action; information only.
81010b01-2d01xxxx	Numeric sensor PCH Temp going high (upper non-recoverable) has deasserted.	Info	An upper non-recoverable sensor going high has deasserted.	No action; information only.
80010204-1d01xxxx 80010204-1d02xxxx 80010204-1d03xxxx 80010204-1d04xxxx 80010204-1d05xxxx 80010204-1d06xxxx	Numeric sensor Fan *n* Tach going low (lower critical) has asserted. (*n* = fan number)	Error	A lower critical sensor going low has asserted.	1. Reseat the failing fan *n*. 2. Replace the failing fan (see "Removing a simple-swap fan" on page 243 and "Installing a simple-swap fan" on page 245). (*n* = fan number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
800b010a-1e81xxxx	Fan Zone redundancy lost has asserted.	Error	Redundancy lost has asserted.	1. Make sure that the connectors on fans are not damaged and all fans are installed correctly. 2. Check Fan *n* Tach error logs to determine fan *n*. 3. Make sure that the fan *n* connector on the system board is not damaged. 4. Make sure that fan *n* is correctly installed. 5. Reseat fan*n*. 6. Replace fan*n* (see "Removing a simple-swap fan" on page 243 and "Installing a simple-swap fan" on page 245). (*n* = fan number)
800b050a-1e81xxxx	Fan Zone insufficient resources has asserted.	Error	There is no redundancy and insufficient to continue operation.	1. Make sure that the connectors on fans are not damaged and all fans are installed correctly. 2. Check Fan *n* Tach error logs to determine fan *n*. 3. Make sure that the fan *n* connector on the system board is not damaged. 4. Make sure that fan *n* is correctly installed. 5. Reseat fan*n*. 6. Replace fan*n* (see "Removing a simple-swap fan" on page 243 and "Installing a simple-swap fan" on page 245). (*n* = fan number)
80070204-0a01xxxx 80070204-0a02xxxx	Sensor PS *n* Fan Fault has transitioned to critical from a less severe state. (*n* = power supply number)	Error	A sensor has changed to Critical state from a less severe state.	1. Make sure that there are no obstructions, such as bundled cables, to the airflow from the power-supply fan. 2. Replace power supply *n* (see "Removing a hot-swap power supply" on page 266 and "Installing a hot-swap power supply" on page 268). (*n* = power supply number)
Power messages				

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80010902-0701xxxx	Numeric sensor Planar 3.3V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	(Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80010202-0701xxxx	Numeric sensor Planar 3.3V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80010902-0701xxxx	Numeric sensor Planar 5V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Replace the power paddle card (see "Removing the power paddle card" on page 288 and "Installing the power paddle card" on page 290). 2. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80010202-0701xxxx	Numeric sensor Planar 5V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	1. Replace the power paddle card (see "Removing the power paddle card" on page 288 and "Installing the power paddle card" on page 290). 2. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80010902-0701xxxx	Numeric sensor Planar 12V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	1. Check power supply *n* LED. 2. Remove the failing power supply (see "Removing a hot-swap power supply" on page 266 and "Installing a hot-swap power supply" on page 268). 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). (*n* = power supply number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80010202-0701xxxx	Numeric sensor Planar 12V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	1. Check power supply *n* LED. 2. Remove the failing power supply (see "Removing a hot-swap power supply" on page 266 and "Installing a hot-swap power supply" on page 268). 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). (*n* = power supply number)
80010002-0701xxxx	Numeric sensor Planar VBAT going low (lower non-critical) has asserted.	Warning	A lower critical sensor going low has asserted.	Replace the system battery (see "Removing the system battery" on page 248 and "Installing the system battery" on page 249).
80010202-0701xxxx	Numeric sensor Planar VBAT going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	Replace the system battery (see "Removing the system battery" on page 248 and "Installing the system battery" on page 249).
80030108-1301xxxx	Sensor PS Heavy Load has asserted.	Info	The system is consuming more power than the power supply or supplies are rated for. The system will throttle to avoid shutting down due to a power supply over-current condition.	1. Reduce the total power consumption by removing newly added or unused options like hard drives or adapters. 2. Add an additional power supply to any empty power supply bay.
800b0309-1301xxxx	Non-redundant:Sufficient Resources from Redundancy Degraded or Fully Redundant for Power Resource has asserted.	Warning	A change to the sufficiency status of the power supply has happened.	1. Power load will be handled by remaining power supply, though the system may throttle to avoid a power supply over-current condition. Check the power supply LED's, see "Power-supply LEDs" on page 121. 2. Replace the power supply with higher rated power.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
800b0509-1301xxxx	Non-redundant:Insufficient Resources for Power Resource has asserted.	Error	A change to the sufficiency status of the power supply has happened.	1. Power load may be handled by remaining power supply. The system will attempt to throttle to avoid a power supply over-current condition, but a system shutdown may happen anyway if the power load is too great. Check the power supply LED's, see "Power-supply LEDs" on page 121. 2. Reduce the total power consumption by removing newly added or unused options like hard drives or adapters. 3. Use the IBM Power Configuration utility to determine current system power consumption. 4. Replace the power supply with higher rated power.
806f0008-0a01xxxx 806f0008-0a02xxxx	The Power Supply (Power Supply *n*) presence has been detected. (*n* = power supply number)	Info	Power supply *n* has been added. (*n* = power supply number)	No action; information only.
806f0009-1301xxxx	System board 1 has been turned off	Info	The compute node has been powered off.	No action; information only.
806f0108-0a01xxxx 806f0108-0a02xxxx	The Power Supply *n* has failed. (*n* = power supply number)	Error	Power supply *n* has failed. (*n* = power supply number)	1. Reseat power supply *n*. 2. If the power-on LED is not lit and the power-supply error LED is lit, replace power supply *n* (see "Removing a hot-swap power supply" on page 266 and "Installing a hot-swap power supply" on page 268). 3. If both the power-on LED and the power-supply error LED are not lit, see "Power-supply LEDs" on page 121 for more information. (*n* = power supply number)
806f0109-1301xxxx	System board 1 has been turned off	Info	The compute node has been powered off.	No action; information only.
806f0308-0a01xxxx 806f0308-0a02xxxx	The Power Supply *n* has lost input. (*n* = power supply number)	Info	Power supply *n* AC has lost. (*n* = power supply number)	1. Reconnect the power cords. 2. Check power supply *n* LED. 3. See "Power-supply LEDs" on page 121 for more information. (*n* = power supply number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80070208-0a01xxxx 80070208-0a02xxxx	Sensor PS *n* Therm Fault has transitioned to critical from a less severe state. (*n* = power supply number)	Error	A sensor has changed to Critical state from a less severe state.	1. Make sure that there are no obstructions, such as bundled cables, to the airflow from the power-supply fan. 2. Use the IBM Power Configurator utility to determine current system power consumption. For more information and to download the utility, go to http://www-03.ibm.com/ systems/bladecenter/resources/ powerconfig.html. 3. Replace power supply *n*. (*n* = power supply number)
80070608-0a01xxxx 80070608-0a02xxxx	Sensor PS *n* 12V AUX Fault has transitioned to non-recoverable from a less severe state. (*n* = power supply number)	Error	A sensor has changed to non-recoverable state from a less severe state.	1. Check power supply *n* LED. 2. Replace power supply *n*. (*n* = power supply number)
80070608-0a01xxxx 80070608-0a02xxxx	Sensor PS *n* 12V OC Fault has transitioned to non-recoverable from a less severe state. (*n* = power supply number)	Error	A sensor has changed to non-recoverable state from a less severe state.	1. Use the IBM Power Configurator utility to determine current system power consumption. For more information and to download the utility, go to http://www-03.ibm.com/ systems/bladecenter/resources/ powerconfig.html.
80070608-0a01xxxx 80070608-0a02xxxx	Sensor PS *n* 12V OV Fault has transitioned to non-recoverable from a less severe state. (*n* = power supply number)	Error	A sensor has changed to non-recoverable state from a less severe state.	1. Check power supply *n* LED. 2. Remove the failing power supply. 3. (Trained technician only) Replace the system board. (*n* = power supply number)
80070608-0a01xxxx 80070608-0a02xxxx	Sensor PS *n* 12V UV Fault has transitioned to non-recoverable from a less severe state. (*n* = power supply number)	Error	A sensor has changed to non-recoverable state from a less severe state.	1. Check power supply *n* LED. 2. Remove the failing power supply. 3. (Trained technician only) Replace the system board. (*n* = power supply number)
800b0008-1301xxxx	Power Unit has been fully redundant.	Info	Power unit redundancy has been restored.	No action; information only.
800b0108-1301xxxx	Power Unit redundancy lost has asserted.	Error	Redundancy has been lost and is insufficient to continue operation.	1. Check the LEDs for both power supplies. 2. Follow the actions in "Power-supply LEDs" on page 121.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0608-1301xx03	Power supply PS Configuration error with rating mismatch.	Error	A power supply configuration error (rating mismatch) has occurred.	1. Make sure that the power supplies installed are with the same rating or wattage. 2. Reinstall the power supplies with the same rating or wattage.
Microprocessor messages				
806f0007-0301xxxx 806f0007-0302xxxx	The Processor CPU *n* Status has Failed with IERR. (*n* = microprocessor number)	Error	A processor failed - IERR condition has occurred.	1. Make sure that the latest levels of firmware and device drivers are installed for all adapters and standard devices, such as Ethernet, SCSI, and SAS. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Update the firmware (UEFI and IMM) to the latest level (see "Updating the firmware" on page 317). 3. Run the DSA program. 4. Reseat the adapter. 5. Replace the adapter. 6. (Trained technician only) Replace microprocessor *n*. 7. (Trained technician only) Replace the system board. (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0107-0301xxxx 806f0107-0302xxxx	The Processor CPU *n* Status has been detected an over-temperature condition. (*n* = microprocessor number)	Error	An over temperature condition has occurred.	1. Make sure that the latest levels of firmware and device drivers are installed for all adapters and standard devices, such as Ethernet, SCSI, and SAS. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Update the firmware (UEFI and IMM) to the latest level (see "Updating the firmware" on page 317). 3. Run the DSA program. 4. Reseat the adapter (see "Removing an adapter" on page 229 and "Installing an adapter" on page 231). 5. Replace the adapter. 6. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 7. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0207-0301xxxx 806f0207-0302xxxx	The Processor CPU *n* Status has Failed with BIST condition. (*n* = microprocessor number)	Error	A processor failed - BIST condition has occurred.	1. Make sure that the fans are operating. There are no obstructions to the airflow (front and rear of the server), the air baffles are in place and correctly installed, and the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n*is installed correctly. 3. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). (*n* = microprocessor number)
806f0507-0301xxxx 806f0507-0302xxxx	The Processor CPU *n* Status has a Configuration Mismatch. (*n* = microprocessor number)	Error	A processor configuration mismatch has occurred.	1. Check the Microprocessor LED. See more information about the Microprocessor LED in "Light path diagnostics" on page 114. 2. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 3. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and heat sink" on page 295 for information about microprocessor requirements). 4. (Trained technician only) Reseat microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 5. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0607-0301xxxx 806f0607-0302xxxx	An SM BIOS Uncorrectable CPU complex error for Processor *n* has asserted. (*n* = microprocessor number)	Error	The system management handler has detected an internal microprocessor error.	1. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and heat sink" on page 295 for information about microprocessor requirements). 2. Update the server firmware to the latest level (see "Updating the firmware" on page 317). 3. (Trained technician only) Replace the incompatible microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).
806f0707-0301xxxx 806f0707-0302xxxx	The Processor CPU *n* has been detected. (*n* = microprocessor number)	Info	A processor has been detected.	No action; information only.
806f0807-0301xxxx 806f0807-0302xxxx	The Processor CPU *n* has been disabled. (*n* = microprocessor number)	Info	A processor has been disabled.	No action; information only.
806f0207-2584xxxx	The Processor All CPUs or One of the CPUs Status has Failed with BIST condition.	Error	A processor failed - BIST condition has occurred.	1. Make sure that the fans are operating. There are no obstructions to the airflow (front and rear of the server), the air baffles are in place and correctly installed, and the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n*is installed correctly. 3. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0507-2584xxxx	The Processor All CPUs or One of the CPUs Status has a Configuration Mismatch.	Error	A processor configuration mismatch has occurred.	1. Check the CPU LED. See more information about the CPU LED in "Light path diagnostics" on page 114. 2. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 3. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and heat sink" on page 295 for information about microprocessor requirements). 4. (Trained technician only) Reseat microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 5. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)
806f0607-2584xxxx	An SM BIOS Uncorrectable CPU complex error for All CPUs or One of the CPUs has asserted.	Error	The system management handler has detected an internal microprocessor error.	1. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and heat sink" on page 295 for information about microprocessor requirements). 2. Update the server firmware to the latest level (see "Updating the firmware" on page 317). 3. (Trained technician only) Replace the incompatible microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).
806f0807-2584xxxx	The Processor for All CPUs or One of the CPUs has been disabled.	Info	A processor has been disabled.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0a07-0301xxxx 806f0a07-0302xxxx	The Processor CPU *n* is operating in a Degraded State. (*n* = microprocessor number)	Warning	Throttling has occurred for microprocessor *n*. (*n* = microprocessor number)	1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Check the ambient temperature. You must be operating within the specifications. 3. Make sure that the heat sink for microprocessor *n*is installed correctly. 4. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)
80070201-0301xxxx 80070201-0302xxxx	Sensor CPU *n* OverTemp has transitioned to critical from a less severe state. (*n* = microprocessor number)	Error	A sensor has changed to critical state from a less severe state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Check the ambient temperature. You must be operating within the specifications (see "Features and specifications" on page 7 for more information). 3. Make sure that the heat sink for microprocessor *n*is installed correctly. 4. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80070301-0301xxxx 80070301-0302xxxx	Sensor CPU *n* OverTemp has transitioned to non-recoverable from a less severe state. (*n* = microprocessor number)	Error	A sensor has changed to non-recoverable state from a less severe state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Check the ambient temperature. You must be operating within the specifications (see "Features and specifications" on page 7 for more information). 3. Make sure that the heat sink for microprocessor *n* is installed correctly (see "Installing a microprocessor and heat sink" on page 295 for more information). 4. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). (*n* = microprocessor number)
8007021b-0301xxxx 8007021b-0302xxxx	Sensor CPU *n* QPI link error has transitioned to critical from a less severe state. (*n* = microprocessor number)	Error	A sensor has changed to critical state from a less severe state.	1. Check for a server firmware update. 2. Make sure that the installed microprocessors are compatible. 3. Make sure the microprocessor 2 expansion board is installed correctly (see "Installing the microprocessor 2 expansion board" on page 303). 4. (Trained technician only) Reseat microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 5. (Trained technician only) replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0813-2584xxxx	An Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = CPUs)	1. Check the system-event log. 2. (Trained technician only) Remove the failing microprocessor from the system board (see "Removing a microprocessor and heat sink" on page 292). 3. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Make sure that the two microprocessors are matching. 5. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
8107021b-0301xxxx	Sensor CPU *n* QPILinkErr has transitioned to a less severe state from critical. (*n* = microprocessor number)	Error	CPU *n* QPI link failure detected. (*n* = microprocessor number)	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Inspect the microprocessor socket for foreign material, if the microprocessor socket contains any foreign material, remove the foreign material. If it is found damaged, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
816f0113-0301xxxx	A bus timeout has occurred on bus CPU n PECI. (n = microprocessor number)	Error	This message is for the use case when CPU *n* PECI bus access error has asserted. (*n* = microprocessor number)	1. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 2. If the problem persists and there is no other CPU with the same error indication, replace the system board. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). (*n* = microprocessor number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
816f0a13-0301xxxx	A Fatal Bus Error has occurred on bus CPU n PECI. (n = microprocessor number)	Error	This message is for the use case when CPU *n* PECI bus access error has asserted. (*n* = microprocessor number)	1. (Trained technician only) Replace microprocessor *n* (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 2. If the problem persists and there is no other CPU with the same error indication, replace the system board. 3. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). (*n* = microprocessor number)
Memory errors				
806f0813-2581xxxx	An Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = DIMMs)	1. Check the system-event log. 2. Check the DIMM error LEDs. 3. Remove the failing DIMM from the system board (see "Removing a memory module" on page 273). 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. Make sure that the installed DIMMs are supported and configured correctly (see "Installing a memory module" on page 274 for more information). 6. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f010c-2001xxxx 806f010c-2002xxxx 806f010c-2003xxxx 806f010c-2004xxxx 806f010c-2005xxxx 806f010c-2006xxxx 806f010c-2007xxxx 806f010c-2008xxxx 806f010c-2009xxxx 806f010c-200axxxx 806f010c-200bxxxx 806f010c-200cxxxx 806f010c-200dxxxx 806f010c-200exxxx 806f010c-200fxxxx 806f010c-2010xxxx 806f010c-2011xxxx 806f010c-2012xxxx 806f010c-2013xxxx 806f010c-2014xxxx 806f010c-2015xxxx 806f010c-2016xxxx 806f010c-2017xxxx 806f010c-2018xxxx	Memory uncorrectable error detected for Memory DIMM *n* Status. (*n* = DIMM number)	Error	A memory uncorrectable error has occurred.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel or microprocessor (see "Installing a memory module" on page 274 for memory population). 3. If the problem follows the DIMM, replace the failing DIMM (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 4. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 5. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 6. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f010c-2581xxxx	Memory uncorrectable error detected for One of the DIMMs or All DIMMs.	Error	A memory uncorrectable error has occurred.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel or microprocessor (see "Installing a memory module" on page 274 for memory population). 3. If the problem follows the DIMM, replace the failing DIMM (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 4. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 5. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 6. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f030c-2001xxxx 806f030c-2002xxxx 806f030c-2003xxxx 806f030c-2004xxxx 806f030c-2005xxxx 806f030c-2006xxxx 806f030c-2007xxxx 806f030c-2008xxxx 806f030c-2009xxxx 806f030c-200axxxx 806f030c-200bxxxx 806f030c-200cxxxx 806f030c-200dxxxx 806f030c-200exxxx 806f030c-200fxxxx 806f030c-2010xxxx 806f030c-2011xxxx 806f030c-2012xxxx 806f030c-2013xxxx 806f030c-2014xxxx 806f030c-2015xxxx 806f030c-2016xxxx 806f030c-2017xxxx 806f030c-2018xxxx	Memory DIMM *n* Status Scrub failure detected. (*n* = DIMM number)	Error	A memory scrub failure has been detected.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. 1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Make sure that the DIMMs are firmly seated and no foreign material is found in the DIMM connector. Then, retry with the same DIMM. 3. If the problem is related to a DIMM, replace the failing DIMM indicated by the error LEDs (see "Removing a memory module" on page 273 and "Installing a memory module" on page 274). 4. If the problem occurs on the same DIMM connector, swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel or microprocessor (see "Installing a memory module" on page 274 for memory population). 5. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). (continued on the next page)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
	Memory DIMM *n* Status Scrub failure detected. (*n* = DIMM number)	Error	A memory scrub failure has been detected.	6. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 7. (Trained technician only) Swap the affected microprocessor, if there are more than one microprocessor installed. If the problem follows the microprocessor, replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295). 8. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
806f040c-2001xxxx 806f040c-2002xxxx 806f040c-2003xxxx 806f040c-2004xxxx 806f040c-2005xxxx 806f040c-2006xxxx 806f040c-2007xxxx 806f040c-2008xxxx 806f040c-2009xxxx 806f040c-200axxxx 806f040c-200bxxxx 806f040c-200cxxxx 806f040c-200dxxxx 806f040c-200exxxx 806f040c-200fxxxx 806f040c-2010xxxx 806f040c-2011xxxx 806f040c-2012xxxx 806f040c-2013xxxx 806f040c-2014xxxx 806f040c-2015xxxx 806f040c-2016xxxx 806f040c-2017xxxx 806f040c-2018xxxx	Memory DIMM disabled for DIMM *n* Status. (*n* = DIMM number)	Info	DIMM disabled.	1. Make sure the DIMM is installed correctly (see "Installing a memory module" on page 274). 2. If the DIMM was disabled because of a memory fault (memory uncorrectable error or memory logging limit reached), follow the suggested actions for that error event and restart the server. 3. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory event. If no memory fault is recorded in the logs and no DIMM connector error LED is lit, you can re-enable the DIMM through the Setup utility or the Advanced Settings Utility (ASU).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f040c-2581xxxx	Memory DIMM disabled for One of the DIMMs or All DIMMs.	Info	DIMM disabled.	1. Make sure the DIMM is installed correctly (see "Installing a memory module" on page 274). 2. If the DIMM was disabled because of a memory fault (memory uncorrectable error or memory logging limit reached), follow the suggested actions for that error event and restart the server. 3. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory event. If no memory fault is recorded in the logs and no DIMM connector error LED is lit, you can re-enable the DIMM through the Setup utility or the Advanced Settings Utility (ASU).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	

806f050c-2001xxxx 806f050c-2002xxxx 806f050c-2003xxxx 806f050c-2004xxxx 806f050c-2005xxxx 806f050c-2006xxxx 806f050c-2007xxxx 806f050c-2008xxxx 806f050c-2009xxxx 806f050c-200axxxx 806f050c-200bxxxx 806f050c-200cxxxx 806f050c-200dxxxx 806f050c-200exxxx 806f050c-200fxxxx 806f050c-2010xxxx 806f050c-2011xxxx 806f050c-2012xxxx 806f050c-2013xxxx 806f050c-2014xxxx 806f050c-2015xxxx 806f050c-2016xxxx 806f050c-2017xxxx 806f050c-2018xxxx	Memory Logging Limit Reached for DIMM *n* Status. (*n* = DIMM number)	Error	The memory logging limit has been reached.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel or microprocessor (see (see "Installing a memory module" on page 274 for memory population). 3. If the error still occurs on the same DIMM, replace the affected DIMM. 4. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 5. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 6. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f050c-2581xxxx	Memory Logging Limit Reached for One of the DIMMs or All DIMMs.	Error	The memory logging limit has been reached.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Swap the affected DIMMs (as indicated by the error LEDs on the system board or the event logs) to a different memory channel or microprocessor (see "Installing a memory module" on page 274 for memory population). 3. If the error still occurs on the same DIMM, replace the affected DIMM. 4. (Trained technician only) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 5. (Trained technician only) Remove the affected microprocessor and check the microprocessor socket pins for any damaged pins. If a damage is found, replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 6. (Trained technician only) Replace the affected microprocessor (see "Removing a microprocessor and heat sink" on page 292 and "Installing a microprocessor and heat sink" on page 295).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f070c-2001xxxx 806f070c-2002xxxx 806f070c-2003xxxx 806f070c-2004xxxx 806f070c-2005xxxx 806f070c-2006xxxx 806f070c-2007xxxx 806f070c-2008xxxx 806f070c-2009xxxx 806f070c-200axxxx 806f070c-200bxxxx 806f070c-200cxxxx 806f070c-200dxxxx 806f070c-200exxxx 806f070c-200fxxxx 806f070c-2010xxxx 806f070c-2011xxxx 806f070c-2012xxxx 806f070c-2013xxxx 806f070c-2014xxxx 806f070c-2015xxxx 806f070c-2016xxxx 806f070c-2017xxxx 806f070c-2018xxxx	Memory DIMM Configuration Error for DIMM *n* Status. (*n* = DIMM number)	Error	A memory DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
806f070c-2581xxxx	Memory DIMM Configuration Error for One of the DIMMs or All DIMMs.	Error	A memory DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
806f090c-2001xxxx 806f090c-2002xxxx 806f090c-2003xxxx 806f090c-2004xxxx 806f090c-2005xxxx 806f090c-2006xxxx 806f090c-2007xxxx 806f090c-2008xxxx 806f090c-2009xxxx 806f090c-200axxxx 806f090c-200bxxxx 806f090c-200cxxxx 806f090c-200dxxxx 806f090c-200exxxx 806f090c-200fxxxx 806f090c-2010xxxx 806f090c-2011xxxx 806f090c-2012xxxx 806f090c-2013xxxx 806f090c-2014xxxx 806f090c-2015xxxx 806f090c-2016xxxx 806f090c-2017xxxx 806f090c-2018xxxx	Memory DIMM for DIMM *n* Status has been automatically throttled. (*n* = DIMM number)	Info	A memory DIMM has been automatically throttled.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0a0c-2001xxxx 806f0a0c-2002xxxx 806f0a0c-2003xxxx 806f0a0c-2004xxxx 806f0a0c-2005xxxx 806f0a0c-2006xxxx 806f0a0c-2007xxxx 806f0a0c-2008xxxx 806f0a0c-2009xxxx 806f0a0c-200axxxx 806f0a0c-200bxxxx 806f0a0c-200cxxxx 806f0a0c-200dxxxx 806f0a0c-200exxxx 806f0a0c-200fxxxx 806f0a0c-2010xxxx 806f0a0c-2011xxxx 806f0a0c-2012xxxx 806f0a0c-2013xxxx 806f0a0c-2014xxxx 806f0a0c-2015xxxx 806f0a0c-2016xxxx 806f0a0c-2017xxxx 806f0a0c-2018xxxx	An Over-Temperature condition has been detected on the DIMM *n* Status. (*n* = DIMM number)	Error	An over-temperature condition has occurred for DIMM *n*. (*n* = DIMM number)	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that ambient temperature is within the specifications. 3. If a fan has failed, complete the action for a fan failure. 4. Replace DIMM *n*. (*n* = DIMM number)
800b010c-2581xxxx	Backup Memory redundancy lost has asserted.	Error	Redundancy has been lost.	1. Check the system-event log for DIMM failure events (uncorrectable or PFA) and correct the failures. 2. Re-enable mirrored mode in the Setup utility.
800b030c-2581xxxx	Backup Memory sufficient resources from redundancy degraded has asserted.	Warning	There is no redundancy. The state has been transitioned from redundancy to sufficient resources.	1. Check the system-event log for DIMM failure events (uncorrectable or PFA) and correct the failures. 2. Re-enable mirrored mode in the Setup utility.
800b050c-2581xxxx	Backup Memory insufficient resources has asserted.	Error	There is no redundancy and insufficient to continue operation.	1. Check the system-event log for DIMM failure events (uncorrectable or PFA) and correct the failures. 2. Re-enable mirrored mode in the Setup utility.
Storage messages				

Table 4. IMM2 error messages (continued)

| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** | | | | |
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
816f000d-0400xxxx 816f000d-0401xxxx 816f000d-0402xxxx 816f000d-0403xxxx 816f000d-0404xxxx 816f000d-0405xxxx 816f000d-0406xxxx 816f000d-0407xxxx 816f000d-0408xxxx 816f000d-0409xxxx 816f000d-040axxxx 816f000d-040bxxxx 816f000d-040cxxxx 816f000d-040dxxxx 816f000d-040exxxx 816f000d-040fxxxx 816f000d-0410xxxx 816f000d-0411xxxx 816f000d-0412xxxx 816f000d-0413xxxx 816f000d-0414xxxx 816f000d-0415xxxx 816f000d-0416xxxx 816f000d-0417xxxx 816f000d-0418xxxx 816f000d-0419xxxx 816f000d-041axxxx 816f000d-041bxxxx 816f000d-041cxxxx 816f000d-041dxxxx 816f000d-041exxxx 816f000d-041fxxxx	The Drive *n* Status has been removed from unit. (*n* = hard disk drive number)	Error	A drive has been removed.	1. Reseat hard disk drive *n*. (*n* = hard disk drive number). Wait 1 minute or more before reinstalling the drive. 2. Replace the hard disk drive. 3. Make sure that the disk firmware and RAID controller firmware is at the latest level. 4. Check the SAS cable.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				

806f010d-0400xxxx
806f010d-0401xxxx
806f010d-0402xxxx
806f010d-0403xxxx
806f010d-0404xxxx
806f010d-0405xxxx
806f010d-0406xxxx
806f010d-0407xxxx
806f010d-0408xxxx
806f010d-0409xxxx
806f010d-040axxxx
806f010d-040bxxxx
806f010d-040cxxxx
806f010d-040dxxxx
806f010d-040exxxx
806f010d-040fxxxx
806f010d-0410xxxx
806f010d-0411xxxx
806f010d-0412xxxx
806f010d-0413xxxx
806f010d-0414xxxx
806f010d-0415xxxx
806f010d-0416xxxx
806f010d-0417xxxx
806f010d-0418xxxx
806f010d-0419xxxx
806f010d-041axxxx
806f010d-041bxxxx
806f010d-041cxxxx
806f010d-041dxxxx
806f010d-041exxxx
806f010d-041fxxxx
	The Drive *n* Status has been disabled due to a detected fault. (*n* = hard disk drive number)	Error	A drive has been disabled because of a fault.	1. Run the hard disk drive diagnostic test on drive *n*.
				2. Reseat the following components:
				  a. Hard disk drive (wait 1 minute or more before reinstalling the drive).
				  b. Cable from the system board to the backplane
				3. Replace the following components one at a time, in the order shown, restarting the server each time:
				  a. Hard disk drive
				  b. Cable from the system board to the backplane
				  c. Hard disk drive backplane
				(*n* = hard disk drive number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f020d-0400xxxx 806f020d-0401xxxx 806f020d-0402xxxx 806f020d-0403xxxx 806f020d-0404xxxx 806f020d-0405xxxx 806f020d-0406xxxx 806f020d-0407xxxx 806f020d-0408xxxx 806f020d-0409xxxx 806f020d-040axxxx 806f020d-040bxxxx 806f020d-040cxxxx 806f020d-040dxxxx 806f020d-040exxxx 806f020d-040fxxxx 806f020d-0410xxxx 806f020d-0411xxxx 806f020d-0412xxxx 806f020d-0413xxxx 806f020d-0414xxxx 806f020d-0415xxxx 806f020d-0416xxxx 806f020d-0417xxxx 806f020d-0418xxxx 806f020d-0419xxxx 806f020d-041axxxx 806f020d-041bxxxx 806f020d-041cxxxx 806f020d-041dxxxx 806f020d-041exxxx 806f020d-041fxxxx	The Drive *n* Status has a predictive failure. (*n* = hard disk drive number)	Warning	A predictive failure has been detected for drive *n*. (*n* = hard disk drive number)	1. Check the hard disk drive LEDs. 2. Reseat the hard disk drive with lit status LED. 3. Replace the hard disk drive *n*. (*n* = hard disk drive number)

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f050d-0400xxxx 806f050d-0401xxxx 806f050d-0402xxxx 806f050d-0403xxxx 806f050d-0404xxxx 806f050d-0405xxxx 806f050d-0406xxxx 806f050d-0407xxxx 806f050d-0408xxxx 806f050d-0409xxxx 806f050d-040axxxx 806f050d-040bxxxx 806f050d-040cxxxx 806f050d-040dxxxx 806f050d-040exxxx 806f050d-040fxxxx 806f050d-0410xxxx 806f050d-0411xxxx 806f050d-0412xxxx 806f050d-0413xxxx 806f050d-0414xxxx 806f050d-0415xxxx 806f050d-0416xxxx 806f050d-0417xxxx 806f050d-0418xxxx 806f050d-0419xxxx 806f050d-041axxxx 806f050d-041bxxxx 806f050d-041cxxxx 806f050d-041dxxxx 806f050d-041exxxx 806f050d-041fxxxx	Array %1 is in critical condition. (%1 = CIM_ComputerSystem. ElementName)	Error	An array is in a critical state. (Sensor = Drive n Status) (n = hard disk drive number)	1. Make sure that the RAID adapter firmware and hard disk drive firmware is at the latest level. 2. Make sure that the SAS cable is connected correctly. 3. Replace the SAS cable. 4. Replace the RAID adapter. 5. Replace the hard disk drive that is indicated by a lit status LED.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f060d-0400xxxx 806f060d-0401xxxx 806f060d-0402xxxx 806f060d-0403xxxx 806f060d-0404xxxx 806f060d-0405xxxx 806f060d-0406xxxx 806f060d-0407xxxx 806f060d-0408xxxx 806f060d-0409xxxx 806f060d-040axxxx 806f060d-040bxxxx 806f060d-040cxxxx 806f060d-040dxxxx 806f060d-040exxxx 806f060d-040fxxxx 806f060d-0410xxxx 806f060d-0411xxxx 806f060d-0412xxxx 806f060d-0413xxxx 806f060d-0414xxxx 806f060d-0415xxxx 806f060d-0416xxxx 806f060d-0417xxxx 806f060d-0418xxxx 806f060d-0419xxxx 806f060d-041axxxx 806f060d-041bxxxx 806f060d-041cxxxx 806f060d-041dxxxx 806f060d-041exxxx 806f060d-041fxxxx	Array %1 has failed. (%1 = CIM_ComputerSystem. ElementName)	Error	An array is in a failed state. (Sensor = Drive *n* Status) (*n* = hard disk drive number)	1. Make sure that the RAID adapter firmware and hard disk drive firmware is at the latest level. 2. Make sure that the SAS cable is connected correctly. 3. Replace the SAS cable. 4. Replace the RAID adapter. 5. Replace the hard disk drive that is indicated by a lit status LED.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f070d-0400xxxx 806f070d-0401xxxx 806f070d-0402xxxx 806f070d-0403xxxx 806f070d-0404xxxx 806f070d-0405xxxx 806f070d-0406xxxx 806f070d-0407xxxx 806f070d-0408xxxx 806f070d-0409xxxx 806f070d-040axxxx 806f070d-040bxxxx 806f070d-040cxxxx 806f070d-040dxxxx 806f070d-040exxxx 806f070d-040fxxxx 806f070d-0410xxxx 806f070d-0411xxxx 806f070d-0412xxxx 806f070d-0413xxxx 806f070d-0414xxxx 806f070d-0415xxxx 806f070d-0416xxxx 806f070d-0417xxxx 806f070d-0418xxxx 806f070d-0419xxxx 806f070d-041axxxx 806f070d-041bxxxx 806f070d-041cxxxx 806f070d-041dxxxx 806f070d-041exxxx 806f070d-041fxxxx	The Drive *n* Status rebuilt has been in progress. (*n* = hard disk drive number)	Info	The Drive *n* has rebuilt in progress. (*n* = hard disk drive number)	No action; information only.
PCI messages				
8007020f-2582xxxx	Sensor No PCI I/O Space has transitioned to Critical from less severe state.	Error	PCI I/O resource error. Firmware progress (no I/O resources).	Complete the following steps for PCI I/O resource error issue resolution: 1. Understand the I/O resource requirements in a basic system. 2. Identify the I/O resource requirements for desired add-in adapters. For examples, PCI-X or PCIe adapters. 3. Disable on-board devices that you can do without and that request I/O. 4. In F1 setup, select the **System Settings** → **Device and I/O Ports** menu. 5. Remove adapters or disable slots until the I/O resource is less than 64 KB.

Table 4. IMM2 error messages (continued)

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**

| 806f0021-2201xxxx | Fault in slot No Op ROM Space on system [ComputerSystemElementName]. | Error | Option ROM resource allocation failure. This message is for the use case when an implementation has detected a Fault in a slot. (Sensor = No Op ROM Space) | Informational message that some devices might not be initialized.

 1. If possible, rearrange the order of the adapters in the PCI slots to change the load order of the optional-device ROM code.

 2. Run the Setup utility, select **Start Options**, and change the boot priority to change the load order of the optional-device ROM code.

 3. Run the Setup utility and disable some other resources, if their functions are not being used, to make more space available. Select **Devices and I/O Ports** to disable any of the integrated devices.

 4. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. Each adapter.
   b. (Trained technician only) System board. |
| 806f0021-3001xxxx
 806f0021-3002xxxx
 806f0021-3003xxxx
 806f0021-3004xxxx
 806f0021-3005xxxx
 806f0021-3006xxxx
 806f0021-3007xxxx
 806f0021-3008xxxx | PCI fault has been detected for PCI *n*. (*n* = PCI slot number) | Error | A PCI fault has been detected. | 1. Check the PCI LED. See more information about the PCI LED in "Light path diagnostics" on page 114.

 2. Reseat the affected adapters and the PCI-X interposer card.

 3. Update the server firmware (UEFI and IMM) and adapter firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

 4. Remove the adapters.

 5. (Trained technicians only) Replace the system board or the microprocessor 2 expansion board. |

Table 4. IMM2 error messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.

806f0021-2582xxxx	PCI fault has been detected for One of PCI Error.	Error	A PCI fault has been detected.	1. Check the PCI LED. See more information about the PCI LED in "Light path diagnostics" on page 114.
				2. Reseat the affected adapters and riser cards.
				3. Update the server firmware (UEFI and IMM) and adapter firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
				4. Remove both adapters.
				5. Replace the riser cards.
				6. (Trained technicians only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
806f0021-2582xxxx	PCI fault has been detected for All PCI Error.	Error	A PCI fault has been detected.	1. Check the PCI LED. See more information about the PCI LED in "Light path diagnostics" on page 114.
				2. Reseat the affected adapters and riser cards.
				3. Update the server firmware (UEFI and IMM) and adapter firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
				4. Replace the adapters.
				5. Replace the riser cards.
				6. (Trained technicians only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0413-2582xxxx	A PCI PERR has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A PCI PERR has occurred. (Sensor = PCIs)	1. Check the PCI LED. See more information about the PCI LED in "Light path diagnostics" on page 114. 2. Reseat the affected adapters and the PCI-X interposer card. 3. Update the server firmware (UEFI and IMM) and adapter firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Replace the adapters. 5. Replace the PCI-X interposer card.
806f0513-2582xxxx	A PCI SERR has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A PCI SERR has occurred. (Sensor = PCIs)	1. Check the PCI LED. See more information about the PCI LED in "Light path diagnostics" on page 114. 2. Reseat the affected adapters and the PCI-X interposer card. 3. Update the server firmware (UEFI and IMM) and adapter firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Make sure that the adapter is supported. For a list of supported optional devices, see http://www.ibm.com/systems/info/ x86servers/serverproven/compat/ us/. 5. Replace the adapters. 6. Replace the PCI-X interposer card.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0813-2582xxxx	An Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = PCIs)	1. Check the system-event log. 2. Check the PCI LED. See more information about the PCI LED in "Light path diagnostics" on page 114. 3. Remove the adapter from the indicated PCI slot. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
Firmware and software messages				
806f000f-22010bxx	The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem. ElementName)	Error	Firmware BIOS (ROM) corruption was detected during POST. (Sensor = ABR Status)	1. Make sure the server meets the minimum configuration to start (see "Power-supply LEDs" on page 121). 2. Recover the server firmware from the backup page: a. Restart the server. b. At the prompt, press F3 to recover the firmware. 3. Update the server firmware to the latest level (see "Updating the firmware" on page 317). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Remove components one at a time, restarting the server each time, to see if the problem goes away. 5. If the problem remains, (trained technician) replace the system board.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
816f000f-22010bxx	The System %1 encountered a POST Error deasserted. (%1 = CIM_ComputerSystem. ElementName)	Error	Firmware BIOS (ROM) corruption was deasserted during POST. (Sensor = ABR Status)	No action; information only.
806f000f-2201xxxx	The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem. ElementName)	Error	The System encountered a firmware error. (Sensor = Firmware Error)	1. Make sure the server meets the minimum configuration to start (see "Power-supply LEDs" on page 121). 2. Update the server firmware on the primary page. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 3. (Trained technician only) Replace the system board.
806f010f-2201xxxx	The System %1 encountered a POST Hang. (%1 = CIM_ComputerSystem. ElementName)	Error	The System encountered a firmware hang. (Sensor = Firmware Error)	1. Make sure the server meets the minimum configuration to start (see "Power-supply LEDs" on page 121). 2. Update the server firmware on the primary page. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 3. (Trained technician only) Replace the system board.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f052b-2101xxxx	IMM2 FW Failover has been detected.	Error	Invalid or unsupported firmware or software was detected.	1. Make sure the server meets the minimum configuration to start (see "Power-supply LEDs" on page 121). 2. Update the server firmware to the latest level (see "Updating the firmware" on page 317). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 3. Remove components one at a time, restarting the server each time, to see if the problem goes away. 4. If the problem remains, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
General messages				
8007010f-2201xxxx	Sensor TXT ACM Module has transitioned from normal to non-critical state.	Warning	When TXT enabled in Setup menu but the startup BIOS fails. Log an error.	1. Ensure the TPM chip is enabled. 2. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80070114-2201xxxx	Sensor TPM Phy Pres Set has transitioned from normal to non-critical state.	Warning	The TPM PP sensor is a monitor on the TPM device PP pin's assertion. There are two TPM devices on the IBM server, one is used by uEFI /OS and another is used by IMM. When the sensor is asserted , it means the TPM device PP pin had been pulled to low state. This is a log for user to know the TPM device had been cleared and TPM owner can be taken again.	1. Complete the administrative tasks that require the TPM physical presence switch to be in the **ON** position. 2. Restore the physical presence switch to the **OFF** position. 3. Reboot the system. 4. (Trained technician only) If the error continues, replace the system-board assembly (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80070202-0701xxxx	Sensor Planar Fault has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state.	1. Check the system-event log. 2. Check for an error LED on the system board. 3. Replace any failing device. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80070202-1201xxxx	Sensor CPU2 BRD Fault has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state for the microprocessor 2 expansion board.	1. Check the system-event log. 2. Check for an error LED on the microprocessor 2 expansion board. 3. Replace any failing device. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained technician only) Replace the microprocessor 2 expansion board (see "Removing the microprocessor 2 expansion board" on page 302 and "Installing the microprocessor 2 expansion board" on page 303).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				

80070202-1501xxxx	Sensor Power PDB Fault has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state for the power paddle card.	1. Reseat the following components:
				   • Power supply (see "Removing a hot-swap power supply" on page 266 and "Installing a hot-swap power supply" on page 268)
				   • Power paddle card cables (see "Removing the power paddle card" on page 288 and "Installing the power paddle card" on page 290)
				   • Power paddle card
				2. Replace the following components one at a time, in the order shown, restarting the server each time:
				   • Power supply (see "Removing a hot-swap power supply" on page 266 and "Installing a hot-swap power supply" on page 268)
				   • Power paddle card (see "Removing the power paddle card" on page 288 and "Installing the power paddle card" on page 290)

80070214-2201xxxx	Sensor TPM Lock has transitioned to a less severe state from critical.	Error	On production build systems, TPM needs to be locked. The error is logged when UEFI detects TPM is not locked on production builds.	1. Update the server firmware (see "Recovering the server firmware" on page 160). 2. If the problem persists, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
80070614-2201xxxx	Sensor TPM Phy Pres Set has transitioned to non-recoverable.	Error	System initial TPM chip has failed.	1. Update the server firmware (see "Recovering the server firmware" on page 160). 2. If the problem persists, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0005-1701xxxx	The chassis error has asserted.	Warning	The system has detected a chassis intrusion.	1. Reseat the left-side cover (see "Removing the left-side cover" on page 201 and "Installing the left-side cover" on page 201). 2. Reseat the left-side cover/power cut-off switch assembly (see "Removing the left-side cover/power cut-off switch assembly" on page 286 and "Installing the left-side cover/power cut-off switch assembly" on page 287). 3. Replace the left-side cover. 4. Replace the left-side cover/power cut-off switch assembly.
816f0005-1701xxxx	The chassis error has deasserted.	Info	The system has not detected a chassis intrusion.	No action; information only.
806f0013-1701xxxx	A front panel NMI has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	An operator information panel NMI/diagnostic interrupt has occurred.	1. Check the device driver. 2. Reinstall the device driver. 3. Update all device drivers to the latest level. 4. Update the firmware (UEFI and IMM) (see "Updating the firmware" on page 317).
806f0023-2101xxxx	Watchdog Timer expired for IPMI Watchdog.	Info	The IPMI watchdog timer has expired.	No action; information only.
806f0123-2101xxxx	Reboot of system [ComputerSystemElementName] initiated by IPMI Watchdog.	Info	The IPMI watchdog timer has expired. The compute node has restarted.	No action; information only.
806f0223-2101xxxx	Powering off system [ComputerSystemElementName] initiated by IPMI Watchdog.	Info	The IPMI watchdog timer has expired. The compute node has been powered off.	No action; information only.
806f0313-1701xxxx	A software NMI has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A software NMI has occurred.	1. Check the device driver. 2. Reinstall the device driver. 3. Update all device drivers to the latest level. 4. Update the firmware (UEFI and IMM) (see "Updating the firmware" on page 317).

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**			
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**			
806f0323-2101xxxx	Power cycle of system [ComputerSystemElementName] initiated by watchdog IPMI Watchdog.	Info	The IPMI watchdog timer has expired. The compute node has been powered off and powered on.	No action; information only.
806f0823-2101xxxx	Watchdog Timer interrupt occurred for [WatchdogElementName].	Info	The IPMI watchdog timer has expired. A watchdog interrupt has occurred.	No action; information only.
81030012-2301xxxx	OS RealTime Mod state has deasserted.	Info	Indicate whether the system management firmware is working in the state to support the realtime OS.	No action; information only.
80070219-0701xxxx	Sensor Sys Board Fault has transitioned to critical.	Error	A sensor has changed to Critical state from a less severe state.	1. Check the system-event log. 2. Check for an error LED on the system board. 3. Replace any failing device. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained technician only) Replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
806f020f-2201xxxx	The System %1 encountered a POST Progress. (%1 = CIM_ComputerSystem. ElementName)	Info	A POST progress has been detected. (Sensor = Progress)	No action; information only.
806f0312-2201xxxx	Entry to aux log has asserted.	Info	Entry to aux log has been detected.	No action; information only.
80080128-2101xxxx	Low security jumper presence has asserted.	Info	The low security jumper has been detected.	No action; information only.
8008010f-2101xxxx	Physical presence jumper presence has asserted.	Info	The physical presence jumper has been detected.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
81030006-2101xxxx	Sig verify fail has deasserted.	Info	The sig verify fail has deasserted.	No action; information only.
806f0028-2101xxxx	TPM command fail has asserted.	Error	The TPM sensor access has been degraded or unavailable.	1. Turn off the server and disconnect the power cords. Reconnect the power cords and restart the server. 2. If the problem remains, (trained technician only) replace the system board (see "Removing the system board" on page 310 and "Installing the system board" on page 312).
Web interface messages				
40000001-00000000	IMM Network Initialization Complete.	Info	An IMM network has completed initialization.	No action; information only.
40000002-00000000	Certificate Authority %1 has detected a %2 Certificate Error. (%1 = IBM_CertificateAuthority. CADistinguishedName; %2 = CIM_PublicKeyCertificate. ElementName)	Error	A problem has occurred with the SSL Server, SSL Client, or SSL Trusted CA certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated by the **Generate a New Key and Certificate Signing Request** link.	1. Make sure that the certificate that you are importing is correct. 2. Try importing the certificate again.
40000003-00000000	Ethernet Data Rate modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.Speed; %2 = CIM_EthernetPort.Speed; %3 = user ID)	Info	A user has modified the Ethernet port data rate.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000004-00000000	Ethernet Duplex setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort. FullDuplex; %2 = CIM_EthernetPort. FullDuplex; %3 = user ID)	Info	A user has modified the Ethernet port duplex setting.	No action; information only.
40000005-00000000	Ethernet MTU setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort. ActiveMaximum TransmissionUnit; %2 = CIM_EthernetPort. ActiveMaximum TransmissionUnit; %3 = user ID)	Info	A user has modified the Ethernet port MTU setting.	No action; information only.
40000006-00000000	Ethernet Duplex setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort. NetworkAddresses; %2 = CIM_EthernetPort. NetworkAddresses; %3 = user ID)	Info	A user has modified the Ethernet port MAC address setting.	No action; information only.
40000007-00000000	Ethernet interface %1 by user %2. (%1 = CIM_EthernetPort. EnabledState; %2 = user ID)	Info	A user has enabled or disabled the Ethernet interface.	No action; information only.
40000008-00000000	Hostname set to %1 by user %2. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = user ID)	Info	A user has modified the host name of the IMM.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000009-00000000	IP address of network interface modified from %1 to %2 by user %3. (%1 = CIM_IPProtocolEndpoint. IPv4Address; %2 = CIM_Static IPAssignment SettingData. IPAddress; %3 = user ID)	Info	A user has modified the IP address of the IMM.	No action; information only.
4000000a-00000000	IP subnet mask of network interface modified from %1 to %2 by user %3s. (%1 = CIM_IPProtocolEndpoint. SubnetMask; %2 = CIM_StaticIPAssignment SettingData. SubnetMask; %3 = user ID)	Info	A user has modified the IP subnet mask of the IMM.	No action; information only.
4000000b-00000000	IP address of default gateway modified from %1 to %2 by user %3s. (%1 = CIM_IPProtocolEndpoint. GatewayIPv4Address; %2 = CIM_StaticIPAssignment SettingData. DefaultGatewayAddress; %3 = user ID)	Info	A user has modified the default gateway IP address of the IMM.	No action; information only.
4000000c-00000000	OS Watchdog response %1 by %2. (%1 = Enabled or Disabled; %2 = user ID)	Info	A user has enabled or disabled an OS Watchdog.	No action; information only.
4000000d-00000000	DHCP[%1] failure, no IP address assigned. (%1 = IP address, *xxx.xxx.xxx.xxx*)	Info	A DHCP server has failed to assign an IP address to the IMM.	1. Make sure that the network cable is connected. 2. Make sure that there is a DHCP server on the network that can assign an IP address to the IMM.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
4000000e-00000000	Remote Login Successful. Login ID: %1 from %2 at IP address %3. (%1 = user ID; %2 = ValueMap(CIM_Protocol Endpoint. ProtocolIFType; %3 = IP address, *xxx.xxx.xxx.xxx*)	Info	A user has successfully logged in to the IMM.	No action; information only.
4000000f-00000000	Attempting to %1 server %2 by user %3. (%1 = Power Up, Power Down, Power Cycle, or Reset; %2 = IBM_ComputerSystem. ElementName; %3 = user ID)	Info	A user has used the IMM to perform a power function on the server.	No action; information only.
40000010-00000000	Security: Userid: '%1' had %2 login failures from WEB client at IP address %3. (%1 = user ID; %2 = MaximumSuccessive LoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from a web browser and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
40000011-00000000	Security: Login ID: '%1' had %2 login failures from CLI at %3. (%1 = user ID; %2 = MaximumSuccessive LoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from the command-line interface and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
40000012-00000000	Remote access attempt failed. Invalid userid or password received. Userid is '%1' from WEB browser at IP address %2. (%1 = user ID; %2 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has attempted to log in from a web browser by using an invalid login ID or password.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000013-00000000	Remote access attempt failed. Invalid userid or password received. Userid is '%1' from TELNET client at IP address %2. (%1 = user ID; %2 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has attempted to log in from a Telnet session by using an invalid login ID or password.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
40000014-00000000	The Chassis Event Log (CEL) on system %1 cleared by user %2. (%1 = CIM_ComputerSystem. ElementName; %2 = user ID)	Info	A user has cleared the IMM event log.	No action; information only.
40000015-00000000	IMM reset was initiated by user %1. (%1 = user ID)	Info	A user has initiated a reset of the IMM.	No action; information only.
40000016-00000000	ENET[0] DHCP-HSTN=%1, DN=%2, IP@=%3, SN=%4, GW@=%5, DNS1@=%6. (%1 = CIM_DNSProtocol Endpoint.Hostname; %2 = CIM_DNSProtocol Endpoint.DomainName; %3 = CIM_IPProtocolEndpoint. IPv4Address; %4 = CIM_IPProtocolEndpoint. SubnetMask; %5 = IP address, *xxx.xxx.xxx.xxx*; %6 = IP address, *xxx.xxx.xxx.xxx*)	Info	The DHCP server has assigned an IMM IP address and configuration.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000017-00000000	ENET[0] IP-Cfg:HstName=%1, IP@%2, NetMsk=%3, GW@=%4. (%1 = CIM_DNSProtocol Endpoint.Hostname; %2 = CIM_StaticIPSettingData. IPv4Address; %3 = CIM_StaticIPSettingData. SubnetMask; %4 = CIM_StaticIPSettingData. DefaultGatewayAddress)	Info	An IMM IP address and configuration have been assigned using client data.	No action; information only.
40000018-00000000	LAN: Ethernet[0] interface is no longer active.	Info	The IMM Ethernet interface has been disabled.	No action; information only.
40000019-00000000	LAN: Ethernet[0] interface is now active.	Info	The IMM Ethernet interface has been enabled.	No action; information only.
4000001a-00000000	DHCP setting changed to by user %1. (%1 = user ID)	Info	A user has changed the DHCP mode.	No action; information only.
4000001b-00000000	IMM: Configuration %1 restored from a configuration file by user %2. (%1 = CIM_ConfigurationData. ConfigurationName; %2 = user ID)	Info	A user has restored the IMM configuration by importing a configuration file.	No action; information only.
4000001c-00000000	Watchdog %1 Screen Capture Occurred. (%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture was successful.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
4000001d-00000000	Watchdog %1 Failed to Capture Screen. (%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture failed.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system. 6. Update the IMM firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
4000001e-00000000	Running the backup IMM main application.	Error	The IMM has resorted to running the backup main application.	Update the IMM firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
4000001f-00000000	Please ensure that the IMM is flashed with the correct firmware. The IMM is unable to match its firmware to the server.	Error	The server does not support the installed IMM firmware version.	Update the IMM firmware to a version that the server supports. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
40000020-00000000	IMM reset was caused by restoring default values.	Info	The IMM has been reset because a user has restored the configuration to its default settings.	No action; information only.
40000021-00000000	IMM clock has been set from NTP server %1. (%1 = IBM_NTPService. ElementName)	Info	The IMM clock has been set to the date and time that is provided by the Network Time Protocol server.	No action; information only.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	

40000022-00000000	SSL data in the IMM configuration data is invalid. Clearing configuration data region and disabling SSL+H25.	Error	There is a problem with the certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated through the **Generate a New Key and Certificate Signing Request** link.	1. Make sure that the certificate that you are importing is correct. 2. Try to import the certificate again.
40000023-00000000	Flash of %1 from %2 succeeded for user %3. (%1 = CIM_ManagedElement. ElementName; %2 = Web or LegacyCLI; %3 = user ID)	Info	A user has successfully updated one of the following firmware components: • IMM main application • IMM boot ROM • Server firmware (UEFI) • Diagnostics • System power backplane • Remote expansion enclosure power backplane • Integrated service processor • Remote expansion enclosure processor	No action; information only.
40000024-00000000	Flash of %1 from %2 failed for user %3. (%1 = CIM_ManagedElement. ElementName; %2 = Web or LegacyCLI; %3 = user ID)	Info	An attempt to update a firmware component from the interface and IP address has failed.	Try to update the firmware again.

Table 4. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000025-00000000	The Chassis Event Log (CEL) on system %1 is 75% full. (%1 = CIM_ComputerSystem. ElementName)	Info	The IMM event log is 75% full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
40000026-00000000	The Chassis Event Log (CEL) on system %1 is 100% full. (%1 = CIM_ComputerSystem. ElementName)	Info	The IMM event log is full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
40000027-00000000	%1 Platform Watchdog Timer expired for %2. (%1 = OS Watchdog or Loader Watchdog; %2 = OS Watchdog or Loader Watchdog)	Error	A Platform Watchdog Timer Expired event has occurred.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.
40000028-00000000	IMM Test Alert Generated by %1. (%1 = user ID)	Info	A user has generated a test alert from the IMM.	No action; information only.
40000029-00000000	Security: Userid: '%1' had %2 login failures from an SSH client at IP address %3. (%1 = user ID; %2 = MaximumSuccessive LoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from SSH and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.

Checkout procedure

The checkout procedure is the sequence of tasks that you should follow to diagnose a problem in the server.

About the checkout procedure

Before you perform the checkout procedure for diagnosing hardware problems, review the following information:

- Read the safety information that begins on page vii.
- The diagnostic programs provide the primary methods of testing the major components of the server, such as the system board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly.
- When you run the diagnostic programs, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

  Exception: If multiple error codes or light path diagnostics LEDs indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 106 for information about diagnosing microprocessor problems.

- Before you run the diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:
  - You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).
  - One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.
  - One or more servers are located near the failing server.

  Important: If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as "quick" or "normal" tests, because this might enable the hard disk drive diagnostic tests.

- If the server is halted and a POST error code is displayed, see "POST/UEFI diagnostic codes" on page 26. If the server is halted and no error message is displayed, see "Troubleshooting tables" on page 99 and "Solving undetermined problems" on page 163.
- For information about power-supply problems, see "Solving power problems" on page 162 and "Power-supply LEDs" on page 121.
- For intermittent problems, check the system-event log; see "Event logs" on page 23, "System-event log" on page 45, and "Diagnostic programs, messages, and error codes" on page 124.

Performing the checkout procedure

To perform the checkout procedure, complete the following steps:

1. Is the server part of a cluster?

   - **No:** Go to step 2.
   - **Yes:** Shut down all failing servers that are related to the cluster. Go to step 2.

2. Complete the following steps:

   a. Turn off the server and all external devices.

   b. Check all cables and power cords.

   c. Check all internal and external devices for compatibility at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

   d. Set all display controls to the middle positions.

   e. Turn on all external devices.

   f. Turn on the server. If the server does not start, see "Troubleshooting tables" on page 99.

   g. Check the system-error LED on the operator information panel (see "Server controls, LEDs, and connectors" on page 9). If it is flashing, check the light path diagnostics LEDs (see "Light path diagnostics" on page 114).

   h. Check for the following results:

      - Successful completion of POST
      - Successful completion of startup, indicated by a readable display of the operating-system desktop

3. Are there readable instructions on the main menu?

   - **No:** Find the failure symptom in "Troubleshooting tables" on page 99; if necessary, see "Solving undetermined problems" on page 163.
   - **Yes:** Run the diagnostic programs (see "Running the diagnostic programs" on page 124).

      – If you receive an error, see "Diagnostic messages" on page 125.

      – If the diagnostic programs were completed successfully and you still suspect a problem, see "Solving undetermined problems" on page 163.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

If you cannot find a problem in these tables, see "Running the diagnostic programs" on page 124 for information about testing the server.

If you have just added new software or a new optional device and the server is not working, complete the following steps before you use the troubleshooting tables:

1. Check the operator information panel and the light path diagnostics LEDs (see "Light path diagnostics" on page 114).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

DVD drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action
The DVD drive is not recognized.	1. Make sure that: • The SATA channel to which the DVD drive is attached (primary or secondary) is enabled in the Setup utility. • All cables and jumpers are installed correctly. • The signal cable and connector are not damaged and the connector pins are not bent. • The correct device driver is installed for the DVD drive. 2. Run the DVD drive diagnostic programs. 3. Reseat the following components: a. DVD drive b. DVD drive cables 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. DVD drive b. DVD drive and cables c. (Trained technician only) System board
A DVD is not working correctly.	1. Clean the DVD. 2. Run the DVD drive diagnostic programs. 3. Reseat the DVD drive. 4. Replace the DVD drive.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
The DVD drive tray is not working.	1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the DVD drive. 4. Replace the DVD drive.

General problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a microprocessor or a system board, the part must be replaced by a trained technician.
The server is hung while the screen is on. Cannot start the Setup utility by pressing F1.	1. See "Nx boot failure" on page 161 for more information. 2. See "Recovering the server firmware" on page 160 for more information.

Hard disk drive problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic tests.	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic tests again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
A hard disk drive passes the diagnostic Fixed Disk Test, but the problem remains.	Run the diagnostic SCSI Fixed Disk Test (see "Running the diagnostic programs" on page 124). **Note:** This test is not available on servers that have RAID arrays or servers that have SATA hard disk drives.

Hypervisor problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
If an optional embedded hypervisor flash device is not listed in the expected boot order, does not appear in the list of boot devices, or a similar problem has occurred.	1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager (<F12> Select Boot Device) at startup. 2. Make sure that the embedded hypervisor flash device is seated in the connector correctly (see "Removing a USB embedded hypervisor flash device" on page 281and "Installing a USB embedded hypervisor flash device" on page 282). 3. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information. 4. Make sure that other software works on the server.

Intermittent problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that:
	  • All cables and cords are connected securely to the rear of the server and attached devices.
	  • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down.
	2. Check the system-event log or IMM2 log (see "Event logs" on page 23).
	3. See "Solving undetermined problems" on page 163.

Keyboard, mouse, or USB-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

All or some keys on the keyboard do not work.	1. Make sure that:
	  • The keyboard cable is securely connected.
	  • The server and the monitor are turned on.
	2. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for keyboard compatibility.
	3. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation to prevent the 301 POST error message from being displayed during startup.
	4. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
	5. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. Keyboard
	  b. (Trained technician only) System board

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	
Symptom	**Action**

The mouse or USB device does not work.	1. Make sure that:
	 • The mouse or USB device is compatible with the server. See http://www.ibm.com/servers/eserver/serverproven/compat/us/.
	 • The mouse or USB device cable is securely connected to the server.
	 • The mouse or USB device drivers are installed correctly.
	 • The server and the monitor are turned on.
	 • The mouse is enabled in the Setup utility.
	 2. If you are using a USB mouse or USB device and it is connected to a USB hub, disconnect the mouse or USB device from the hub and connect it directly to the server.
	 3. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. Mouse or USB device
	   b. (Trained technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that:
	  • No error LEDs are lit on the operator information panel or on the DIMM.
	  • Memory mirrored does not account for the discrepancy.
	  • The memory modules are seated correctly.
	  • You have installed the correct type of memory.
	  • If you changed the memory, you updated the memory configuration in the Setup utility.
	  • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
	2. Check the POST error log:
	  • If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.
	  • If a DIMM was disabled by the user or by POST, run the Setup utility and enable the DIMM.
	3. Run memory diagnostics (see "Running the diagnostic programs" on page 124).
	4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration (one 1 GB DIMM); see the information about the minimum required configuration on page "Solving undetermined problems" on page 163).
	5. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair match.
	6. Reseat the DIMMs, and then restart the server.
	7. Reverse the DIMMs between the channels (of the same microprocessor), and then restart the server. If the problem is related to a DIMM, replace the failing DIMM.
	8. (Trained technician only) Install the failing DIMM into a DIMM connector for microprocessor 2 (if installed) to verify that the problem is not the microprocessor or the DIMM connector.
	9. (Trained technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
Multiple rows of DIMMs in a branch are identified as failing.	1. Reseat the DIMMs; then, restart the server.
	2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical pair of known good DIMMs; then, restart the server. Repeat as necessary. If the failures continue after all identified pairs are replaced, go to step4.
	3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace each DIMM in the failed pair with an identical known good DIMM, restarting the server after each DIMM. Replace the failed DIMM. Repeat step 3 until you have tested all removed DIMMs.
	4. Replace the lowest-numbered DIMM pair of those identified; then, restart the server. Repeat as necessary.
	5. Reverse the DIMMs between the channels (of the same microprocessor), and then restart the server. If the problem is related to a DIMM, replace the failing DIMM.
	6. (Trained technician only) Install the failing DIMM into a DIMM connector for microprocessor 2 (if installed) to verify that the problem is not the microprocessor or the DIMM connector.
	7. (Trained technician only) Replace the system board.

Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

The server emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. Correct any errors that are indicated by the light path diagnostics LEDs (see "Light path diagnostics" on page 114).
	
	2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size.
	
	3. (Trained technician only) Reseat microprocessor 1
	
	4. (Trained technician only) If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor at a time.
	
	5. Replace the following components one at a time, in the order shown, restarting the server each time:
	
	  a. (Trained technician only) Microprocessor 2
	
	  b. (Trained technician only) System board
	
	6. (Trained technician only) If multiple error codes or light path diagnostics LEDs indicate a microprocessor error, reverse the locations of two microprocessors to determine whether the error is associated with a microprocessor or with a microprocessor socket.
	
	  • If the error is associated with a microprocessor, replace the microprocessor.
	
	  • If the error is associated with a microprocessor socket, replace the system board.

Monitor problems

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
- **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action
Testing the monitor	1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. (Trained technician only) Replace the system board.
The screen is blank.	1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server. 2. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 110. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • No POST errors are generated when the server is turned on. 3. Make sure that the correct server is controlling the monitor, if applicable. 4. See "Solving undetermined problems" on page 163.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that: • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics (see "Running the diagnostic programs" on page 124). • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 163. • (Trained technician only) If the server fails the video diagnostics, replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. **Notes:** a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. 2. Reseat the monitor. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained technician only) System board
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the server firmware with the correct language (see "Updating the firmware" on page 317). 2. Reseat the monitor 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained technician only) System board

Network connection problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action
Log in failed by using LDAP account with SSL enabled.	1. Make sure the license key is valid. 2. Generate a new license key and log in again.

Optional-device problems

* **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
* **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
* **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action
An IBM optional device that was just installed does not work.	1. Make sure that: • The device is designed for the server (see http://www.ibm.com/servers/ eserver/serverproven/compat/us/). • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Setup utility. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An IBM optional device that used to work does not work now.	1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. If the failing device is a SCSI device, make sure that: • The cables for all external SCSI devices are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server. 4. Reseat the failing device. 5. Replace the failing device.

Power problems

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
•	**Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

The power-control button does not work (the server does not start).
Note: The power-control button will not function until 5 seconds after the server has been connected to AC power.
	1. Make sure that the power-control button is working correctly:
	   a. Disconnect the server power cords.
	   b. Reconnect the power cords.
	   c. (Trained technician only) Reseat the operator information panel cables, and then repeat steps 1a and 1b. If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	2. Make sure that:
	   • The power cords are correctly connected to the server and to a working electrical outlet.
	   • The type of memory that is installed is correct.
	   • The DIMM is fully seated.
	   • The LEDs on the power supply do not indicate a problem.
	   • The microprocessors are installed in the correct sequence.
	3. Reseat the following components:
	   a. DIMMs
	   b. (Trained technician only) Power switch connector
	   c. (Trained technician only) Power backplane
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. DIMMs
	   b. (Trained technician only) Power switch connector
	   c. (Trained technician only) Power backplane
	   d. (Trained technician only) System board
	5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.
	6. See "Power-supply LEDs" on page 121.
	7. See "Solving undetermined problems" on page 163.

The server does not turn off.	1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
	   a. Press Ctrl+Alt+Delete.
	   b. Turn off the server by pressing the power-control button for 5 seconds.
	   c. Restart the server.
	   d. If the server fails POST and the power-control button does not work, disconnect the power cord for 5 seconds; then, reconnect the power cord and restart the server.
	2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.	
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.	
• Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	

Symptom	Action
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See "Solving undetermined problems" on page 163.

Serial port problems

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.	
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.	
• Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	

Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	1. Make sure that: • Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled. • The serial port adapter (if one is present) is seated correctly. 2. Reseat the serial port adapter. 3. Replace the serial port adapter.

A serial device does not work.	1. Make sure that:
	• The device is compatible with the server.
	• The serial port is enabled and is assigned a unique address.
	• The device is connected to the correct connector.
	
	2. Reseat the following components:
	  a. Failing serial device
	  b. Serial cable
	
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. Failing serial device
	  b. Serial cable
	  c. (Trained technician only) System board

ServerGuide problems

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
•	**Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action
The *ServerGuide Setup and Installation* CD will not start.	1. Make sure that the server supports the ServerGuide program and has a startable (bootable) DVD drive. 2. If the startup (boot) sequence settings have been changed, make sure that the DVD drive is first in the startup sequence. 3. If more than one DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The ServeRAID Manager program cannot view all installed drives, or the operating system cannot be installed.	1. Make sure that the hard disk drive is connected correctly. 2. Make sure that the SAS hard disk drive cables are securely connected.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. Go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-GUIDE, click the link for your ServerGuide version, and scroll down to the list of supported Microsoft Windows operating systems.
The operating system cannot be installed; the option is not available.	Make sure that the server supports the operating system. If it does, either no logical drive is defined (SCSI RAID servers), or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Software problems

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**
•	**Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

You suspect a software problem.	1. To determine whether the problem is caused by the software, make sure that:
	  • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.
	  • The software is designed to operate on the server.
	  • Other software works on the server.
	  • The software works on another server.
	2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	3. Contact the software vendor.

Universal Serial Bus (USB) port problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

Symptom	Action

A USB device does not work.	1. Run USB diagnostics (see "Running the diagnostic programs" on page 124).
	2. Make sure that:
	  • The correct USB device driver is installed.
	  • The operating system supports USB devices.
	3. Make sure that the USB configuration optional devices are set correctly in the Setup utility (see "Setup utility menu choices" on page 322 for more information).
	4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server. When an error occurs, LEDs are lit throughout the server. By viewing the LEDs in a particular order, you can often identify the source of the error.

When LEDs are lit to indicate an error, they remain lit when the server is turned off, provided that the server is still connected to power and the power supply is operating correctly.

Before you work inside the server to view light path diagnostics LEDs, read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

If an error occurs, view the light path diagnostics LEDs in the following order:

1. Look at the operator information panel on the front of the server.

   - If the check log LED is lit, it indicates that an error or multiple errors have occurred. The sources of the errors cannot be isolated or concluded by observing the light path diagnostics LEDs directly. A further investigation into IMM2 system-event log or system-error log might be required.

   - If the system-error LED is lit, it indicates that an error has occurred; go to step 2.

   The following illustration shows the operator information panel:

The following table describes the LEDs on the operator information panel and suggested actions to correct the detected problems.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**	
• **Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**	

LED	Description	Action
System locator (blue)	Use this LED to visually locate the server among other servers. You can use IBM Systems Director or IMM2 to light this LED remotely.	
Check log (yellow)	An error has occurred and cannot be isolated without performing certain procedures.	1. Check the IMM2 system event log and the system-error log for information about the error. 2. Save the log if necessary and clear the log afterwards.

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.	
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.	
• Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	

LED	Description	Action
System-error (yellow)	An error has occurred.	1. Check the light path diagnostics LEDs and follow the instructions. 2. Check the IMM2 system event log and the system-error log for information about the error. 3. Save the log if necessary and clear the log afterwards.

2. Look at the light path diagnostics panel on the front of the server. Lit LEDs on the light path diagnostics panel indicate the type of error that has occurred. The light path diagnostics panel LEDs are visible through the bezel.
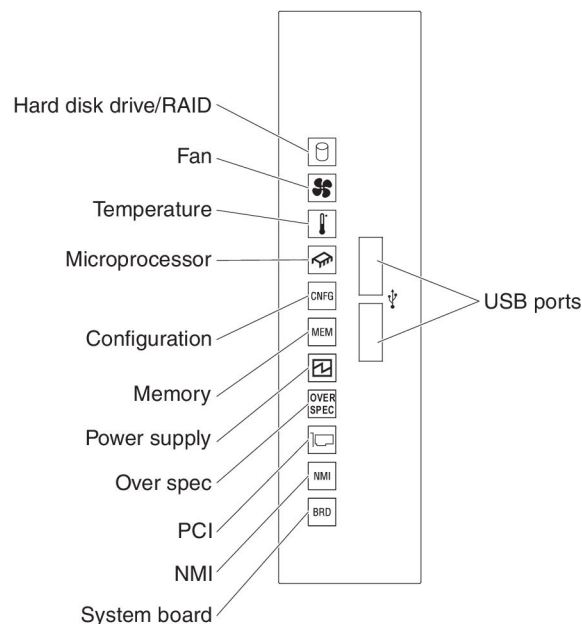
The following table describes the LEDs on the light path diagnostics panel and suggested actions to correct the detected problems.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**		
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**		

LED	Description	Action

⊟
 	
 Hard disk drive/ RAID
	A hard disk drive has failed or is missing. A SAS controller or a ServeRAID controller error has occurred.	1. Check the LEDs on the hard disk drives for the drive with a lit status LED and reseat the hard disk drive.
		 2. Reseat the hard disk drive backplane.
		 3. Check the LEDs near SAS controllers or ServeRAID controllers and reseat the corresponding controllers.
		 4. For more information, see "Hard disk drive problems" on page 100.
		 5. If the error remains, replace the following components one at a time, in the order listed, restarting the server after each:
		    a. Replace the hard disk drive.
		    b. Replace the hard disk drive backplane.
		    c. Replace the SAS controller.
		    d. Replace the ServeRAID controller.
		 6. If the problem remains, go to http://www.ibm.com/ systems/support/supportsite.wss/ docdisplay?brandind=5000008&lndocid=SERV-CALL.

✹ Fan	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	1. Open the fan cage cover to reseat the failing fan (with lit LED). 2. Replace the failing fan (see "Removing a simple-swap fan" on page 243).
🌡 Temperature	The system temperature has exceeded a threshold level. A failing fan can cause the Temperature LED to be lit.	1. Make sure that the heat sink is seated correctly. 2. Determine whether a fan has failed. If it has failed, replace the failing fan. 3. Make sure that the room temperature is not too high. See "Features and specifications" on page 7 for the server temperature information. 4. Make sure that the air vents are not blocked. 5. Make sure that the fan on the adapter and the network adapter is seated correctly. If it has failed, replace the failing component. 6. If the failure remains, go to http://www.ibm.com/ systems/support/supportsite.wss/ docdisplay?brandind=5000008&lndocid=SERV-CALL.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**

| LED	Description	Action
 Microprocessor	When only the Microprocessor LED is lit, a microprocessor has failed.	If the Configuration LED is not lit, a microprocessor failure occurs, complete the following steps: 1. (Trained technician only) Make sure that the failing microprocessor and its heat sink, which are indicated by a lit LED on the system board, are installed correctly. See "Installing a microprocessor and heat sink" on page 295 for information about installation and requirements. 2. (Trained technician only) Replace the failing microprocessor (see "Installing a microprocessor and heat sink" on page 295). 3. If the failure remains, go to http://www.ibm.com/ systems/support/supportsite.wss/ docdisplay?brandind=5000008&lndocid=SERV-CALL.
	Microprocessor + Configuration When both the Microprocessor and Configuration LEDs are lit, the microprocessor configuration is invalid.	If the Configuration LED and the Microprocessor LED are lit, the system issues an invalid microprocessor configuration error. Complete the following steps to correct the problem: 1. Check the microprocessors that were just installed to make sure that they are compatible with each other (see "Installing a microprocessor and heat sink" on page 295 for additional information about microprocessor requirements) and use the Setup utility and select **System Information ⇾ System Summary ⇾ Processor Details** to verify the microprocessors information. 2. (Trained technician only) Replace the incompatible microprocessor. 3. Check the system-error logs for information about the error. Replace any component that is identified in the error log.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**

LED	Description	Action
CNFG Configuration	Configuration + Microprocessor A hardware configuration error has occurred.	If the Configuration LED and the Microprocessor LED are lit, complete the following steps to correct the problem: 1. Check the microprocessors that were just installed to make sure that they are compatible with each other (see "Installing a microprocessor and heat sink" on page 295 for additional information about microprocessor requirements). 2. (Trained technician only) Replace the incompatible microprocessor. 3. Check the system-event logs for information about the error (see "Event logs" on page 23). Replace any component that is identified in the error log.
	Configuration + Memory A hardware configuration error has occurred.	If the Configuration LED and the Memory LED are lit, check the system-event logs for information about the error (see "Event logs" on page 23).
	Configuration + Power supply A hardware configuration error has occurred.	If the Configuration LED and the Power supply LED are lit, the system issues an invalid power configuration error. Make sure that both power supplies installed in the server are of the same rating or wattage.
MEM Memory	When only the Memory LED is lit, a memory error has occurred.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server. If the Configuration LED is not lit, the system might detect a memory error. Complete the following steps to correct the problem: 1. Reseat or swap the DIMMs with lit LEDs. 2. Check the system-event logs for information about the error (see "Event logs" on page 23). 3. Update the server firmware to the latest level (see "Updating the firmware" on page 317 for more information). 4. Replace the failing DIMM (see "Installing a DIMM" on page 280).
	Memory + Configuration When both the Memory and Configuration LEDs are lit, the memory configuration is invalid.	If the Memory LED and the Configuration LED are lit, check the system-event logs for information about the error (see "Event logs" on page 23).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**

LED	Description	Action
Power supply	When only the Power supply LED is lit, a power supply has failed.	If the CONFIG LED is not lit, the system might detect a power supply error. Complete the following steps to correct the problem: 1. Check the power-supply with an lit yellow LED (see "Power-supply LEDs" on page 121). 2. Make sure that the power supplies are seated correctly and plugged in a good AC outlet. 3. Remove one of the power supplies to isolate the failed power supply. 4. Make sure that both power supplies installed in the server are of the same voltage. 5. Replace the failed power supply (see "Removing a hot-swap power supply" on page 266).
	Power supply + Configuration When both the Power supply and Configuration LEDs are lit, the power supply configuration is invalid.	If the PS LED and the CONFIG LED are lit, the system issues an invalid power configuration error. Make sure that both power supplies installed in the server are of the same rating or wattage.
OVER SPEC Over spec	The power supplies are using more power than their maximum rating.	If the Over spec LED on the light path diagnostics panel is lit, complete the following steps in order until the problem is solved: 1. Add a second power supply. 2. Replace the failed power supply. 3. Remove the optional devices.
PCI	An error has occurred on a PCI card or a PCI bus.	1. Check if any PCI slot error LED is lit to identify the component that caused the error. 2. Check the system-error log for information about the error (see "Event logs" on page 23). 3. If you cannot isolate the failing component by using the LEDs and the information in the system-event logs, remove one component at a time; and restart the server after each component is removed. 4. If the failure remains, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
NMI NMI	A nonmaskable interrupt has occurred, or the NMI button was pressed.	1. Check the system-event logs for information about the error (see "Event logs" on page 23). 2. Restart the server.

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.		
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.		

LED	Description	Action
 BRD System board	An error has occurred on the system battery, the microprocessor 2 expansion board, the power paddle card, or the system board.	1. Check the LEDs on the system board to identify the component that caused the error. The System board LED can be lit due to any of the following reasons: • Battery (see "Removing the system battery" on page 248 and "Installing the system battery" on page 249). • Microprocessor 2 expansion board (see "Removing the microprocessor 2 expansion board" on page 302 and "Installing the microprocessor 2 expansion board" on page 303). • Power paddle card (see "Removing the power paddle card" on page 288 and "Installing the power paddle card" on page 290). • (Trained technician only) System board (see "Removing the system board" on page 310 and "Installing the system board" on page 312). 2. Check the system-event logs for information about the error. 3. Replace the failing component: • Battery • Microprocessor 2 expansion board • Power paddle card • (Trained technician only) System board

Look at the system service label on the top of the server, which gives an overview of internal components that correspond to the LEDs on the light path diagnostics panel. This information can often provide enough information to diagnose the error.

Power-supply LEDs

The following illustration shows the power-supply LEDs on the rear of the server.

Error
(Amber)

DC power
(Green)

AC power
(Green)
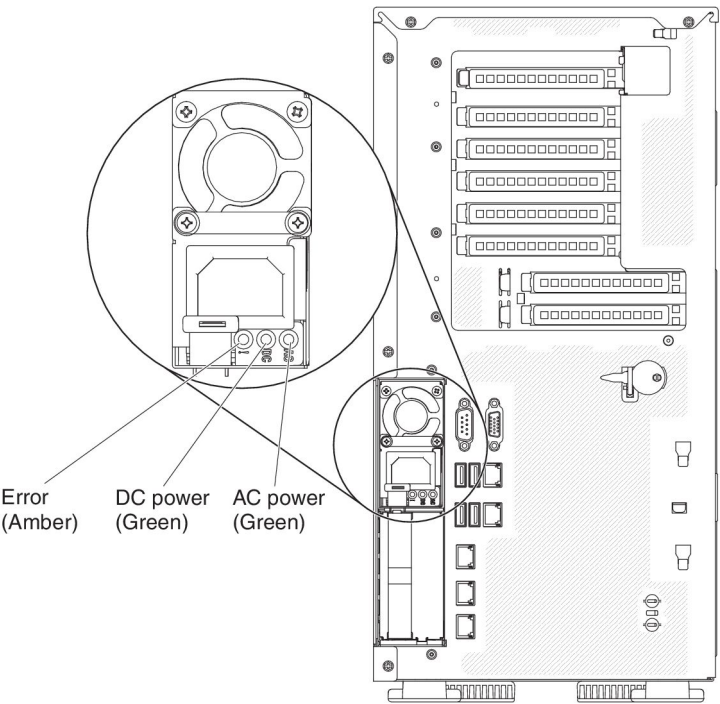
The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the system power LED on the operator information panel and suggested actions to correct the detected problems.

Table 5. Power-supply LEDs

AC Power-supply LEDs					
AC	**DC**	**Error**	**Description**	**Action**	**Notes**
On	On	Off	Normal operation		
Off	Off	Off	No ac power to the server or a problem with the ac power source.	1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Restart the server. If the error remains, check the power-supply LEDs. 4. If the problem remains, replace the power-supply.	This is a normal condition when no ac power is present.
Off	Off	On	Faulty power-supply.	1. Make sure that the power cord is connected to a functioning power source. 2. Replace the power supply.	This happens only when a second power supply is providing power to the server.
Off	On	Off	Faulty power supply	Replace the power supply.	
Off	On	On	Faulty power supply	Replace the power supply.	
On	Off	Off	Power supply not fully seated, faulty system board, or faulty power supply	1. Reseat the power supply. 2. If the system board error LED is not lit, replace the power supply. 3. (Trained technician only) If the system board error LED is lit, replace the system board.	Typically indicates that a power supply is not fully seated.
On	Off or Flashing	On	Faulty power supply	Replace the power supply.	
On	On	On	Power supply is faulty but still operational	Replace the power supply.	

System pulse LEDs

The following LEDs are on the system board and monitor the system power-on and power-off sequencing and boot progress (see "System-board LEDs and controls" on page 20 for the location of these LEDs):

Table 6. System pulse LEDs

LED	Description	Action
RTMM heartbeat	Power-on and power-off sequencing.	1. If the LED blinks at 1Hz, it is functioning properly and no action is necessary. 2. If the LED is not blinking, (trained technician only) replace the system board.

Table 6. System pulse LEDs (continued)

LED	Description	Action
IMM2 heartbeat	IMM2 heartbeat boot process.	The following steps describe the different stages of the IMM2 heartbeat sequencing process. 1. When this LED is blinking fast (approximately 4Hz), this indicates, that the IMM2 code is in the loading process. 2. When this LED goes off momentarily, this indicates that the IMM2 code has loaded completely. 3. When this LED goes off momentarily and then starts blinking slowing (approximately 1Hz), this indicates that IMM2 is fully operational. You can now press the power-control button to power-on the server. 4. If this LED does not blink within 30 seconds of connecting a power source to the server, (trained technician only) Replace the system board.

Diagnostic programs, messages, and error codes

The diagnostic programs are the primary method of testing the major components of the server. As you run the diagnostic programs, text messages and error codes are displayed on the screen and are saved in the test log. A diagnostic text message or error code indicates that a problem has been detected; to determine what action you should take as a result of a message or error code, see the table in "Diagnostic messages" on page 125.

Running the diagnostic programs

To run the diagnostic programs, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt `Press F2 for Dynamic System Analysis (DSA)` is displayed, press F2.

   Note: DSA Preboot might appear to be unresponsive when you start the program. This is normal operation while the program loads. The loading process may take up to 10 minutes.

4. Optionally, select **Quit to DSA** to exit from the stand-alone memory diagnostic program.

   Note: After you exit from the stand-alone memory diagnostic environment, you must restart the server to access the stand-alone memory diagnostic environment again.

5. Type **gui** to display the graphical user interface, or select **cmd** to display the DSA interactive menu.
6. Follow the instructions on the screen to select the diagnostic test to run.

If the diagnostic programs do not detect any hardware errors but the problem remains during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with your software.

A single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

Exception: If multiple error codes or light path diagnostics LEDs indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 106 for information about diagnosing microprocessor problems.

If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.

Diagnostic text messages

Diagnostic text messages are displayed while the tests are running. A diagnostic text message contains one of the following results:

Passed: The test was completed without any errors.

Failed: The test detected an error.

User Aborted: You stopped the test before it was completed.

Not Applicable: You attempted to test a device that is not present in the server.

Aborted: The test could not proceed because of the server configuration.

Warning: The test could not be run. There was no failure of the hardware that was being tested, but there might be a hardware failure elsewhere, or another problem prevented the test from running; for example, there might be a configuration problem, or the hardware might be missing or is not being recognized.

The result is followed by an error code or other additional information about the error.

Viewing the test log

To view the DSA log when the tests are completed, select **Utility** from the top of the screen and then select **View Test Log**. To view a detailed test log, press Tab while you view the DSA log. The DSA log data is maintained only while you are running the diagnostic programs. When you exit from the diagnostic programs, the DSA log is cleared.

To save the DSA log to a file on a diskette or to the hard disk, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.

Notes:

1. To create and use a diskette, you must add an optional external diskette drive to the server.
2. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with preformatted diskettes. If the diskette has sufficient space for the test log, the diskette can contain other data.

Diagnostic messages

The following table describes the messages that the diagnostic programs might generate and suggested actions to correct the detected problems. Follow the suggested actions in the order in which they are listed in the column.

Table 7. DSA messages

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
089-801-xxx	CPU	CPU Stress Test	Aborted	Internal program error.	1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
089-802-xxx	CPU	CPU Stress Test	Aborted	System resource availability error.	1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 9. Run the test again. 10. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.	
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.	

Message number	Component	Test	State	Description	Action
089-901-xxx	CPU	CPU Stress Test	Failed	Test failure.	1. Turn off and restart the system if necessary to recover from a hung state. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.
166-801-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the IMM returned an incorrect response length.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.

Table 7. DSA messages (continued)

| • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. |
| • If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician. |

Message number	Component	Test	State	Description	Action
166-802-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the test cannot be completed for an unknown reason.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-803-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the node is busy; try later.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
166-804-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: invalid command.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-805-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: invalid command for the given LUN.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

| • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. |
| • If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician. |

Message number	Component	Test	State	Description	Action
166-806-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: timeout while processing the command.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-807-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: out of space.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-808-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: reservation aborted or invalid reservation ID.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.
166-809-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: request data was truncated.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.

Table 7. DSA messages (continued)

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**

Message number	Component	Test	State	Description	Action
166-810-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: request data length is invalid.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
166-811-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: request data field length limit is exceeded.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**					
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-812-xxx	IMM	IMM I2C Test	Aborted	IMM I2C Test stopped a parameter is out of range.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.
166-813-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot return the number of requested data bytes.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					

Message number	Component	Test	State	Description	Action
166-814-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: requested sensor, data, or record is not present.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-815-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: invalid data field in the request.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.

Message number	Component	Test	State	Description	Action
166-816-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the command is illegal for the specified sensor or record type.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.
166-817-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-CALL.

Table 7. DSA messages (continued)

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**

Message number	Component	Test	State	Description	Action
166-818-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot execute a duplicated request.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-819-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided; the SDR repository is in update mode.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

Message number	Component	Test	State	Description	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					
166-820-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided; the device is in firmware update mode.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code and IMM firmware are at the latest level. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
166-821-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided; IMM initialization is in progress.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**

Message number	Component	Test	State	Description	Action
166-822-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the destination is unavailable.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-823-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot execute the command; insufficient privilege level.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					

Message number	Component	Test	State	Description	Action
166-824-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot execute the command.	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
166-901-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the HBS 2117 bus (Bus 0)	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Remove power from the system. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to power and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

•	**Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
•	**If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**

Message number	Component	Test	State	Description	Action
166-902-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the TPM bus (Bus 2).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					

Message number	Component	Test	State	Description	Action
166-903-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the Powerville (Bus 2).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Disconnect the system from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
166-904-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the PCA 9543 bus (Bus 3).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**					
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-905-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the PCA bus (Bus 4)	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

Message number	Component	Test	State	Description	Action
	• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.				
	• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.				
166-906-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the PCA bus (Bus 5).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**					
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-907-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the PCA bus (Bus 6).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. Reseat the optional dual-port network adapter. 9. Reseat PCI riser assembly 1. 10. Reseat PCI riser assembly 2. 11. (Trained technician only) Reseat the system board. 12. Reconnect the system to the power source and turn on the system. 13. Run the test again. 14. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**					
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-908-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the PCA 9567 bus (Bus 7).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from AC power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
201-801-xxx	Memory	Memory Test	Aborted	Test aborted: the server firmware programmed the memory controller with an invalid CBAR address	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

Message number	Component	Test	State	Description	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					
201-802-xxx	Memory	Memory Test	Aborted	Test aborted: the end address in the E820 function is less than 16 MB.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that all DIMMs are enabled in the Setup utility. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
201-803-xxx	Memory	Memory Test	Aborted	Test aborted: could not enable the processor cache.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
201-804-xxx	Memory	Memory Test	Aborted	Test aborted: the memory controller buffer request failed.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
201-805-xxx	Memory	Memory Test	Aborted	Test aborted: the memory controller display/alter write operation was not completed.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
201-806-xxx	Memory	Memory Test	Aborted	Test aborted: the memory controller fast scrub operation was not completed.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
201-807-xxx	Memory	Memory Test	Aborted	Test aborted: the memory controller buffer free request failed.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
201-808-xxx	Memory	Memory Test	Aborted	Test aborted: memory controller display/alter buffer execute error.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.

Message number	Component	Test	State	Description	Action
201-809-xxx	Memory	Memory Test	Aborted	Test aborted program error: operation running fast scrub.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-810-xxx	Memory	Memory Test	Aborted	Test stopped: unknown error code xxx received in COMMONEXIT procedure.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**					
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**					

Message number	Component	Test	State	Description	Action
201-901-xxx	Memory	Memory Test	Failed	Test failure: single-bit error, failing bank x, failing memory card y, failing DIMM z.	1. Turn off the system and disconnect it from the power source. 2. Reseat DIMM z. 3. Reconnect the system to power and turn on the system. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 6. Run the test again. 7. Replace the failing DIMMs. 8. Re-enable all memory in the Setup utility (see "Using the Setup utility" on page 321). 9. Run the test again. 10. Replace the failing DIMM. 11. Re-enable all memory in the Setup utility (see "Using the Setup utility" on page 321). 12. Run the test again. 13. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
202-801-xxx	Memory	Memory Stress Test	Aborted	Internal program error.	1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 4. Run the test again. 5. Turn off and restart the system if necessary to recover from a hung state. 6. Run the memory diagnostics to identify the specific failing DIMM. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

Message number	Component	Test	State	Description	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					
202-802-xxx	Memory	Memory Stress Test	Failed	General error: memory size is insufficient to run the test.	1. Make sure that all memory is enabled by checking the Available System Memory in the Resource Utilization section of the DSA log. If necessary, enable all memory in the Setup utility (see "Using the Setup utility" on page 321). 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Run the standard memory test to validate all memory. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
202-901-xxx	Memory	Memory Stress Test	Failed	Test failure.	1. Run the standard memory test to validate all memory. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 3. Turn off the system and disconnect it from power. 4. Reseat the DIMMs. 5. Reconnect the system to power and turn on the system. 6. Run the test again. 7. Run the standard memory test to validate all memory. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
215-801-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Aborted	Unable to communicate with the device driver.	1. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 8. Run the test again. 9. Replace the CD/DVD drive. 10. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
215-802-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Aborted	The media tray is open.	1. Close the media tray and wait 15 seconds. 2. Run the test again. 3. Insert a new CD/DVD into the drive and wait for 15 seconds for the media to be recognized. 4. Run the test again. 5. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 6. Run the test again. 7. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 8. Run the test again. 9. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 10. Run the test again. 11. Replace the CD/DVD drive. 12. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.

Message number	Component	Test	State	Description	Action
215-803-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Failed	The disc might be in use by the system.	1. Wait for the system activity to stop. 2. Run the test again 3. Turn off and restart the system. 4. Run the test again. 5. Replace the CD/DVD drive. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
215-901-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Aborted	Drive media is not detected.	1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
215-902-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Failed	Read miscompare.	1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
215-903-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Aborted	Could not access the drive.	1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 6. Run the test again. 7. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 8. Run the test again. 9. Replace the DVD drive. 10. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
215-904-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test Messages and actions apply to both tests.	Failed	A read error occurred.	1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
217-900-xxx	SAS/SATA Hard Drive	Disk Drive Test	Failed		1. Reseat all hard disk drive backplane connections at both ends. 2. Reseat the all drives. 3. Run the test again. 4. Make sure that the firmware is at the latest level. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

Message number	Component	Test	State	Description	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					
264-901-000	Tape Drive	Tape Drive Test	Failed	An error was found in the tape alert log page.	1. Clean the tape drive using the appropriate cleaning media and install new media. 2. Run the test again. 3. Clear the error log. 4. Run the test again. 5. Make sure that the firmware is at the latest level. Software for tape drives and libraries can be found at http://www.ibm.com/systems/support/. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
264-902-000	Tape Drive	Tape Drive Test	Failed	Media is not detected.	1. Clean the tape drive using the appropriate cleaning media and install new media. 2. Run the test again. 3. Clear the error log. 4. Run the test again. 5. Make sure that the firmware is at the latest level. Software for tape drives and libraries can be found at http://www.ibm.com/systems/support/. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
264-903-000	Tape Drive	Tape Drive Test	Failed	Media error.	1. Clean the tape drive using the appropriate cleaning media and install new media. 2. Run the test again. 3. Clear the error log. 4. Run the test again. 5. Make sure that the firmware is at the latest level. Software for tape drives and libraries can be found at http://www.ibm.com/systems/support/. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
264-904-000	Tape Drive	Tape Drive Test	Failed	Drive hardware error.	1. Check the tape drive cabling for loose or broken connections or damage to the cable. Replace the tape drive cable if damage is present. 2. Clean the tape drive using the appropriate cleaning media and install new media. 3. Run the test again. 4. Clear the error log. 5. Run the test again. 6. Make sure that the firmware is at the latest level. Software for tape drives and libraries can be found at http://www.ibm.com/systems/support/. 7. Run the test again. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
264-905-000	Tape Drive	Tape Drive Test	Failed	Software error: invalid request.	1. If the system has stopped responding, turn off and restart the system and then run the test again. 2. Check system firmware level and upgrade if necessary. The installed firmware level can be found in the DSA Log within the Firmware/VPD section for this component. The latest level firmware for this component can be found at http://www.ibm.com/systems/support/. 3. Run the test again. 4. If the system has stopped responding, turn off and restart the system. 5. Make sure that the firmware is at the latest level. Software for tape drives and libraries can be found at http://www.ibm.com/systems/support/. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
264-906-000	Tape Drive	Tape Drive Test	Failed	Unrecognized error.	1. Clean the tape drive using the appropriate cleaning media and install new media. 2. Run the test again. 3. Clear the error log. 4. Run the test again. 5. Make sure that the firmware is at the latest level. Software for tape drives and libraries can be found at http://www.ibm.com/systems/support/. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
405-901-xxx	Ethernet Device	Test Control Registers	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
405-901-xxx	Ethernet Device	Test MII Registers	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.
405-902-xxx	Ethernet Device	Test EEPROM	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &Indocid=SERV-CALL.

Table 7. DSA messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.**	

Message number	Component	Test	State	Description	Action
405-903-xxx	Ethernet Device	Test Internal Memory	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA log. If the Ethernet device is sharing interrupts, if possible, use the Setup utility (see "Using the Setup utility" on page 321) to assign a unique interrupt to the device. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
405-904-xxx	Ethernet Device	Test Interrupt	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA log. If the Ethernet device is sharing interrupts, if possible, use the Setup utility (see "Using the Setup utility" on page 321) to assign a unique interrupt to the device. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 7. DSA messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.					
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a Trained technician.					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
405-905-xxx	Ethernet Device	Test Loop back at MAC-Layer	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
405-906-xxx	Ethernet Device	Test Loop back at Physical Layer	Failed		1. Check the Ethernet cable for damage and make sure that the cable type and connection are correct. 2. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 3. Run the test again. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
405-907-xxx	Ethernet Device	Test LEDs	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 317. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Recovering the server firmware

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

If the server firmware has become corrupted, such as from a power failure during an update, you can recover the server firmware in the following way:

- **In-band method:** Recover server firmware, using either the boot block jumper (Automated Boot Recovery) and a server Firmware Update Package Service Pack.

Note: You can obtain a server update package from one of the following sources:

- Download the server firmware update from the World Wide Web.
- Contact your IBM service representative.

To download the server firmware update package from the World Wide Web, complete the following steps:

1. Go to http://www.ibm.com/supportportal/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, select **Software and device drivers**.
4. From the **Product family** menu, select **System x3500 M4** to display the matrix of downloadable files for the server.
5. Download the latest server firmware update and the update tool UXSPI.

The flash memory of the server consists of a primary bank and a backup bank. It is essential that you maintain the backup bank with a bootable firmware image. If the primary bank becomes corrupted, you can either manually boot the backup bank with the boot block jumper, or in the case of image corruption, this will occur automatically with the Automated Boot Recovery function.

In-band manual recovery method

To recover the server firmware and restore the server operation to the primary bank, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
4. Locate SW4 on the system board.
5. Change the position of the UEFI boot backup switch (change switch 1 of the SW4 to the on position) to enable the UEFI recovery mode.
6. Reinstall the server cover; then, reconnect all power cords.
7. Restart the server. The system begins the power-on self-test (POST).
8. Boot the server to an operating system that is supported by the firmware update package that you downloaded.
9. Perform the firmware update by following the instructions that are in the firmware update package readme file.

10. Turn off the server and disconnect all power cords and external cables, and then remove the left-side cover (see "Removing the left-side cover" on page 201).

11. Change the position of the UEFI boot backup switch back (change switch 1 of the SW4 to the off position).

12. Reinstall the left-side cover (see "Installing the left-side cover" on page 201).

13. Reconnect the power cord and any cables that you removed.

14. Restart the server. The system begins the power-on self-test (POST). If this does not recover the primary bank, continue with the following steps.

15. Remove the left-side cover (see "Removing the left-side cover" on page 201).

16. Reset the CMOS by removing the system battery (see "Removing the system battery" on page 248).

17. Leave the system battery out of the server for approximately 5 to 15 minutes.

18. Reinstall the system battery (see "Installing the system battery" on page 249).

19. Reinstall the left-side cover (see "Installing the left-side cover" on page 201).

20. Reconnect the power cord and any cables that you removed.

21. Restart the server. The system begins the power-on self-test (POST).

22. If these recovery efforts fail, contact your IBM service representative for support.

In-band automated boot recovery method

Note: Use this method if the System board LED on the light path diagnostics panel is lit and there is a log entry or `Booting Backup Image` is displayed on the firmware splash screen; otherwise, use the in-band manual recovery method.

1. Boot the server to an operating system that is supported by the firmware update package that you downloaded.

2. Perform the firmware update by following the instructions that are in the firmware update package readme file.

3. Restart the server.

4. At the firmware splash screen, press F3 when prompted to restore to the primary bank. The server boots from the primary bank.

Automated boot recovery (ABR)

While the server is starting, if the integrated management module detects problems with the server firmware in the primary bank, the server automatically switches to the backup firmware bank and gives you the opportunity to recover the firmware in the primary bank. For instructions for recovering the UEFI irmware, see "Recovering the server firmware" on page 160. After you have recovered the firmware in the primary bank, complete the following steps:

1. Restart the server.

2. When the prompt `Press F3 to restore to primary` is displayed, press F3 to start the server from the primary bank.

Nx boot failure

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test). If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the Nx boot failure feature causes the server to revert to the default UEFI configuration and start the Setup utility so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board.

To specify the number of consecutive restart attempts that will trigger the Nx boot failure feature, in the Setup utility, click **System Settings > Recovery > POST Attempts > POST Attempts Limit**. The available options are 3, 6, 9, and 255 (disable Nx boot failure).

Solving power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition. To diagnose a power problem, use the following general procedure:

1. Turn off the server and disconnect all AC power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see "Solving undetermined problems" on page 163 for the minimum configuration).
4. Reconnect all AC power cords and turn on the server. If the server starts successfully, replace the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Solving Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Try the following procedures:
- Make sure that the correct device drivers, which come with the server, are installed and that they are at the latest level.
- Make sure that the Ethernet cable is installed correctly.
  - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
  - If the Ethernet controller is set to operate at 100 Mbps, you must use Category 5 cabling.
  - If you directly connect two servers (without a hub), or if you are not using a hub with X ports, use a crossover cable. To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.

- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
  - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
  - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity light is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check the LAN activity LEDs on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check for operating-system-specific causes of the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Solving undetermined problems

If the diagnostic tests did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see "Software problems" on page 112.

Damaged data in CMOS memory or damaged IBM System x Server Firmware can cause undetermined problems. To reset the CMOS data, use the password switch 2 (SW4) to override the power-on password and clear the CMOS memory; see "Internal LEDs, connectors, and jumpers" on page 15.

Check the LEDs on all the power supplies (see "Power-supply LEDs" on page 121). If the LEDs indicate that the power supplies are working correctly, complete the following steps:
1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Modem, printer, mouse, and non-IBM devices.
   - Each adapter.
   - Hard disk drives.

The following minimum configuration is required for the server to start:
- One microprocessor
- One 2 GB DIMM
4. Turn on the server. If the problem remains, suspect the following components in the following order:
   a. Power supply

b. Memory

c. Microprocessor

d. System board

If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the system board or extender card.

If you suspect a networking problem and the server passes all the system tests, suspect a network cabling problem that is external to the server.

Problem determination tips

Because of the variety of hardware and software combinations that you can encounter, use the following information to assist you in problem determination. If possible, have this information available when you request assistance from IBM.

- Machine type and model
- Microprocessor and hard disk drive upgrades
- Failure symptoms
  - Does the server fail the diagnostic tests?
  - What occurs? When? Where?
  - Does the failure occur on a single server or on multiple servers?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - What changes, if any, were made before the configuration failed?
  - Is this the original reported failure?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- IBM System x Server Firmware level
- Operating-system type and version level

You can solve some problems by comparing the configuration and software setups between working and nonworking servers. When you compare servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all the servers:

- Machine type and model
- IBM System x Server Firmware level
- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and levels
- Diagnostic program type and version level
- Configuration option settings
- Operating-system control-file setup

See Appendix A, "Getting help and technical assistance," on page 341 for information about calling IBM for service.

Chapter 4. Parts listing, System x3500 M4 Type 7383

The following replaceable components are available for the System x3500 M4 Type 7383 server, except as specified otherwise in "Customer replaceable units." To check for an updated parts listing on the web, go to http://www.ibm.com/supportportal/.

The types of replaceable components are:

- **Consumables:** Purchase and replacement of consumables (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If IBM acquires or installs a consumable component at your request, you will be charged for the service.
- **Structural parts:** Purchase and replacement of structural parts (components, such as chassis assembly, top cover, and bezel) is your responsibility. If IBM acquires or installs a structural component at your request, you will be charged for the service.
- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.

Customer replaceable units

For information about the terms of the warranty, see the *Warranty Information* document that comes with the server.

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.
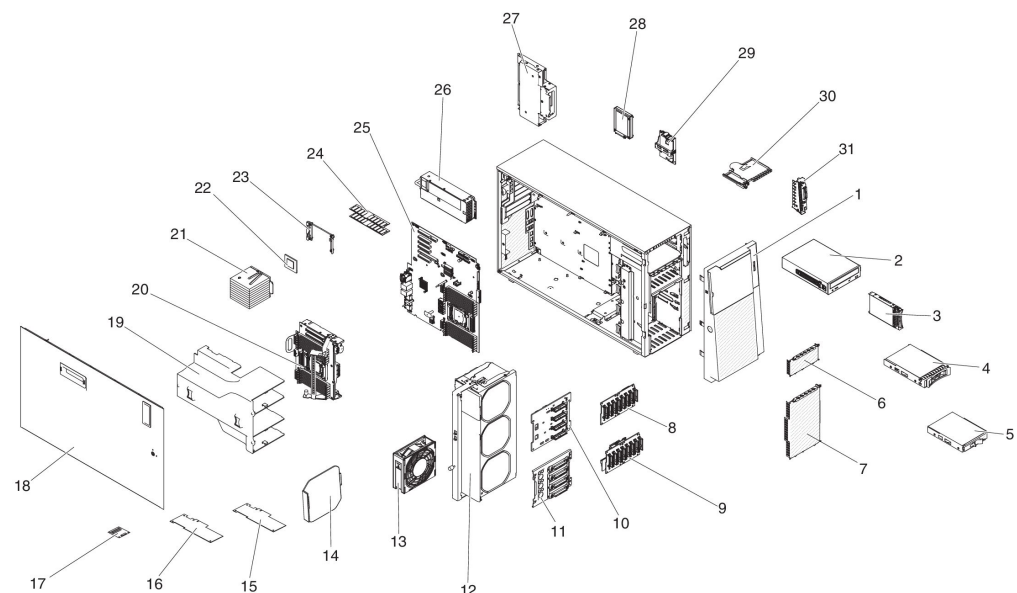
The following table lists the part numbers for the server components.

Table 8. Parts listing, Type 7383

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
2	DVD-ROM drive	43W8466	
2	DVD-RW drive	43W8467	
3	Hard disk drive, 2.5-inch hot-swap, 250 GB, 7.2 K, SATA	81Y9723	
3	Hard disk drive, 2.5-inch hot-swap, 500 GB, 7.2 K, SATA	81Y9727	
3	Hard disk drive, 2.5-inch hot-swap, 1 TB, 7.2 K, SATA	81Y9731	
3	Hard disk drive, 2.5-inch hot-swap, 128 GB, SATA Slim	90Y8649	
3	Hard disk drive, 2.5-inch hot-swap, 250 GB, SATA Slim	90Y8644	
3	Hard disk drive, 2.5-inch hot-swap, 500 GB, 7.2 K, NL SAS	90Y8954	
3	Hard disk drive, 2.5-inch hot-swap, 1 TB, 7.2 K, NL SAS	81Y9691	
3	Hard disk drive, 2.5-inch hot-swap, 300 GB, 10 K, SAS	90Y8878	
3	Hard disk drive, 2.5-inch hot-swap, 600 GB, 10 K, SAS	90Y8873	
3	Solid state drive, 2.5-inch hot-swap, 64 GB, SATA MLC	49Y5840	
3	Solid state drive, 2.5-inch hot-swap, 100 GB, SATA MLC	00W1126	
3	Solid state drive, 2.5-inch hot-swap, 200 GB, SATA MLC	43W7721	
3	Solid state drive, 2.5-inch hot-swap, 512 GB SATA MLC	49Y5845	
3	Hard disk drive, 2.5-inch hot-swap, 300 GB, 10 K, SAS SED	90Y8914	
3	Hard disk drive, 2.5-inch hot-swap, 600 GB, 10 K, SAS SED	90Y8909	
3	Hard disk drive, 2.5-inch hot-swap, 900 GB, 10 K, SAS SED	81Y9663	
3	Hard disk drive, 2.5-inch hot-swap, 146 GB, 15 K, SAS	90Y8927	
3	Hard disk drive, 2.5-inch hot-swap, 146 GB, 15 K, SAS SED	90Y8945	
4	Hard disk drive, 3.5-inch hot-swap, 500 GB, 7.2 K, NL SATA	81Y9787	
4	Hard disk drive, 3.5-inch hot-swap, 2 TB, 7.2 K, NL SATA	81Y9795	
4	Hard disk drive, 3.5-inch hot-swap, 1 TB, 7.2 K, NL SAS	90Y8568	
4	Hard disk drive, 3.5-inch hot-swap, 2 TB, 7.2 K, NL SAS	90Y8573	
4	Hard disk drive, 3.5-inch hot-swap, 3 TB, 7.2 K, NL SAS	90Y8578	
4	Hard disk drive, 3.5-inch hot-swap, 300 GB, 15K, SAS	49Y6093	
4	Hard disk drive, 3.5-inch hot-swap, 450 GB, 15K, SAS	49Y6098	
4	Hard disk drive, 3.5-inch hot-swap, 600 GB, 15K, SAS	49Y6103	
5	Hard disk drive, 3.5-inch simple-swap, 500 GB, 7.2 K	81Y9803	
5	Hard disk drive, 3.5-inch simple-swap, 2 TB, 7.2 K	81Y9811	
8	Backplane, 2.5-inch	46W9187	
9	Backplane, 2.5-inch (with expander)	90Y5875	
10	Backplane, 3.5-inch	49Y4462	
11	Backplate assembly, 3.5-inch simple-swap	94Y7746	
12	Fan cage assembly	94Y7735	
13	Fan module, simple-swap	94Y7733	
15	ServeRAID M5120 SAS/SATA adapter	81Y4479	
15	ServeRAID M5110 SAS/SATA adapter	90Y4449	
15	ServeRAID M1115 SAS/SATA adapter	46C8928	

Table 8. Parts listing, Type 7383 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
15	IBM 6 Gb Performance Optimized HBA	46C8937	
16	Emulex 16 Gb FC single-port HBA	81Y1658	
16	Emulex 16 Gb FC dual-port HBA	81Y1665	
16	Brocade 16 Gb FC single-port HBA	81Y1671	
16	Brocade 16 Gb FC dual-port HBA	81Y1678	
16	Emulex 10 GbE virtual fabric adapter III	95Y3766	
16	QLogic 8 GB FC dual-port HBA	42D0516	
16	Broadcom NetXtreme quad-port GbE adapter	90Y9355	
16	Broadcom NetXtreme dual-port GbE adapter	90Y9373	
16	365 GB High IOPS MLC Mono adapter	46C9079	
16	785 GB High IOPS MLC Mono adapter	46C9082	
16	1.2 TB High IOPS MLC Mono adapter	90Y4378	
16	Quadro 6000 video adapter	43V5921	
17	ServeRAID M5100 series 512 MB cache (RAID 5 upgrade)	81Y4485	
17	ServeRAID M5100 series 512 MB cache (RAID 5 upgrade)	46C9027	
17	ServeRAID M5100 series 1 GB cache (RAID 5 upgrade)	46C9029	
20	Microprocessor 2 expansion board		00W2047
21	Heat sink assembly		94Y7740
22	Microprocessor, Intel Xeon E5-2690, 2.90 GHz, 20 MB, 1600 MHz, 135 W (8 core)		49Y8115
22	Microprocessor, Intel Xeon E5-2637, 3.00 GHz, 5 MB, 1066 MHz, 80 W (2 core)		49Y8124
22	Microprocessor, Intel Xeon E5-2665, 2.40 GHz, 20 MB, 115 W (8 core)		49Y8142
22	Microprocessor, Intel Xeon E5-2650L, 1.80 GHz, 20 MB, 1600 MHz, 70 W (8 core)		81Y5160
22	Microprocessor, Intel Xeon E5-2603, 1.80 GHz, 10 MB, 1066 MHz, 80 W (4 core)		81Y5161
22	Microprocessor, Intel Xeon E5-2609, 2.40 GHz, 10 MB, 1066 MHz, 80 W (4 core)		81Y5163
22	Microprocessor, Intel Xeon E5-2630L 2.00 GHz, 15 MB, 1333 MHz, 60 W (6 core)		81Y5204
22	Microprocessor, Intel Xeon E5-2620, 2.00 GHz, 15 MB, 1333 MHz, 95 W (6 core)		81Y5164
22	Microprocessor, Intel Xeon E5-2630, 2.30 GHz, 15 MB, 1333 MHz, 95 W (6 core)		81Y5165
22	Microprocessor, Intel Xeon E5-2640, 2.50 GHz, 15 MB, 1333 MHz, 95 W (6 core)		81Y5166
22	Microprocessor, Intel Xeon E5-2650, 2.00 GHz, 20 MB, 1600 MHz, 95 W (8 core)		81Y5167
22	Microprocessor, Intel Xeon E5-2660, 2.20 GHz, 20 MB, 1600 MHz, 95 W (8 core)		81Y5168

Table 8. Parts listing, Type 7383 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
22	Microprocessor, Intel Xeon E5-2680, 2.70 GHz, 20 MB, 1600 MHz, 130 W (8 core)		81Y5169
22	Microprocessor, Intel Xeon E5-2667, 2.90 GHz, 15 MB, 1600 MHz, 130 W (6 core)		81Y5170
22	Microprocessor, Intel Xeon E5-2643, 3.30 GHz, 10 MB, 1600 MHz, 130 W (4 core)		81Y5171
22	Microprocessor, Intel Xeon E5-2648L, 1.80 GHz, 20 MB, 1600 MHz, 70 W (8 core)		95Y4671
22	Microprocessor, Intel Xeon E5-2658, 2.10 GHz, 20 MB, 1600 MHz, 95 W (8 core)		95Y4676
22	Microprocessor, Intel Xeon E5-2670, 2.60 GHz, 20 MB, 1600 MHz, 115 W (8 core)		81Y9419
23	Retention module, heat sink		94Y7739
24	Memory, 8 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1415	
24	Memory, 16 GB quad-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1418	
24	Memory, 2 GB single-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1421	
24	Memory, 2 GB single-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1423	
24	Memory, 4 GB single-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1424	
24	Memory, 4 GB dual-rank 1.35 V, PC3L-10600E-999 LP ECC UDIMM	49Y1422	
24	Memory, 4 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1425	
24	Memory, 16 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1565	
24	Memory, 4 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	90Y3180	
24	Memory, 4 GB single-rank 1.5 V, DDR3, 1600MHz, RDIMM	49Y1561	
24	Memory, 8 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	90Y3111	
24	Memory, 16 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	00D4970	
24	Memory, 32 GB dual-rank 1.35 V, DDR3, 1333MHz, LR-DIMM	90Y3107	
25	System board		00W2046
26	Power supply, 550 W, ac	94Y8105	
26	Power supply, 750 W, ac	69Y5747	
26	Power supply, 750 W, ac	94Y8071	
26	Power supply, 750 W, ac	94Y8079	
26	Power supply, 750 W, ac	94Y8086	
26	Power supply, 900 W, ac	94Y8067	
26	Power supply, 900 W, ac	94Y8073	
26	Power supply, 900 W, ac	94Y8087	
27	Power paddle card		69Y5792
27	Power paddle card bracket		94Y7742
28	ServeRAID M5100 series super cap pack	81Y4579	
	Label, system service	94Y7750	
	Battery, 3.0 volt	33F8354	
	Thermal grease kit		41Y9292

Table 8. Parts listing, Type 7383 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Alcohol wipes		59P4739
	Microprocessor installation tool		94Y9955
	Cage, 3.5-inch hard disk drive	94Y7743	
	Cage, 2.5-inch hard disk drive	94Y7744	
	PCI-X interposer card	90Y5961	
	Mouse, USB	39Y9875	
	Bracket, tape drive	81Y7000	
	Bracket, PCI adapter, 3U	94Y7628	
	Bracket, PCI adapter	94Y7752	
	Bracket, USB cable and light path diagnostics	94Y7754	
	Bracket, microprocessor 2 expansion board		00D3579
	Operator information panel assembly	94Y7734	
	Power cut-off switch assembly	94Y7747	
	CMA kit	68Y7213	
	Slide rail kit	68Y7226	
	Rail guide assembly, 5.25-inch drive	81Y6982	
	EIA bracket	94Y7756	
	Cable, line cord	39M5206	
	Cable, SAS 820 mm	81Y6674	
	Cable, backplane connection, 2.5-inch	81Y7514	
	Cable, fan cage assembly	81Y7533	
	Cable, SATA optical power	81Y7535	
	Cable, SATA backplate assembly, 3.5-inch	81Y7536	
	Cable, backplane power conversion	81Y7537	
	Cable, backplane configuration, 2.5-inch	81Y7538	
	Cable, backplane, 3.5-inch hot-swap HDD	81Y7539	
	Cable, power cut-off switch assembly	81Y7540	
	Cable, ServeRAID power module	90Y7310	
	Cable, front USB	94Y6367	
	Cable, graphical adapter power conversion	94Y6414	
	Cable, backplane	00W2022	
	Cable, light path diagnostics	94Y7745	
	Cable, backplane, 2.5-inch hot-swap HDD	00D2706	

Consumable and structural parts

Consumable and structural parts are not covered by the IBM Statement of Limited Warranty.

Table 9. Consumable and structural parts, Type 7383

Index	Description	Part number
1	Bezel, tower	94Y7729
	Bezel, rack	94Y7753
	Filler, 2.5-inch hot-swap hard disk drive bay	44T2248
	Filler, 3.5-inch hot-swap hard disk drive bay	69Y5364
	Filler, 3.5-inch simple-swap hard disk drive bay	69Y5368
	Filler, 5.25-inch drive bay	94Y7732
6	Filler, 2.5-inch cage filler	94Y7748
7	Filler, 3.5-inch cage filler	94Y7749
	Filler, rack kit	94Y7755
	Filler, power supply bay	94Y7610
14	Filler, fan	00D4373
17	ServeRAID M5100 series battery Kit	81Y4491
19	Air baffle	94Y7741
18	Cover, left-side	94Y7736
	Cover, right-side	94Y7737
	Cover, top	94Y7738
	Foot kit, rear	13N2985
	Foot kit, stabilizer, front	26K7345
	Keylock assembly, universal	94Y7730
	Keylock assembly	94Y7731
29	Remote RAID battery tray	94Y7609

To order a consumable and structural part, complete the following steps:

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com.
2. From the **Products** menu, select **Upgrades, accessories & parts**.
3. Click **Obtain maintenance parts**; then, follow the instructions to order the part from the retail store.

If you need help with your order, call the toll-free number that is listed on the retail parts page, or contact your local IBM representative for assistance.

Product recovery CDs

The following table describes the product recovery CD's CRUs.

Description	CRU part number
VMware ESX Server 3i Version 3.5	46D0762

Description	CRU part number
VMware ESX Server 3i Version 3.5 Update 2	46M9236
VMware ESX Server 3i Version 3.5 Update 3	46M9237
VMware ESX Server 3i Version 3.5 Update 4	46M9238
VMware ESX Server 3i Version 3.5 Update 5	68Y9633
VMware ESXi 4.0	49Y8747
VMware ESXi 4.0 Update 1	68Y9634
VMware ESXi 4.1	81Y2028
VMware vSphere ESXi 4.1 (without Flash memory USB key)	81Y2028
VMware vSphere ESXi 4.1 Update 1 (without Flash memory USB key)	95Y3065
Microsoft Windows 2008 DataCenter 32b/64b, Multilingual	49Y0222
Microsoft Windows 2008 Datacenter SP2 32b/64b, Multilingual	60Y1760
Microsoft Windows 2008 Datacenter 32b/64b, Simplified Chinese	49Y0223
Microsoft Windows 2008 Datacenter 32b/64b, Traditional Chinese	49Y0224
Microsoft Windows 2008 R2 Datacenter, Multilingual	59Y7332
Microsoft Windows 2008 R2 Datacenter, Simplified Chinese	59Y7333
Microsoft Windows 2008 R2 Datacenter, Traditional Chinese	59Y7334
Microsoft Windows HPC Server 2008, 1-4 Processors, English	68Y9455
Microsoft Windows HPC Server 2008, 1-4 Processors, Japanese	68Y9456
Microsoft Windows HPC Server 2008, 1-4 Processors, Simplified Chinese	68Y9457
Microsoft Windows 2008 Server Standard Edition 32b/64b, 1-4 Processors, Multilingual	49Y0892
Microsoft Windows 2008 Server Standard Edition 32b/64b, 1-4 Processors, Simplified Chinese	49Y0893
Microsoft Windows 2008 Server Standard Edition 32b/64b, 1-4 Processors, Traditional Chinese	49Y0894
Microsoft Windows 2008 Enterprise Edition 32b/64b, 1-8 Processors, Multilingual	49Y0895
Microsoft Windows 2008 Enterprise Edition 32b/64b, 1-8 Processors, Simplified Chinese	49Y0896
Microsoft Windows 2008 Enterprise Edition 32b/64b, 1-8 Processors, Traditional Chinese	49Y0897
Microsoft Windows Server 2008 R2 Foundation Edition, English	81Y2001
Microsoft Windows Server 2008 R2 Foundation Edition, French	81Y2002
Microsoft Windows Server 2008 R2 Foundation Edition, German	81Y2003
Microsoft Windows Server 2008 R2 Foundation Edition, Spanish	81Y2004
Microsoft Windows Server 2008 R2 Foundation Edition, Italian	81Y2005
Microsoft Windows Server 2008 R2 Foundation Edition, Brazilian	81Y2006
Microsoft Windows Server 2008 R2 Foundation Edition, Polish	81Y2007
Microsoft Windows Server 2008 R2 Foundation Edition, Russian	81Y2008
Microsoft Windows Server 2008 R2 Foundation Edition, Turkish	81Y2009
Microsoft Windows Server 2008 R2 Foundation Edition, Japanese	81Y2010
Microsoft Windows Server 2008 R2 Foundation Edition, Simplified Chinese	81Y2011
Microsoft Windows Server 2008 R2 Foundation Edition, Traditional Chinese	81Y2012
Microsoft Windows Server 2008 R2 Foundation Edition, Korean	81Y2013
Microsoft Windows Server 2008 R2 Foundation Edition, Czech	81Y2014

Description	CRU part number
Microsoft Windows Server 2008 R2 Standard Edition, Multilingual	81Y2015
Microsoft Windows Server 2008 R2 Standard Edition, Simplified Chinese	81Y2016
Microsoft Windows Server 2008 R2 Standard Edition, Traditional Chinese	81Y2017
Microsoft Windows Server 2008 R2 Enterprise Edition, Multilingual	81Y2018
Microsoft Windows Server 2008 R2 Enterprise Edition, Simplified Chinese	81Y2019
Microsoft Windows Server 2008 R2 Enterprise Edition, Traditional Chinese	81Y2020
Microsoft Windows Server 2008 R2 Enterprise Edition, 10 CALs, Multilingual	81Y2021
Microsoft Windows Server 2008 R2 Enterprise Edition, 10 CALs, Simplified Chinese	81Y2022
Microsoft Windows Server 2008 R2 Enterprise Edition, 10 CALs, Traditional Chinese	81Y2023
Microsoft Windows Server 2008 R2 Datacenter Edition Service Pack 1, Multilingual	88Y7794
Microsoft Windows Server 2008 R2 Datacenter Edition Service Pack 1, Czech	88Y7795
Microsoft Windows Server 2008 R2 Datacenter Edition Service Pack 1, Traditional Chinese	88Y7796
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, English	95Y3009
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, French	95Y3010
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, German	95Y3011
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Spanish	95Y3012
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Italian	95Y3013
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Brazilian	95Y3014
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Polish	95Y3015
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Russian	95Y3016
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Turkish	95Y3017
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Japanese	95Y3018
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Simplified Chinese	95Y3020
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Traditional Chinese	95Y3021
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Korean	95Y3022
Microsoft Windows Server 2008 R2 Foundation Edition Service Pack 1, Czech	95Y3023
Microsoft Windows Server 2008 R2 Enterprise Edition Service Pack 1, Multilingual	95Y3024
Microsoft Windows Server 2008 R2 Enterprise Edition Service Pack 1, Simplified Chinese	95Y3025
Microsoft Windows Server 2008 R2 Enterprise Edition Service Pack 1, Traditional Chinese	95Y3026
Microsoft Windows Server 2008 R2 Standard Edition Service Pack 1, Multilingual	95Y3027
Microsoft Windows Server 2008 R2 Standard Edition Service Pack 1, Simplified Chinese	95Y3028
Microsoft Windows Server 2008 R2 Standard Edition Service Pack 1, Traditional Chinese	95Y3029
Microsoft Windows Server 2008 R2 Standard Edition, Multilingual	95Y3213
Microsoft Windows Server 2008 R2 Enterprise Edition, Multilingual	95Y3214
Microsoft Windows Server 2012 Standard/Datacenter Edition, Brazilian Portuguese	47C8611
Microsoft Windows Server 2012 Standard/Datacenter Edition, Simplified Chinese	47C8612
Microsoft Windows Server 2012 Standard/Datacenter Edition, Traditional Chinese	47C8613
Microsoft Windows Server 2012 Standard/Datacenter Edition, Czech	47C8614
Microsoft Windows Server 2012 Standard/Datacenter Edition, English	47C8615
Microsoft Windows Server 2012 Standard/Datacenter Edition, French	47C8616
Microsoft Windows Server 2012 Standard/Datacenter Edition, German	47C8617

Description	CRU part number
Microsoft Windows Server 2012 Standard/Datacenter Edition, Italian	47C8618
Microsoft Windows Server 2012 Standard/Datacenter Edition, Japanese	47C8619
Microsoft Windows Server 2012 Standard/Datacenter Edition, Korean	47C8620
Microsoft Windows Server 2012 Standard/Datacenter Edition, Polish	47C8621
Microsoft Windows Server 2012 Standard/Datacenter Edition, Russian	47C8622
Microsoft Windows Server 2012 Standard/Datacenter Edition, Spanish	47C8623
Microsoft Windows Server 2012 Standard/Datacenter Edition, Swedish	47C8624
Microsoft Windows Server 2012 Standard/Datacenter Edition, Turkish	47C8625
Microsoft Windows Server 2012 Foundation Edition, Brazilian Portuguese	47C8626
Microsoft Windows Server 2012 Foundation Edition, Simplified Chinese	47C8627
Microsoft Windows Server 2012 Foundation Edition, Traditional Chinese	47C8628
Microsoft Windows Server 2012 Foundation Edition, Czech	47C8629
Microsoft Windows Server 2012 Foundation Edition, English	47C8630
Microsoft Windows Server 2012 Foundation Edition, French	47C8631
Microsoft Windows Server 2012 Foundation Edition, German	47C8632
Microsoft Windows Server 2012 Foundation Edition, Italian	47C8633
Microsoft Windows Server 2012 Foundation Edition, Japanese	47C8634
Microsoft Windows Server 2012 Foundation Edition, Korean	47C8635
Microsoft Windows Server 2012 Foundation Edition, Polish	47C8636
Microsoft Windows Server 2012 Foundation Edition, Russian	47C8637
Microsoft Windows Server 2012 Foundation Edition, Spanish	47C8638
Microsoft Windows Server 2012 Foundation Edition, Swedish	47C8639
Microsoft Windows Server 2012 Foundation Edition, Turkish	47C8640
Microsoft Windows Storage Server 2012, Brazilian Portuguese	47C8641
Microsoft Windows Storage Server 2012, Simplified Chinese	47C8642
Microsoft Windows Storage Server 2012, Traditional Chinese	47C8643
Microsoft Windows Storage Server 2012, Czech	47C8644
Microsoft Windows Storage Server 2012, English	47C8645
Microsoft Windows Storage Server 2012, French	47C8646
Microsoft Windows Storage Server 2012, Germany	47C8647
Microsoft Windows Storage Server 2012, Italian	47C8648
Microsoft Windows Storage Server 2012, Japanese	47C8649
Microsoft Windows Storage Server 2012, Korean	47C8650
Microsoft Windows Storage Server 2012, Polish	47C8651
Microsoft Windows Storage Server 2012, Russian	47C9252
Microsoft Windows Storage Server 2012, Spanish	47C9253
Microsoft Windows Storage Server 2012, Swedish	47C9254
Microsoft Windows Storage Server 2012, Turkish	47C9255
Microsoft Windows Server 2012 Essentials Edition, Brazilian Portuguese	47C9384
Microsoft Windows Server 2012 Essentials Edition, Simplified Chinese	47C9385
Microsoft Windows Server 2012 Essentials Edition, Traditional Chinese	47C9386

Description	CRU part number
Microsoft Windows Server 2012 Essentials Edition, Czech	47C9387
Microsoft Windows Server 2012 Essentials Edition, English	47C9388
Microsoft Windows Server 2012 Essentials Edition, French	47C9389
Microsoft Windows Server 2012 Essentials Edition, German	47C9390
Microsoft Windows Server 2012 Essentials Edition, Italian	47C9391
Microsoft Windows Server 2012 Essentials Edition, Japanese	47C9392
Microsoft Windows Server 2012 Essentials Edition, Korean	47C9393
Microsoft Windows Server 2012 Essentials Edition, Polish	47C9394
Microsoft Windows Server 2012 Essentials Edition, Russian	47C9395
Microsoft Windows Server 2012 Essentials Edition, Spanish	47C9396
Microsoft Windows Server 2012 Essentials Edition, Swedish	47C9397
Microsoft Windows Server 2012 Essentials Edition, Turkish	47C9398

Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
39M5206	China
39M5102	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea

IBM power cord part number	Used in these countries and regions
39M5123	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
39M5130 39M5179	Denmark
39M5144	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
39M5151	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
39M5158	Liechtenstein, Switzerland
39M5165	Chile, Italy, Libyan Arab Jamahiriya
39M5172	Israel
39M5095	220 - 240 V Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
39M5081	110 - 120 V Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela
39M5076 39M5512	United States of America

IBM power cord part number	Used in these countries and regions
39M5463	Taiwan
39M5087	Thailand
39M5219	Korea (Democratic People's Republic of), Korea (Republic of)
39M5199	Japan
39M5068	Argentina, Paraguay, Uruguay
39M5226	India
39M5240 39M5241	Brazil
39M5375 39M5378 39M5509	Canada, Germany, United States of America

Chapter 5. Removing and replacing server components

The types of replaceable components are:

- **Consumable parts:** Purchase and replacement of consumable parts (components, such as batteries and printer cartridges, that have depletable life) is your responsibility. If IBM acquires or installs a consumable part at your request, you will be charged for the service.
- **Structural parts:** Purchase and replacement of structural parts (components, such as chassis assembly, top cover, and bezel) is your responsibility. If IBM acquires or installs a structural component at your request, you will be charged for the service.
- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.

See Chapter 4, "Parts listing, System x3500 M4 Type 7383," on page 165 to determine whether a component is a consumable part, structural part, Tier 1 CRU, or Tier 2 CRU.

For information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document.

Installation guidelines

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the system to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when removing or installing a hot-swap device.

Before you install optional devices, read the following information:

- Make sure that the devices that you are installing are supported. For a list of supported optional devices for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
- Read the safety information that begins on page vii and the guidelines in "Handling static-sensitive devices" on page 179. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, go to http://www.ibm.com/support/fixcentral/.

  Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
  For additional information about tools for updating, managing, and deploying firmware, see the ToolsCenter for System x and BladeCenter at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are next:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper

cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.

- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffle or the fan filler installed. Operating the server without the air baffle or the fan filler might cause the microprocessor to overheat.

    Note: The air baffle comes with the microprocessor 2 expansion board option.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.
- You have installed the air baffle and fan 2 when you installed the microprocessor 2 expansion board option.

Note: Do not install the ServeRAID M5120 SAS/SATA adapter in slot 4, 7, and 8 for proper cooling.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

The server supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:

Note: In order to work inside the server with the power on, you have to disable the power cut-off switch before removing the server cover.

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before you work inside the server; do not wear cuff links while you are you work inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that might fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.

- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Opening the bezel media door

To open the media door, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Check the status of the media door icon. If the icon on the side of the bezel is in the unlocked position, open the bezel media door directly.
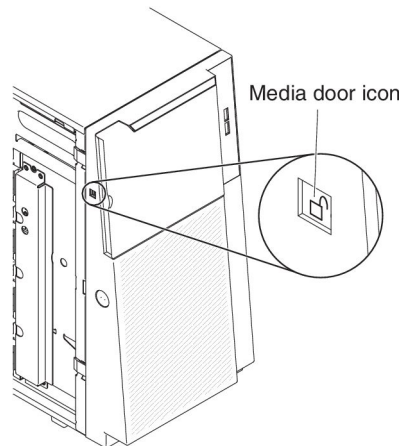
Media door icon

3. Unlock the left-side cover.

    Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button
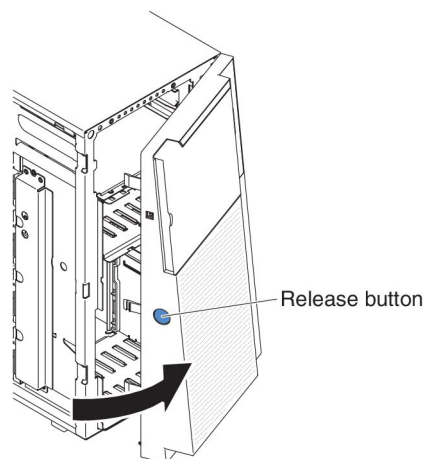
5. From inside of the top section of the bezel door, slide the blue tab up to unlock the bezel media door; then, grasp the depressed area on the media door and pull the door open.

Bezel media door
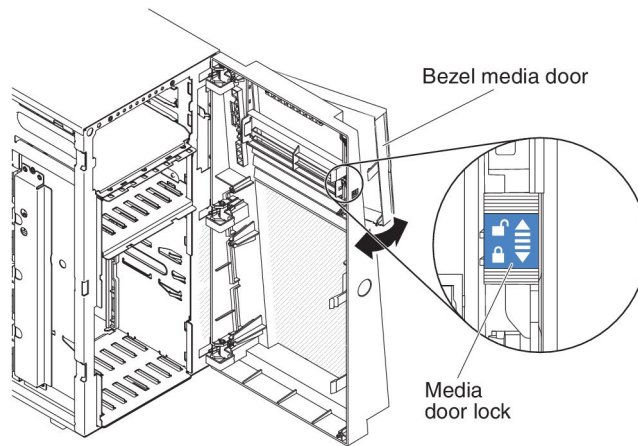
Media door lock

6. When the media door is unlocked, the icon on the side of the bezel will be in the unlocked position.
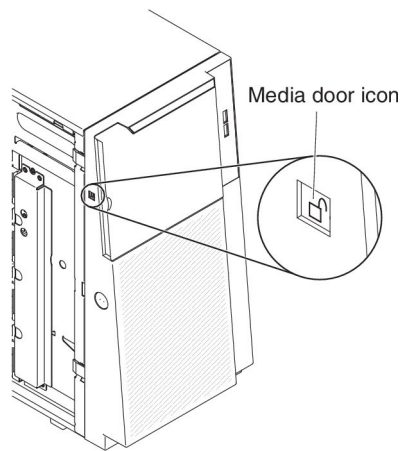
Media door icon

Closing the bezel media door

To close the media door, complete the following steps:

1. Swing the bezel media door closed and push it into the bezel to close it.

2. From inside of the top section of the bezel door, slide the blue tab down to lock the bezel media door.

Bezel media door

Media door lock
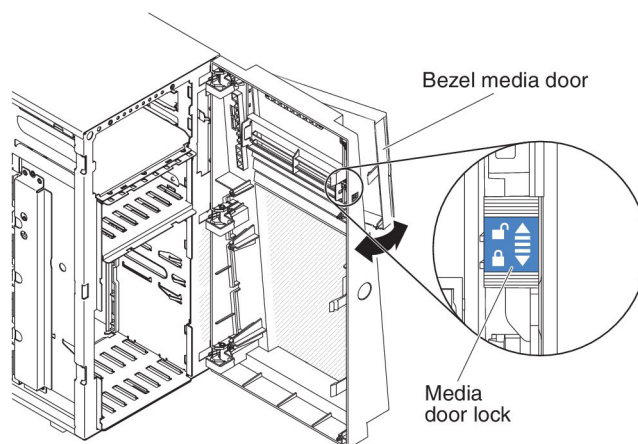
3. Close the bezel.

Internal cable routing and connectors

The server uses cables to connect SATA attached, hot-swap SATA, hot-swap SAS and DVD drive devices to the power supply and to the system board.

Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

Power cable connection

The following illustration shows the power cable routing and the connectors from the power paddle card to the system board and the microprocessor 2 expansion board.
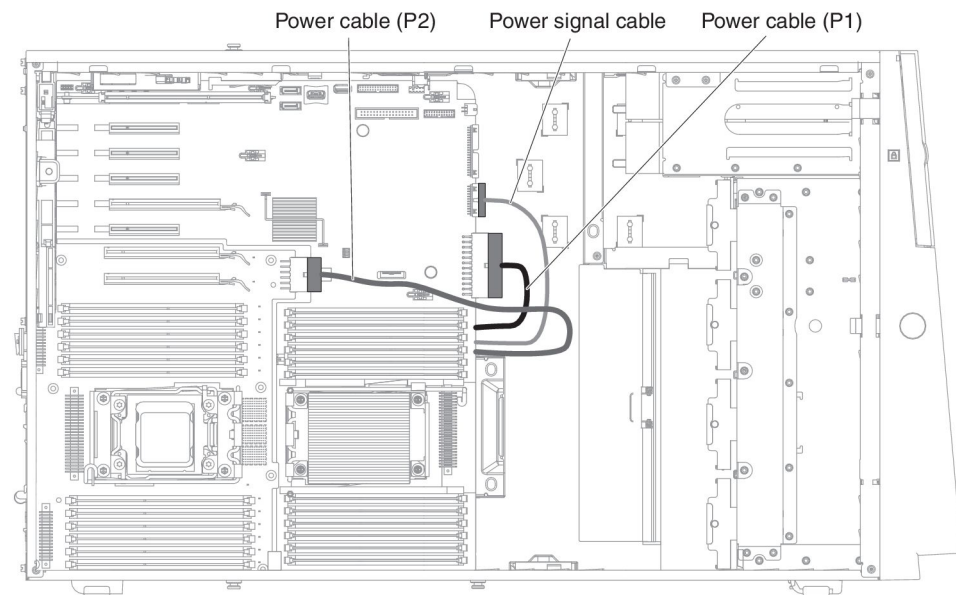
Operator information panel cable connection

The following illustration shows the internal cable routing and connectors from the operator information panel to the system board.
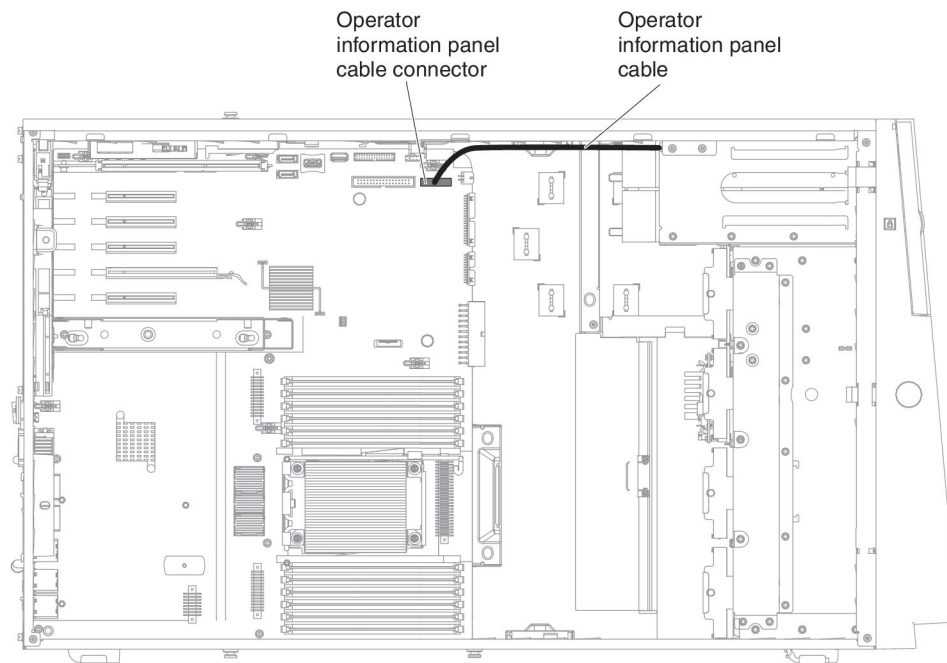
Light path diagnostics panel cable connection

The following illustration shows the internal cable routing and connectors from the light path diagnostics panel to the system board.
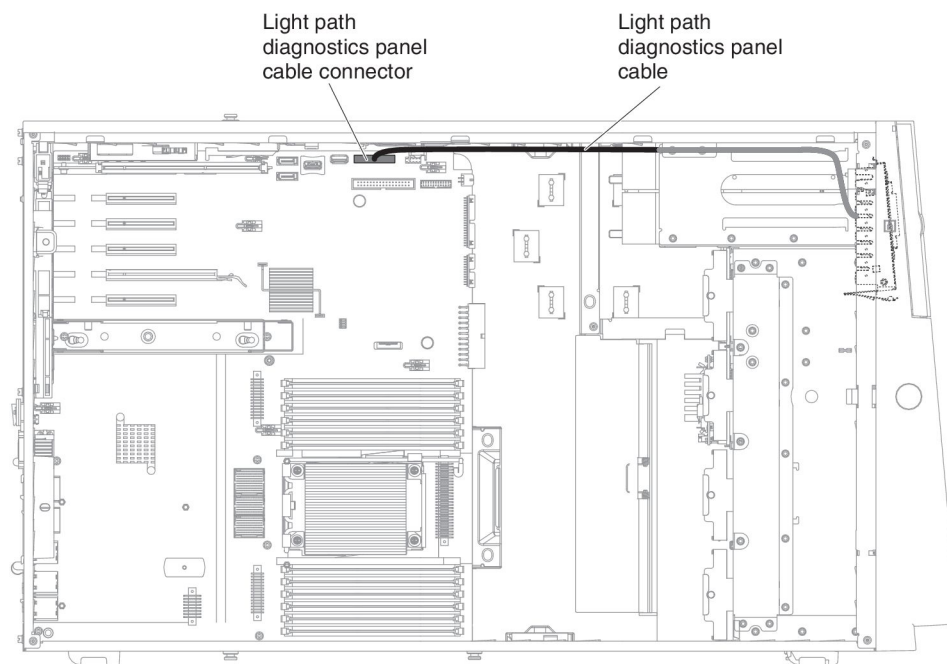
Tape drive cable connection

You can install either a USB or SATA tape drive in the server. The following illustration shows the internal cable routing and connectors for the USB tape drive. It also shows the internal power cable for the optical drives.
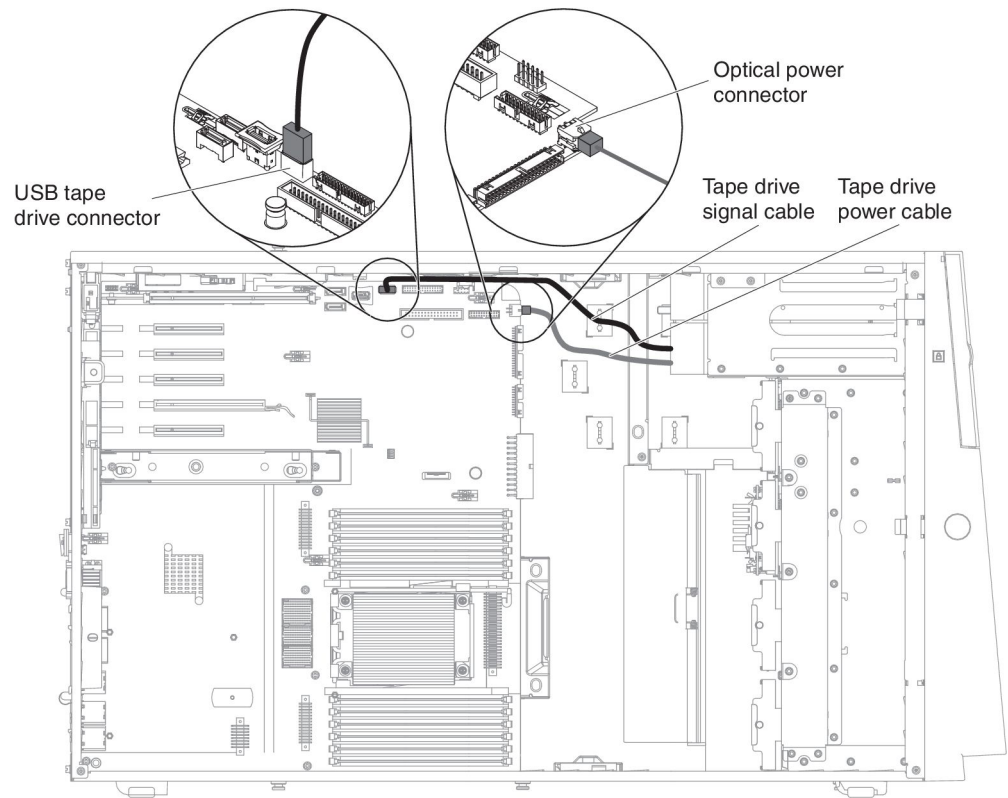
The following illustrations show the cable routing and connectors for the SATA tape drive. It also shows the internal power cable for the optical drives.
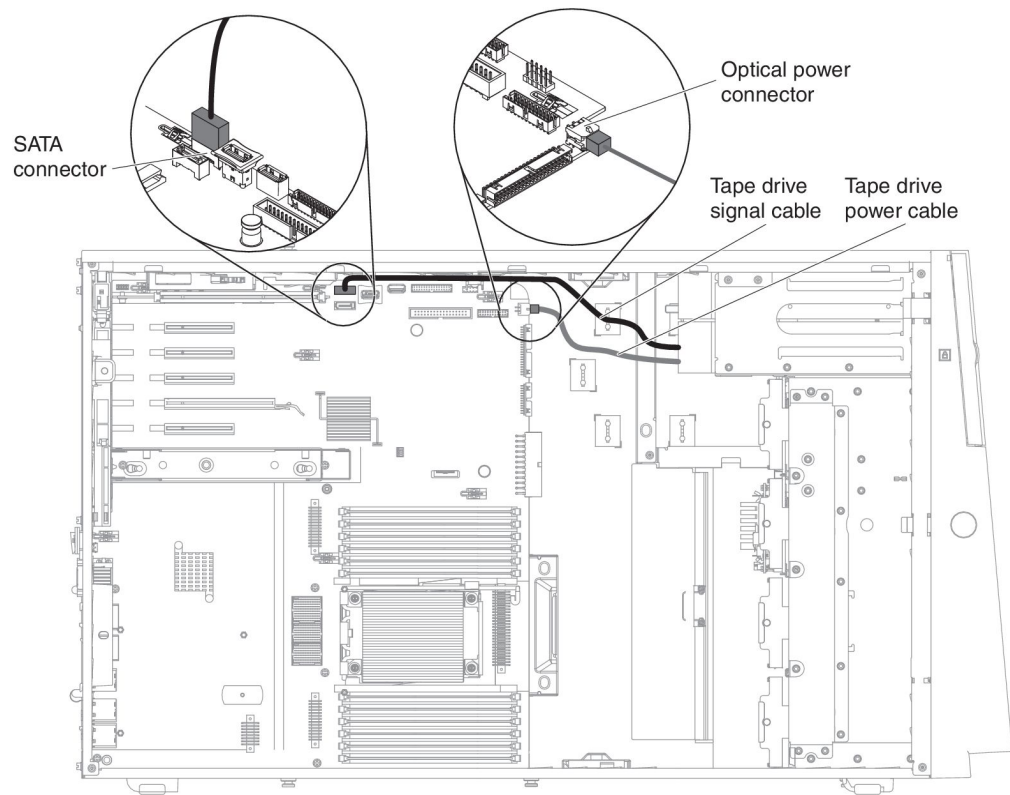
DVD drive cable connection

The following illustration shows the internal SATA and power cable routing and the connectors from the DVD drive to the system board.
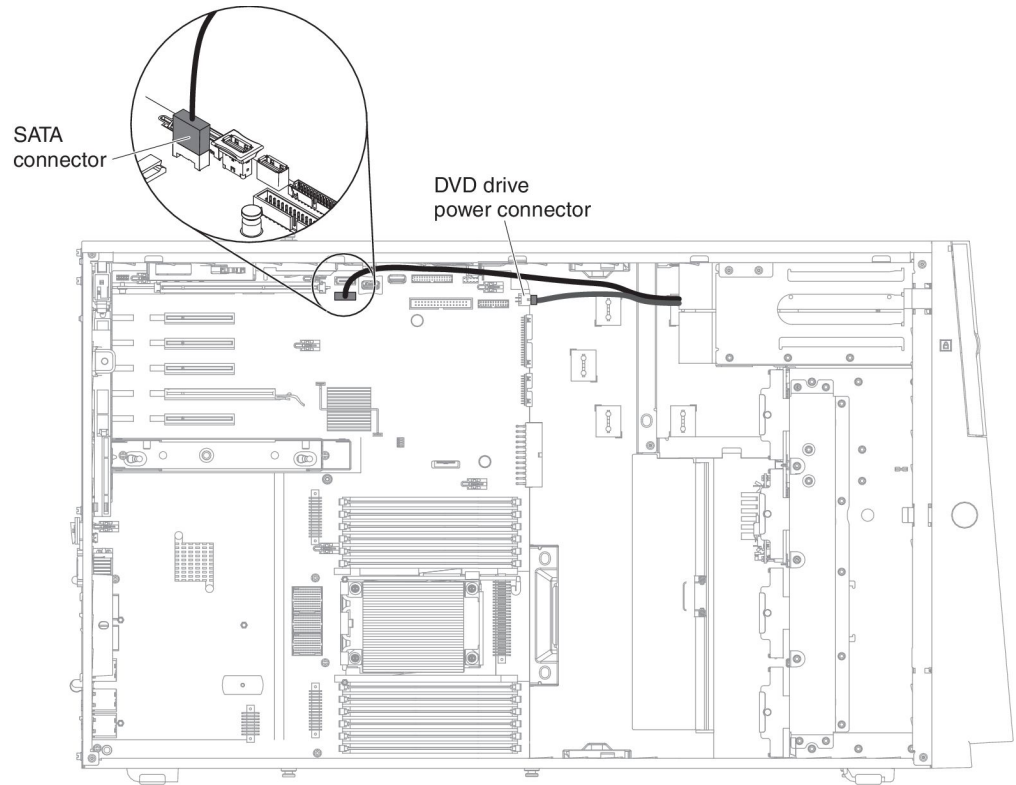
Hard disk drive cable connection

Review the following information before connecting power and signal cables to internal drives:

1. The following illustrations show the connectors on the 2.5-inch and 3.5-inch hard disk drive backplanes.
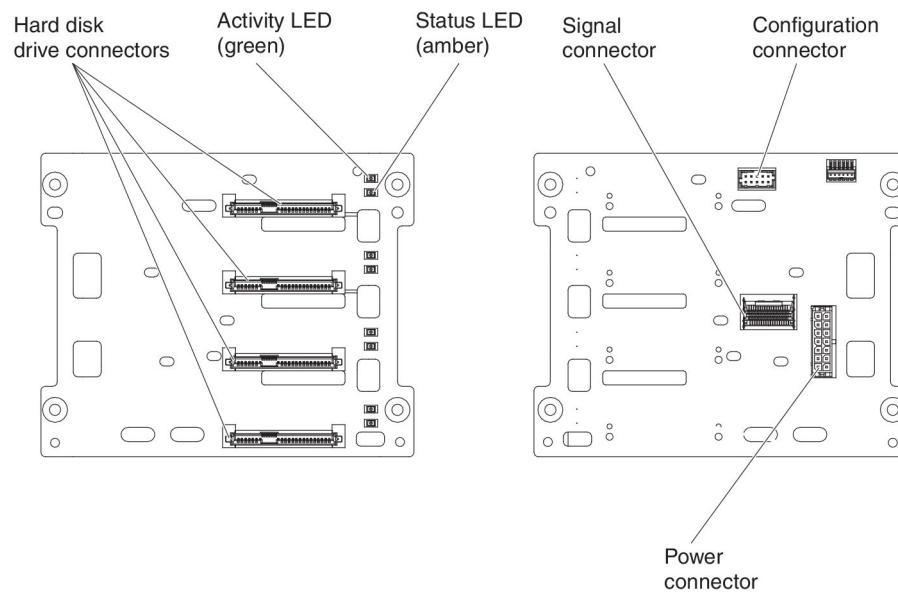
Figure 5. Connectors on the 3.5-inch hard disk drive backplane

Hard disk
drive connectors

Power
connector

Configuration
connector

Status LED
(amber)

Activity LED
(green)

Signal connectors

Hard disk
drive connectors

Signal connector
(backplane configuration)

Power connector

Status LED
(amber)

Activity LED
(green)

Configuration connector

Signal connectors
(ServeRAID adapter)
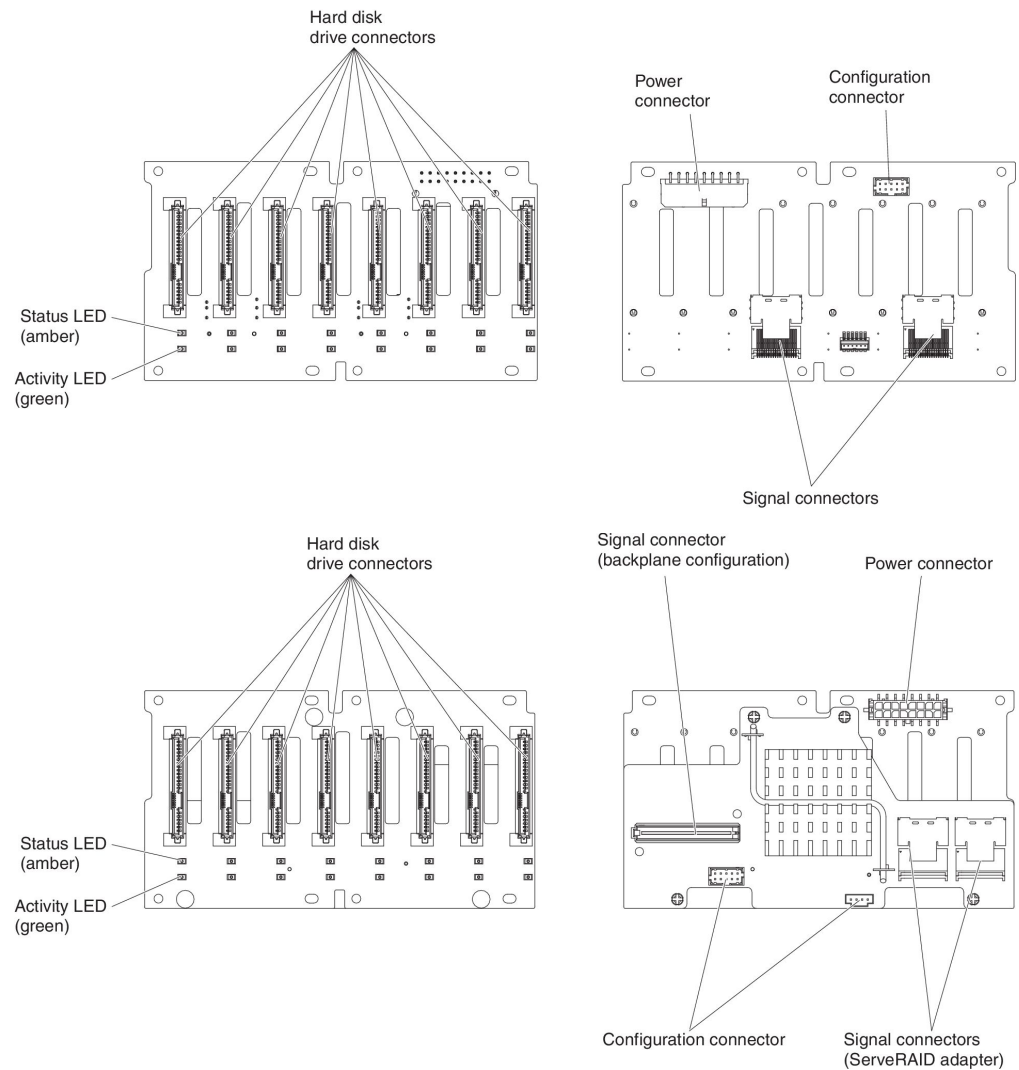
Figure 6. Connectors on the 2.5-inch hard disk drive backplane

Note: If the server is configured for RAID operation using a ServeRAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ServeRAID adapter documentation for additional information about RAID operation and complete instructions for using the ServeRAID adapter.

Review the following information before connecting cables to the backplanes:

1. For server models with sixteen 2.5-inch hot-swap hard disk drives.

SAS signal cables   Configuration cable

0

1

Power cable (BP1)   Power cable (BP2)

SAS/SATA configuration connector

Configuration cable

0

Hard disk drive backplane (drive bay 0 - 7)

SAS signal cables

Backplane configuration cables

Hard disk drive backplane with the expander (drive bay 8 - 15)

1

Port 0   Port 1

Power cable (BP1)

Power cable (BP2)

2. For server models with sixteen 2.5-inch hot-swap hard disk drives and two ServeRAID adapters.

SAS signal cables
Configuration cable

0

1

Power cable (BP1)   Power cable (BP2)

SAS/SATA configuration connector

Configuration cable

0

Hard disk drive backplane (drive bay 0 - 7)

Port 0   Port 1

Hard disk drive backplane with the expander (drive bay 8 - 15)

1

Port 0   Port 1

SAS signal cables

Port 0   Port 1

Port 0   Port 1

Power cable (BP1)

Power cable (BP2)

3. For server models with twenty-four 2.5-inch hot-swap hard disk drives.

SAS signal cables

Configuration cable

0

1

2

Power cable (BP1)   Power cable (BP2)   Power cable (BP3)

SAS/SATA configuration connector

Configuration cable

SAS signal cables

0

Hard disk drive backplane (drive bay 0 - 7)

Backplane configuration cables

Port 0   Port 1

1

Hard disk drive backplane with the expander (drive bay 8 - 15)

2

Hard disk drive backplane with the expander (drive bay 16 - 23)

Power cable (BP1)

Power cable (BP2)

Power cable (BP3)

4. For server models with twenty-four 2.5-inch hot-swap hard disk drives and two ServeRAID adapters.

SAS signal cables   Configuration cable

0

1

2

Power cable (BP1)   Power cable (BP2)   Power cable (BP3)

SAS/SATA configuration connector

Configuration cable

0

Hard disk drive backplane (drive bay 0 - 7)

Backplane configuration cables

Hard disk drive backplane with the expander (drive bay 8 - 15)

1

Port 0   Port 1

SAS signal cables

Hard disk drive backplane with the expander (drive bay 16 - 23)

2

Port 0   Port 1

Power cable (BP1)

Power cable (BP2)

Power cable (BP3)

5. For server models with thirty-two 2.5-inch hot-swap hard disk drives.

SAS signal cables   Configuration cable

Power cable (BP1)   Power cable (BP2)   Power cable (BP3)   Power cable (BP4)

SAS/SATA configuration connector   Configuration cable

SAS signal cables

Port 0   Port 1

Power cable (BP1)
Power cable (BP2)
Power cable (BP3)
Power cable (BP4)

Hard disk drive backplane (drive bay 0 - 7)

Backplane configuration cables

Hard disk drive backplane with the expander (drive bay 8 - 15)

Backplane configuration cables

Hard disk drive backplane with the expander (drive bay 16 - 23)

Hard disk drive backplane with the expander (drive bay 24 - 31)

6. For server models with thirty-two 2.5-inch hot-swap hard disk drives and two
ServeRAID adapters.

SAS signal   Configuration
cables   cable

Power cable (BP1)   Power cable (BP2)   Power cable (BP3)   Power cable (BP4)

SAS/SATA
configuration   Configuration
connector   cable

0

Hard disk drive
backplane
(drive bay 0 - 7)

Backplane configuration
cables

Hard disk drive backplane
with the expander
(drive bay 8 - 15)

1

Backplane configuration
cables

SAS
signal
cables

Port 0   Port 1

Hard disk drive backplane
with the expander
(drive bay 16 - 23)

2

3

Port 0   Port 1

Hard disk drive backplane
with the expander
(drive bay 24 - 31)

Power cable (BP1)

Power cable (BP2)

Power cable (BP3)

Power cable (BP4)

7. For server models with eight 3.5-inch hot-swap hard disk drives.

SAS/SATA configuration connector Configuration cable SAS signal cables

0

1

Power cable (BP1) Power cable (BP2) Power converter cables

SAS signal cables

Port 0 Port 1 Configuration cable

SAS/SATA configuration connector

0

3.5-inch Hard disk drive backplane (drive bay 0 - 3)

1

3.5-inch Hard disk drive backplane with the expander (drive bay 4 - 7)

Power cable (BP1)

Power cable (BP2)

Power converter cables

8. For server models with eight 2.5-inch hot-swap hard disk drives and eight 3.5-inch hot-swap hard disk drives.

SAS/SATA configuration connector   Configuration cable   SAS signal cables

Power cable (BP1)   Power cable (BP3)   Power cable (BP4)   Power converter cables

SAS signal cables

Port 0   Port 1

Configuration cable

SAS/SATA configuration connector

2.5-inch Hard disk drive backplane (drive bay 0 - 7)

3.5-inch Hard disk drive backplane with the expander (drive bay 8 - 11)

SAS signal cables

Port 0   Port 1

Power cable (BP1)

Power cable (BP3)

Power cable (BP4)

3.5-inch Hard disk drive backplane with the expander (drive bay 12 - 15)

Power converter cables

9. For server models with eight 3.5-inch simple-swap hard disk drives.

Signal/Power
combination cables

Power cable (BP1)   Power cable (BP2)

Signal/Power
combination cables

Port 0   Port 1

3.5-inch
Hard disk drive
backplane
(drive bay 0 - 3)

3.5-inch
Hard disk drive backplane
with the expander
(drive bay 4 - 7)

Power cable (BP1)
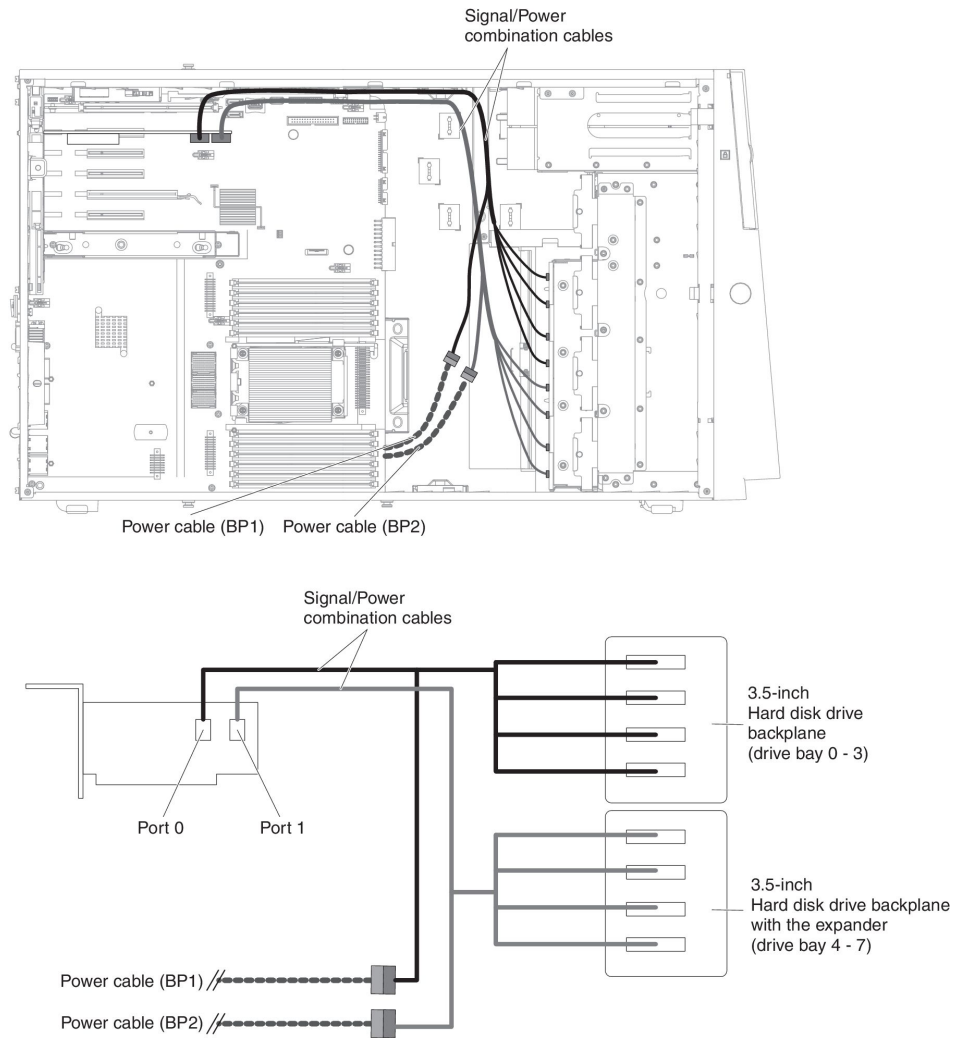
Power cable (BP2)

10. For server models with one 2.5-inch simple-swap hard disk drives.
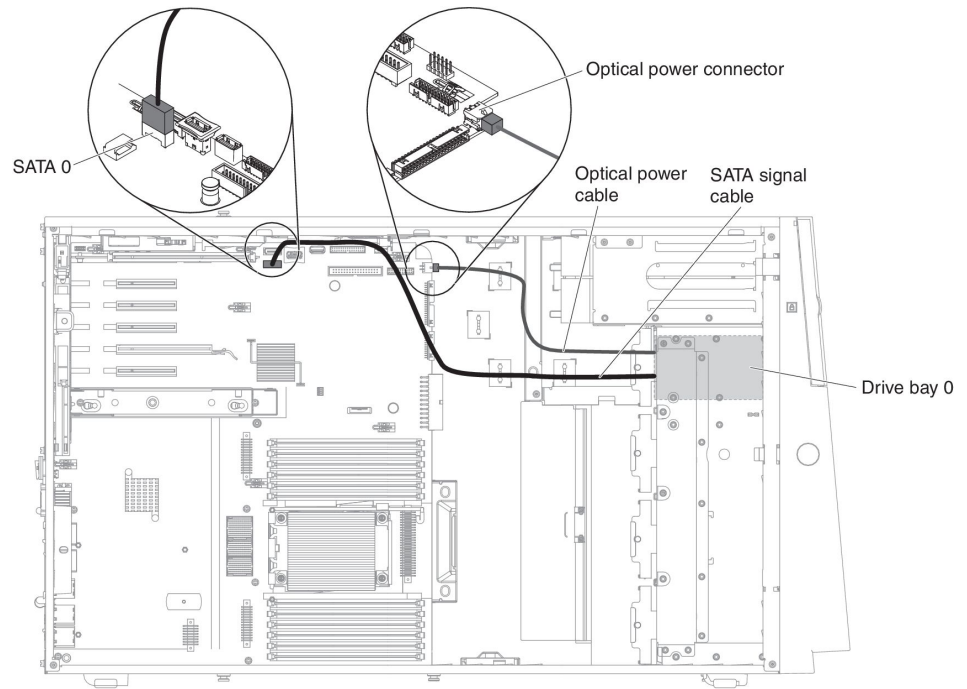
Fan cage power cable connection

The following illustration shows the internal cable routing and connectors from the fan cage assembly to the system board.
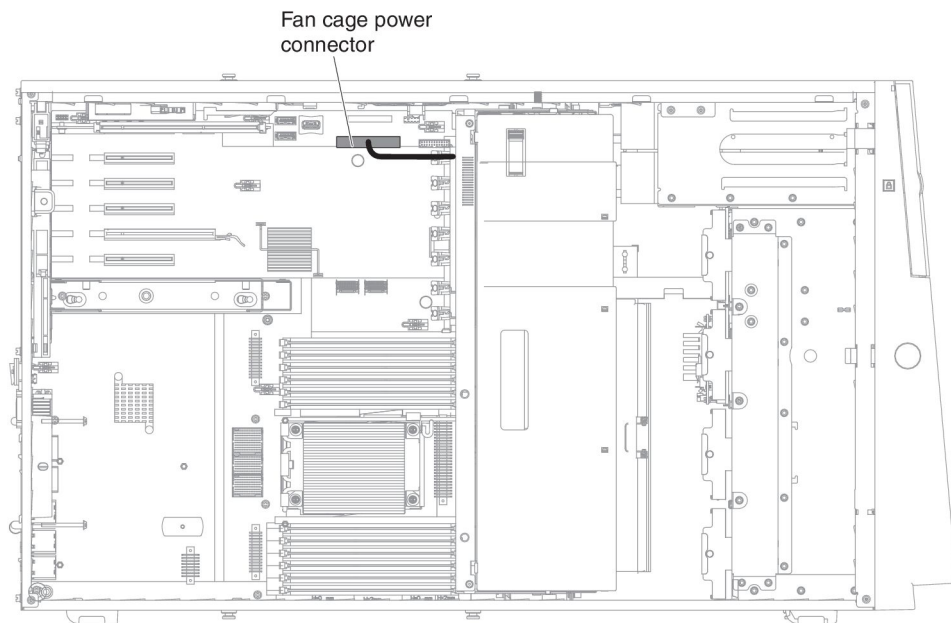
Left-side cover/power cut-off switch assembly cable connection

The following illustration shows the power cut-off switch assembly cable routing and the connector on the system board.

Power cut-off switch assembly
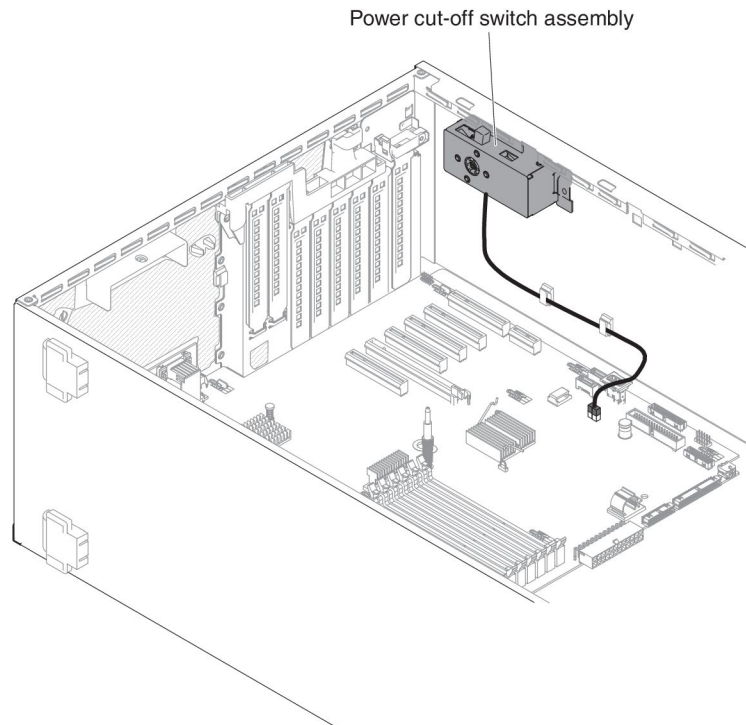
Removing and replacing consumable and structural parts

Replacement of consumable and structural parts is your responsibility. If IBM installs a consumable or structural part at your request, you will be charged for the installation.

Note: The illustrations in this document might differ slightly from your hardware.

Removing the left-side cover

Attention: The server automatically powers off when the left-side cover is removed.

To remove the left-side cover, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Unlock the left-side cover, using the key that comes with the server.
4. Pull the cover-release latch down while you rotate the top edge of the cover away from the server; then, lift the cover off the server.

Cover release latch   Left-side cover

Lock
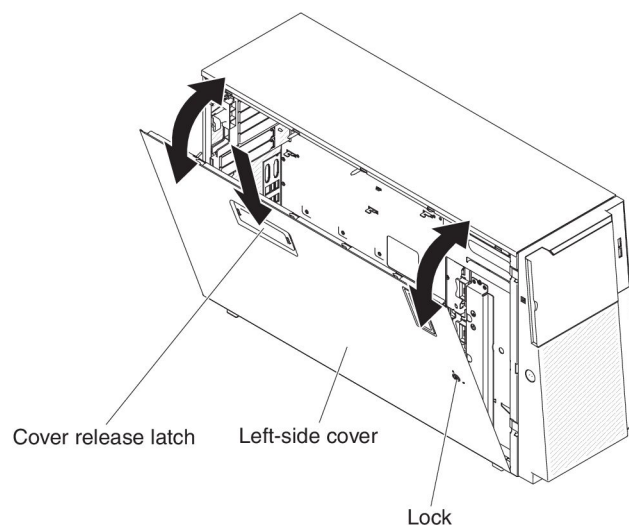
Installing the left-side cover

To install the left-side cover, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Set the bottom edge of the left-side cover on the bottom ledge of the server.

Cover release latch   Left-side cover
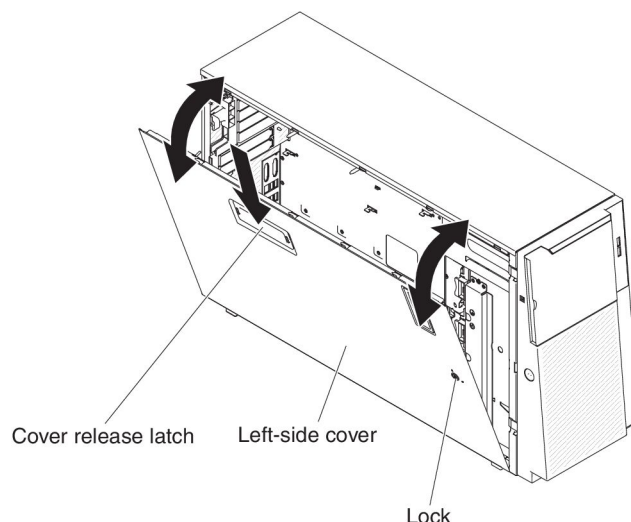
Lock

4. Rotate the top edge of the cover toward the server and press inward on the cover until it clicks into place.

5. Lock the cover, using the key that comes with the server.

Removing the bezel

To remove the bezel, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

3. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button
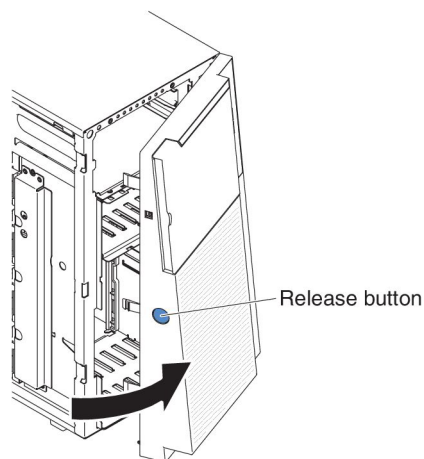
4. Pull the hinge assemblies upward and release the bezel out of the chassis.

Bezel

Hinge assembly
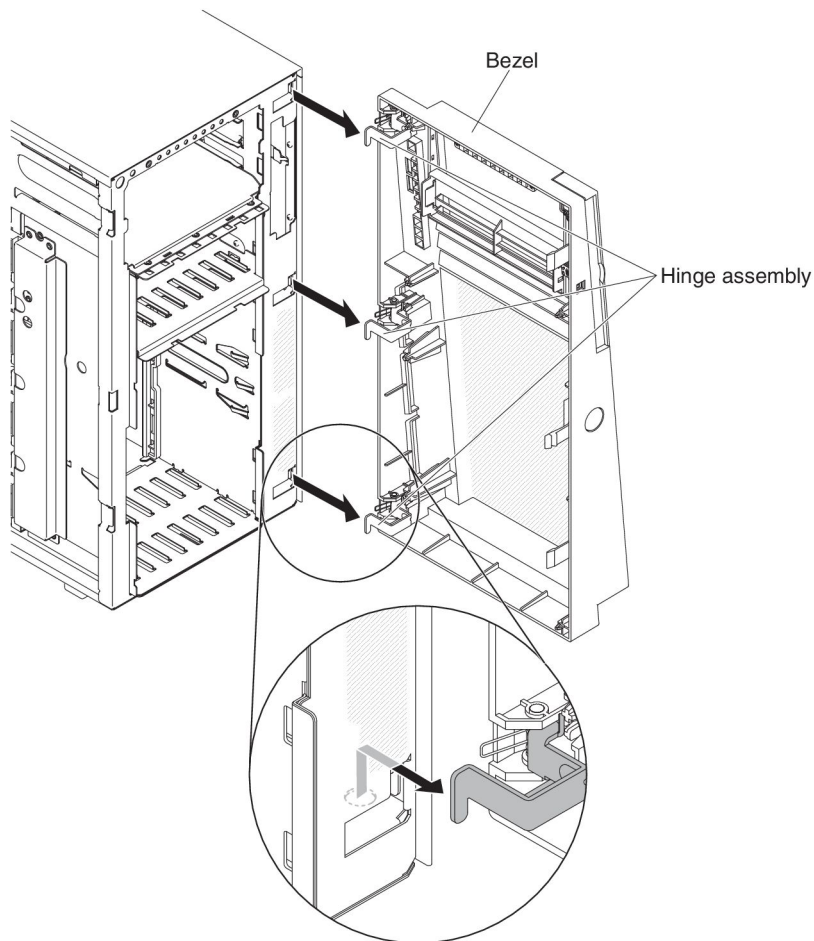
5. If you are instructed to return the bezel, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the bezel

To install the bezel, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.
3. Align the hinge assemblies with the hinge holes on the chassis.
4. Push the hinges into the holes downward on the chassis until they snap into place.

Bezel

Hinge assembly
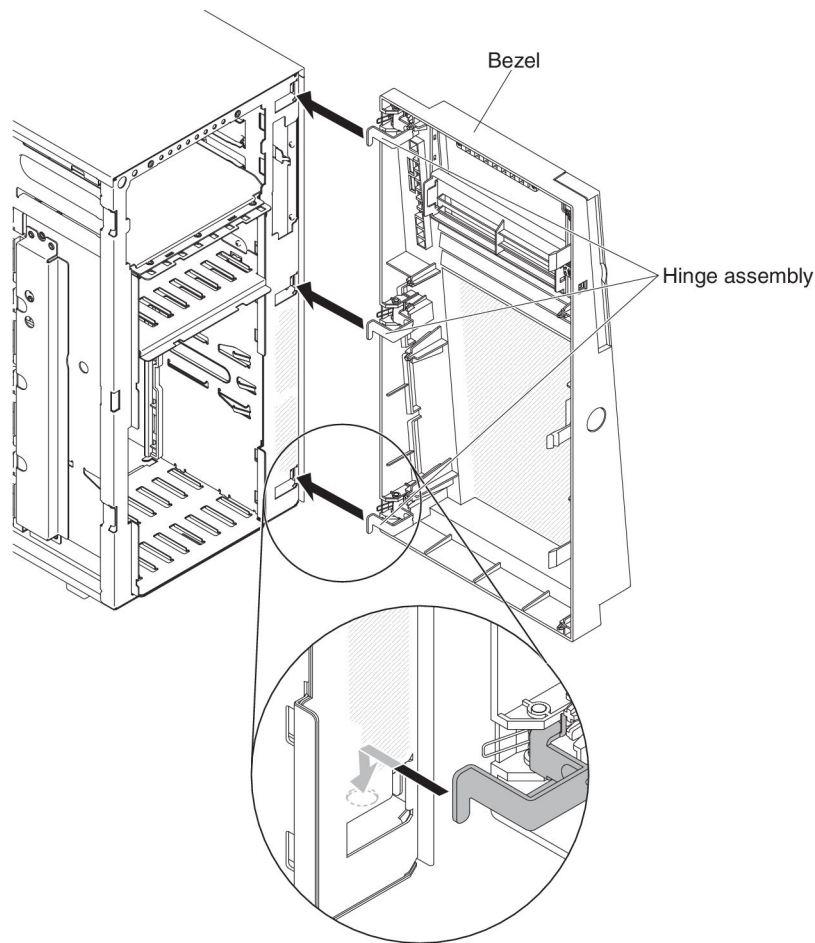
5. Close the bezel.

6. Lock the left-side cover.

Turning the stabilizing feet

To rotate the front feet, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Carefully position the server on a flat surface, with the feet hanging over the edge of the flat surface to ease removal.

5. Press in on the clips that hold the feet in place; then, pry the feet away from the server. In some cases, you might need a screwdriver to press in on the clips.

Feet

Clips

Clips
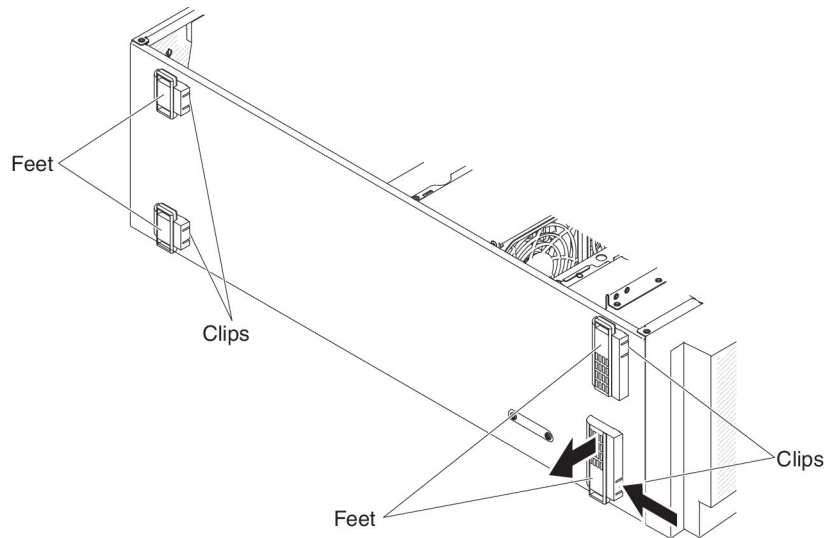
Feet

6. Reinstall the feet in the opposite location, with the tab on the feet extending beyond the edge of the server.
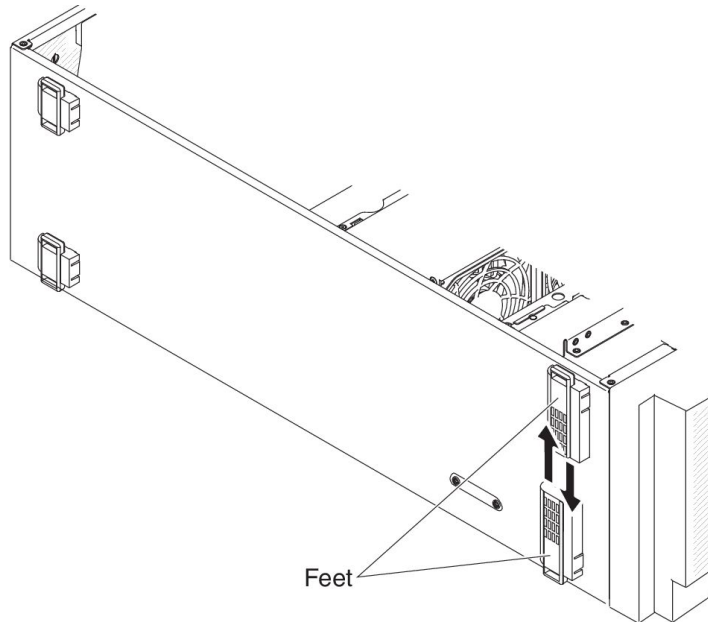
Feet

Removing the air baffle

Note: When you install the second microprocessor, you must also install fan 2 and the air baffle that come with the second microprocessor upgrade kit.
To remove the air baffle, complete the following steps:

1. Read the safety information that begins on page vii, and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle from the server and set it aside.
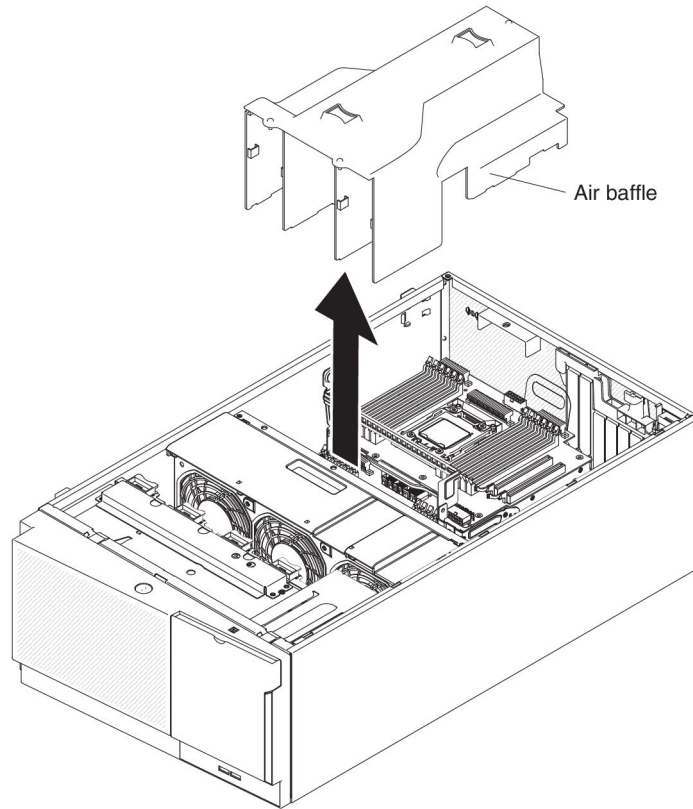
Air baffle

Attention: For proper cooling and airflow, replace the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components when two microprocessors installed.

6. If you are instructed to return the air baffle, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the air baffle

Note: When you install the second microprocessor, you must also install fan 2 and the air baffle that come with the second microprocessor upgrade kit.

To install the air baffle, complete the following steps:

1. Read the safety information that begins on page vii, and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Align the positioning pins on the ends of the air baffle with the locating holes in the server chassis and fan cage assembly.
6. Slide the air baffle down into the server until the positioning pins fit into the locating holes; then, press down on the air baffle until the pinch tab clicks into place.
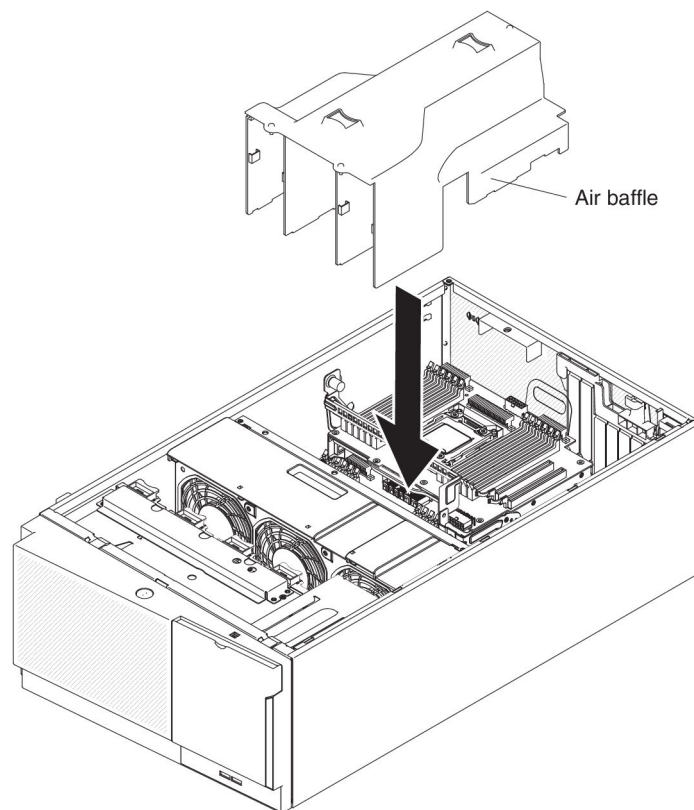
7. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).
8. Reconnect the power cords and any cables that you removed.
9. Turn on the peripheral devices and the server.

Removing a RAID adapter battery holder

To remove a RAID adapter battery holder, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Remove the remotely installed RAID adapter battery (see "Removing a remotely installed RAID adapter battery" on page 235).
6. Pull the blue touch point slightly to release the battery holder out of the guide pin.
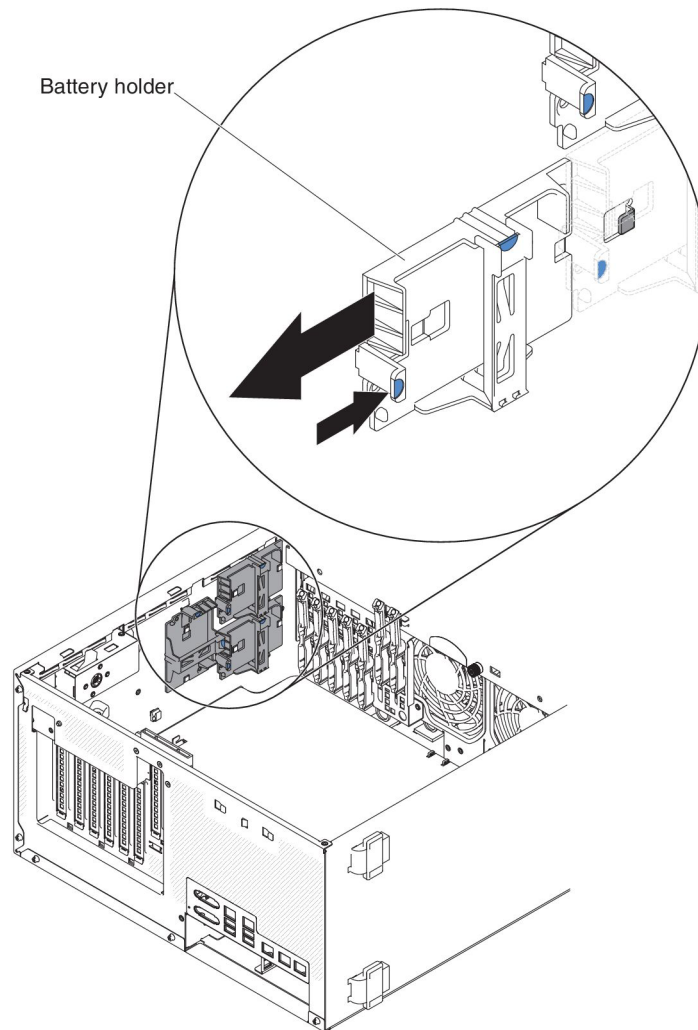
7. If you are instructed to return the RAID adapter battery holder, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a RAID adapter battery holder

To install a RAID adapter battery holder, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Align the battery holder with the guide pin to install the battery holder.
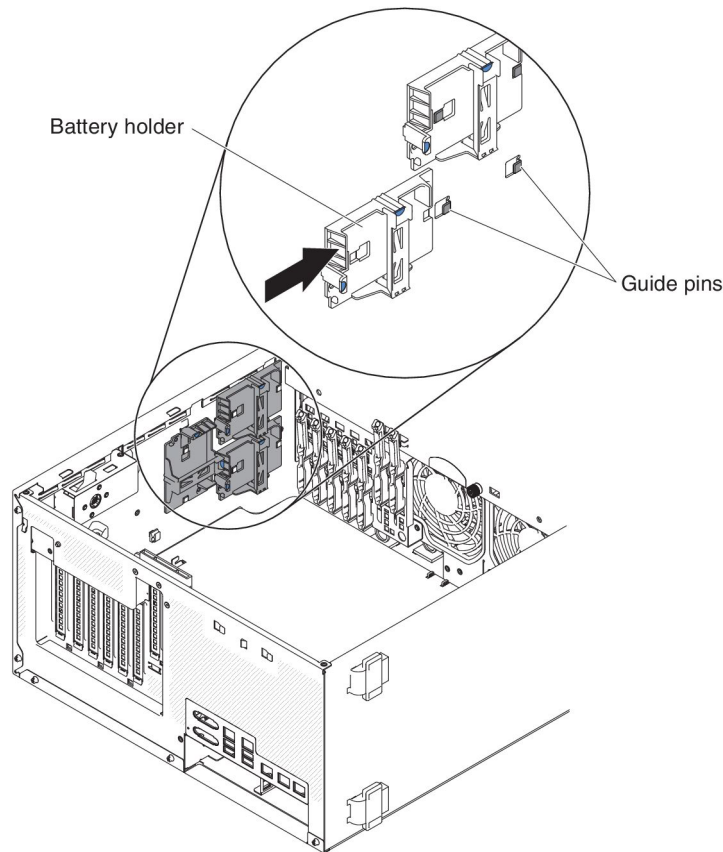
6. Make sure that the battery holder is secured firmly.
7. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

Removing and replacing Tier 1 CRUs

Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Removing and installing drives

Depending on the server model, the server might come with a SATA attached DVD-ROM drive in bay 1.

The followings are illustrations of the server and the location of the drive bays. Your hardware might differ, depending on the model.

Note: If the server is configured for RAID operation using a ServeRAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ServeRAID adapter documentation for additional information about RAID operation and complete instructions for using the ServeRAID adapter.

The following illustrations show the location of the drive bays in the 2.5-inch hot-swap SAS or hot-swap SATA hard disk drive server models.
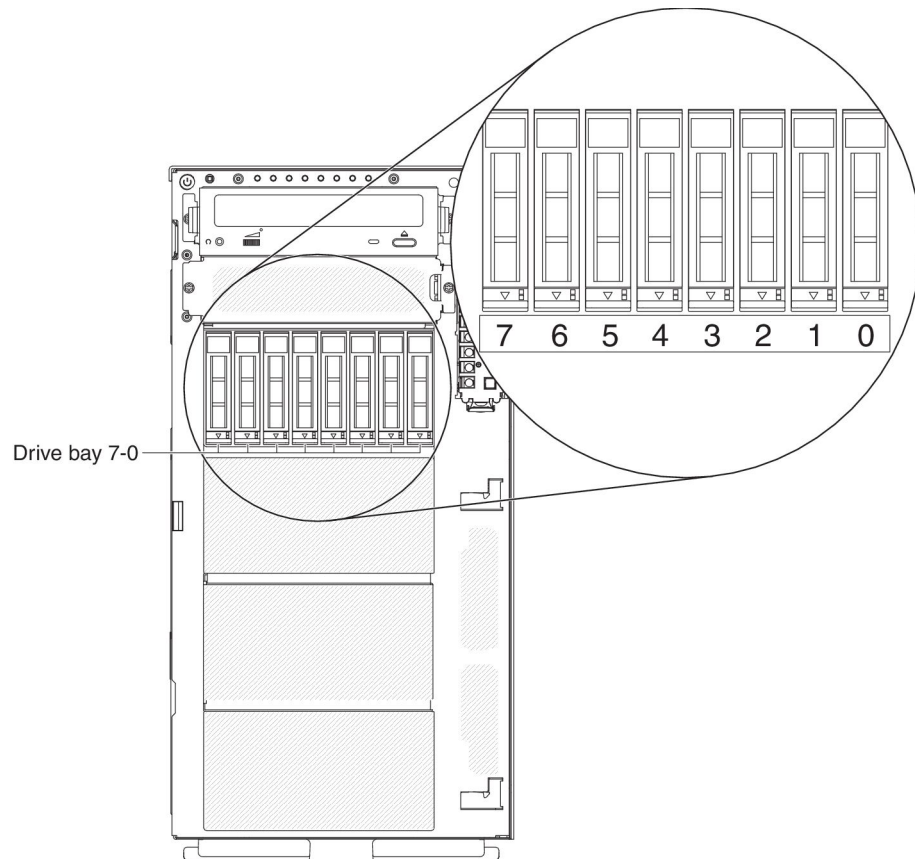
Figure 7. server with eight 2.5-inch hard disk drives
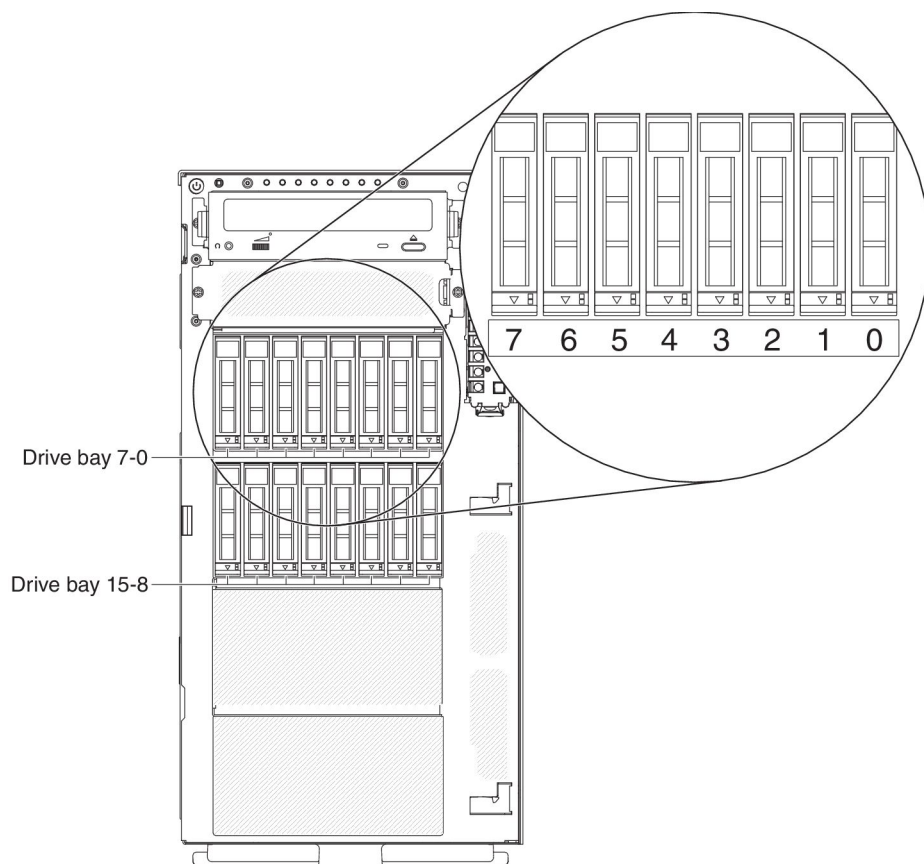
Figure 8. Server with sixteen 2.5-inch hard disk drives
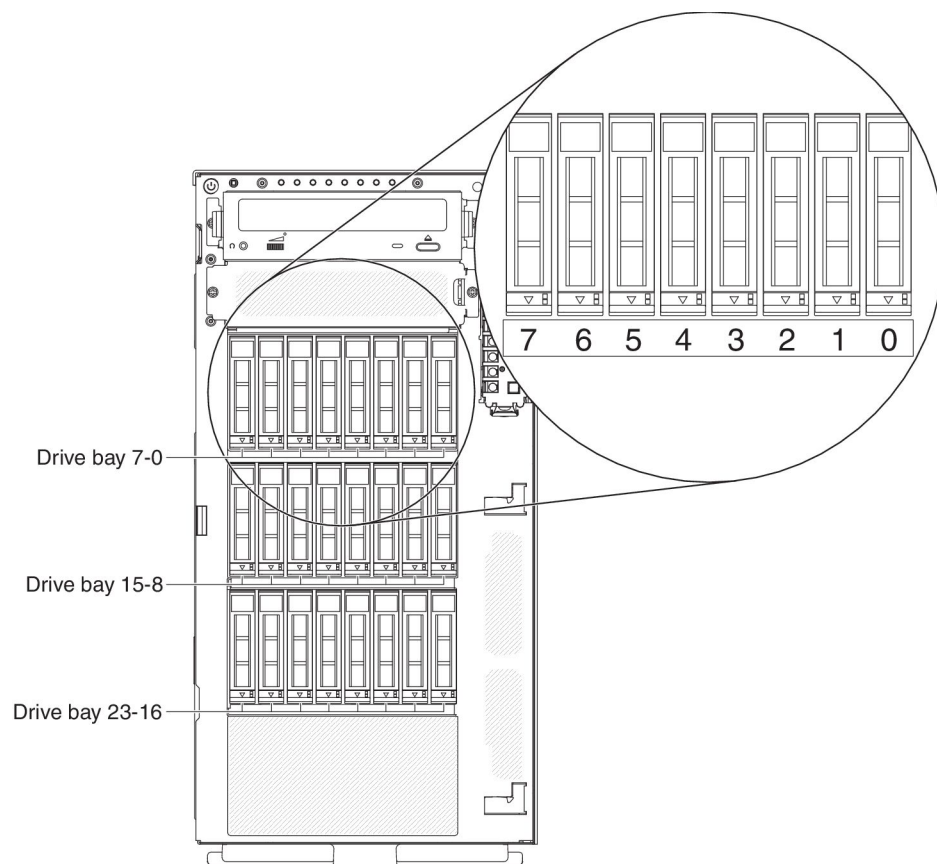
Figure 9. server with twenty-four 2.5-inch hard disk drives
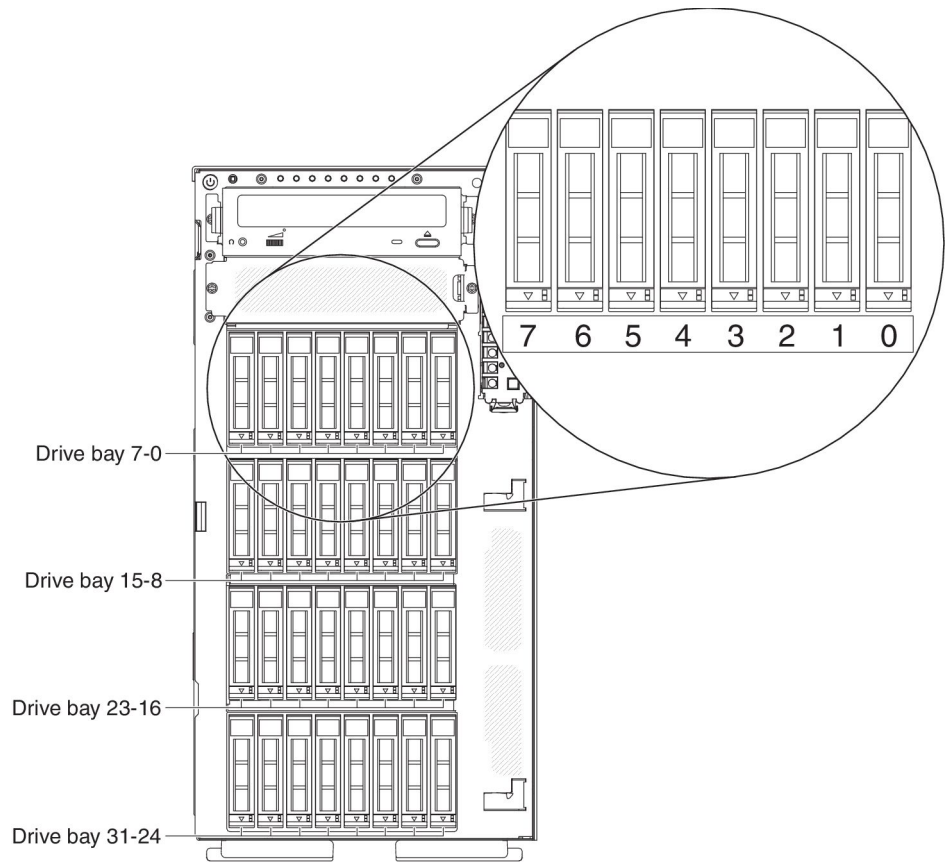
Figure 10. Server with thirty-two 2.5-inch hard disk drives

The following illustrations show the location of the drive bays in the 3.5-inch hot-swap SAS or hot-swap SATA hard disk drive server models.
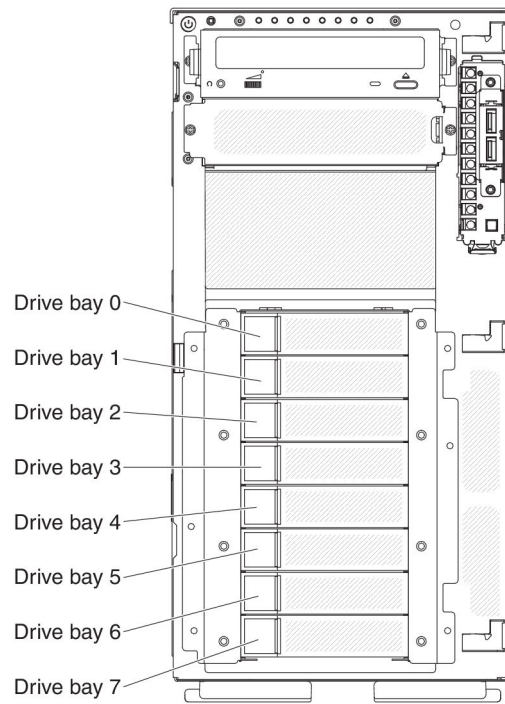
Figure 11. Server with eight 3.5-inch hard disk drives

The following illustrations show the location of the drive bays in the 2.5-inch and 3.5-inch hot-swap SAS or hot-swap SATA hard disk drive server models.
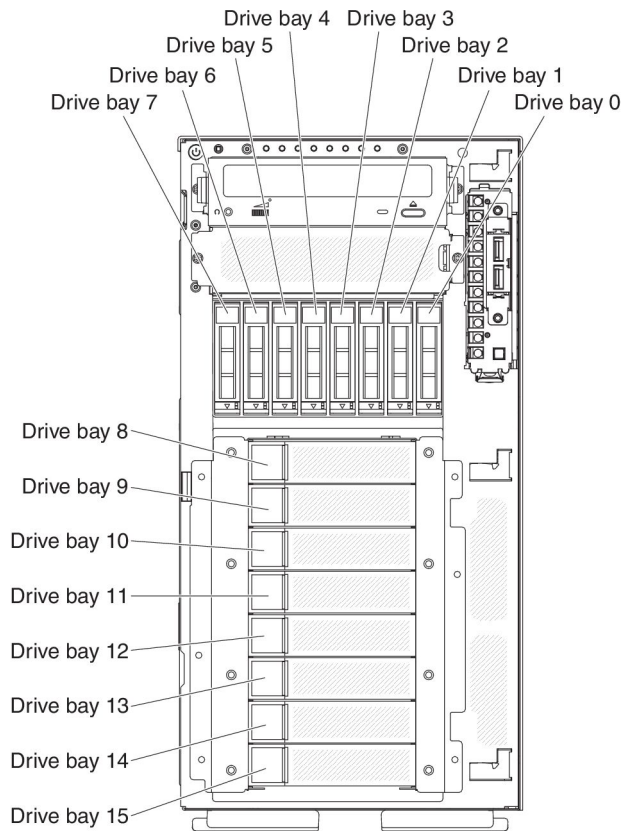
Figure 12. Server with eight 2.5-inch hard disk drives and eight 3.5-inch hard disk drives

The following notes describe the types of drives that the server supports and other information that you must consider when installing a drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- Optional external tape drives and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives only in bays 1 and 2 on models with eight 3.5-inch, eight, sixteen, twenty-four, and thirty-two 2.5-inch hard disk drives.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event that you later remove the drive or adapter.
- For a complete list of supported options for the server, see http://www.ibm.com/ servers/eserver/serverproven/compat/us/.

Removing a 2.5-inch hot-swap hard disk drive
To remove a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

2. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

3. Open the bezel (see "Opening the bezel media door" on page 181).

4. Press down on the release latch to open the drive handle; then, pull the drive out of the drive bay.
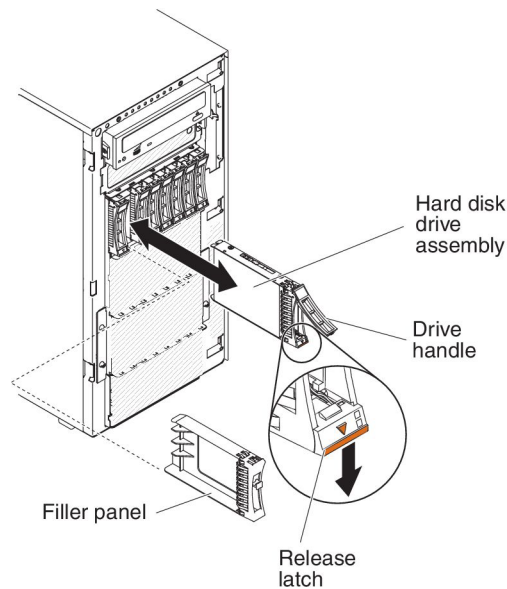
5. If you are instructed to return the hot-swap hard disk drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 2.5-inch hot-swap hard disk drive

The following notes describe the types of hard disk drives that the server supports and other information that you must consider when you install a hard disk drive:

- Depending on the model, the server supports up to eight or up to thirty-two 2.5-inch SAS/SATA hot-swap hard disk drives in the hot-swap bays.

  Note: When using ServeRAID adapter M1015 to support more than sixteen 2.5-inch hard disk drives, the maximum number of RAID supported drives is 16. All the other drives will remain JBOD (the drives are presented to the operating system without a RAID configuration).

- For a list of supported optional devices for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- Inspect the drive and drive bay for signs of damage.

- Make sure that the drive is correctly installed in the drive bay.

- See the documentation for the ServeRAID adapter for instructions for installing a hard disk drive.

- All hot-swap drives in the server must have the same throughput speed rating; using drives with different speed ratings might cause all drives to operate at the speed of the slowest drive.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when you perform any steps that involve installing or removing cables.

To install a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

2. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

3. Open the bezel (see "Opening the bezel media door" on page 181).

4. Remove the filler panel, if one is present.

5. Touch the static-protective package that contains the disk drive to any unpainted metal surface on the server; then, remove the disk drive from the package.

6. Make sure that the tray handle is open; then, install the hard disk drive into the hot-swap bay.

7. Rotate the drive handle down until the drive is seated in the hot-swap bay and the release latch clicks into place.
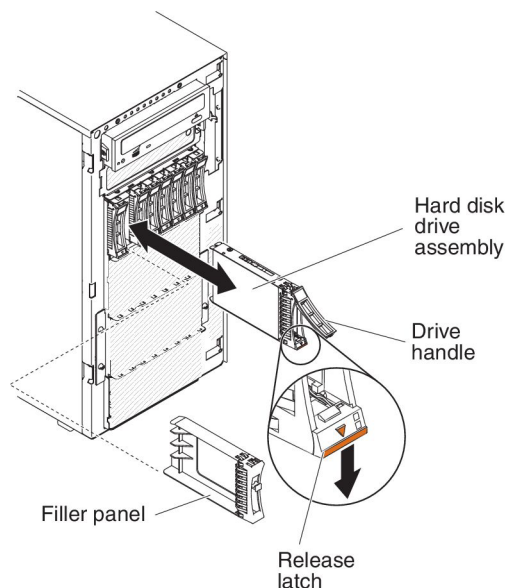
Notes:

a. After you install the hard disk drive, check the disk drive status LEDs to verify that the hard disk drive is operating correctly.

   If the yellow hard disk drive status LED is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

b. If the server is configured for RAID operation through an optional ServeRAID adapter, you might have to reconfigure your disk arrays after you install hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

8. Close the bezel (see "Closing the bezel media door" on page 182).

9. Lock the left-side cover.

Removing a 3.5-inch hot-swap hard disk drive

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To remove a 3.5-inch hot-swap SAS/SATA hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.

2. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

3. Open the bezel (see "Opening the bezel media door" on page 181).

4. Rotate the drive tray handle of the drive assembly to the open position.

5. Grasp the handle of the drive and pull the drive out of the bay.
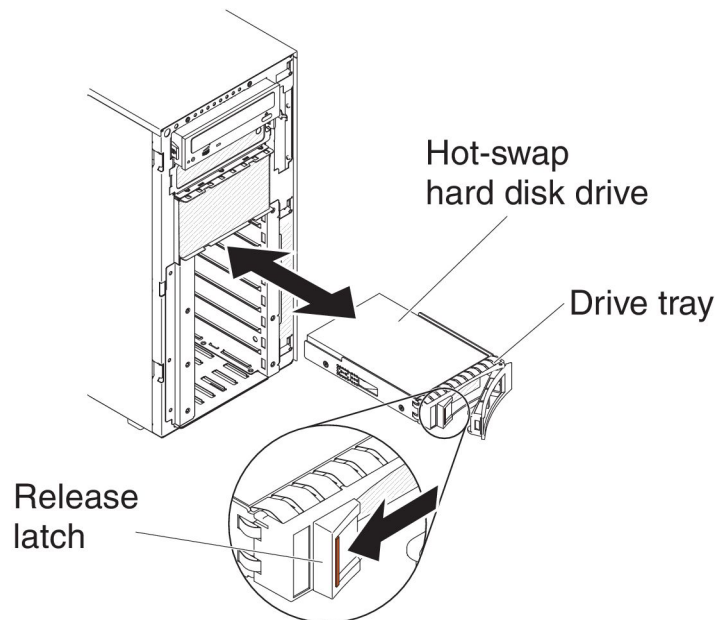
6. If you are instructed to return the 3.5-inch hot-swap hard disk drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 3.5-inch hot-swap hard disk drive

Before installing a 3.5-inch hot-swap hard disk drive, read the following information:

• Inspect the drive tray for signs of damage.

• To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.

To install a 3.5-inch hot-swap hard disk drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

3. Open the bezel (see "Opening the bezel media door" on page 181).
4. Remove the filler panel, if one is present.
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Make sure that the drive tray handle is in the open position.
7. Align the drive assembly with the guide rails in the bay; then, carefully slide the drive assembly into the drive bay until the drive snaps into place.
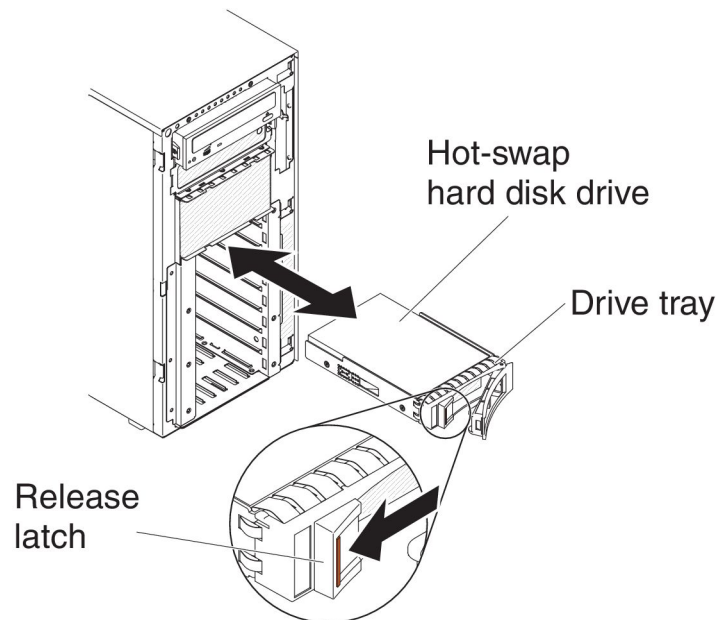
8. Rotate the drive tray handle to the closed position.
9. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly.

   After you replace a failed hard disk drive, the green activity LED flashes as the disk spins up. The yellow LED turns off after approximately 1 minute. If the new drive starts to rebuild, the yellow LED flashes slowly, and the green activity LED remains lit during the rebuild process. If the yellow LED remains lit, see "Hard disk drive problems" on page 100.

   Note: You might have to reconfigure the disk arrays after you install hard disk drives. See the RAID documentation on the IBM website at http://www.ibm.com/systems/support/ for information about RAID adapters.

10. Close the bezel (see "Closing the bezel media door" on page 182).
11. Lock the left-side cover.

Removing a 3.5-inch simple-swap hard disk drive

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To remove a 3.5-inch simple-swap SATA hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the left-side cover.

   Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.
4. Open the bezel (see "Opening the bezel media door" on page 181).
5. Slide the blue release latch to the right with one finger (to release the drive) while using another finger to grasp the black drive handle and pull the hard disk drive out of the drive bay.
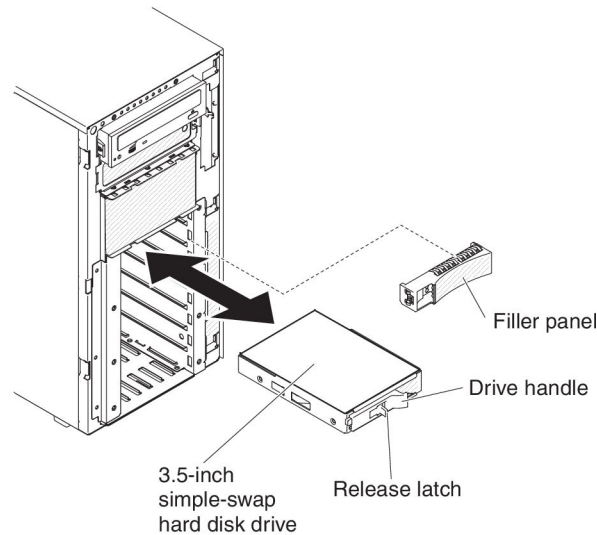
6. If you are instructed to return the 3.5-inch simple-swap hard disk drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 3.5-inch simple-swap hard disk drive

Before installing a 3.5-inch simple-swap hard disk drive, read the following information:

- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To install a 3.5-inch simple-swap hard disk drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock the left-side cover.

Note: You must unlock the left-side cover to open or remove the bezel. When you lock the left-side cover, it locks both the cover and the bezel.

4. Open the bezel (see "Opening the bezel media door" on page 181).

5. Remove the filler panel, if one is present.

6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

7. Grasp the black drive handle and slide the blue release latch to the right and align the drive assembly with the guide rails in the bay.
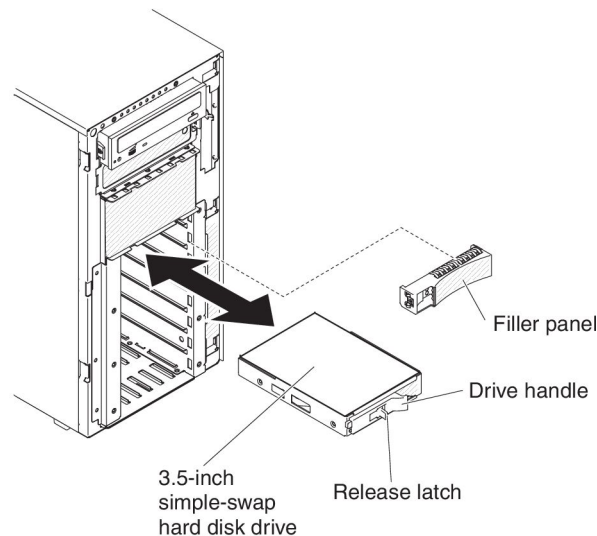
8. Gently push the drive into the bay until the drive stops.

9. Close the bezel (see "Closing the bezel media door" on page 182).

10. Lock the left-side cover.

11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a DVD drive

To remove the DVD drive, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel (see "Opening the bezel media door" on page 181).

5. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

6. Disconnect the DVD drive cables from the back of the DVD drive.

7. Grasp the blue tabs on each side of the DVD drive and press them inward while you pull the drive out of the server.

Optical drive
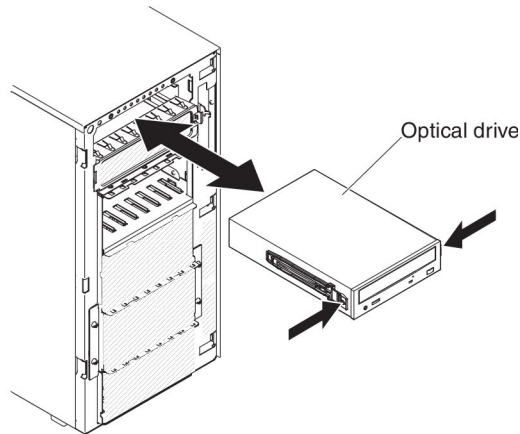
8. Remove the blue rails from the DVD drive and save them for future use.

9. If you are instructed to return the DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a DVD drive

To install the DVD drive, complete the following steps:

1. If you are replacing a drive, make sure that:

   • You have all the cables and other equipment that are specified in the documentation that comes with the new drive.

   • You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers in the drive.

   • You have removed the blue optical drive rails from the side of the old drive and have them available for installation on the new drive.

   Note: If you are installing a drive that contains a laser, observe the following safety precautions.
   Statement 3:

   CAUTION:
   When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

   • **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**

   • **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

> **Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.**
>
> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

2. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
3. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Open the bezel (see "Opening the bezel media door" on page 181).
6. Remove the air baffle if installed (see "Removing the air baffle" on page 205).
7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).
8. Touch the static-protective package that contains the DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package.
9. Install the blue rails on the DVD drive, using the holes nearest the center of the drive.
10. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

   Note: You might find it easier to install the new drive from the front and then attach the cables.
11. Align the rails on the DVD drive with the guides in the drive bay; then, slide the DVD drive into the drive bay until the rails click into place.

Optical drive
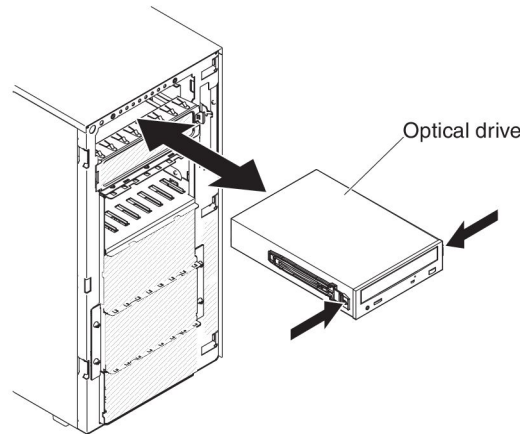
12. Connect power and signal cables to the drive and the connectors on the system board. (See "Internal cable routing and connectors" on page 183 for more information.)

13. Reinstall the fan cage assembly (see "Removing the fan cage assembly" on page 282).

14. Reinstall the air baffle is one is present (see "Installing the air baffle" on page 207).

15. Close the bezel (see "Closing the bezel media door" on page 182).

16. Reinstall and lock the left-side cover (see "Installing the left-side cover" on page 201).

17. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing an optional tape drive

To remove an optional full-high tape drive, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel (see "Opening the bezel media door" on page 181).

5. Remove the air baffle if installed (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Disconnect the power and signal cables from the back of the tape drive.

8. Grasp the blue tabs on each side of the tape drive and press them inward while you pull the drive out of the server.
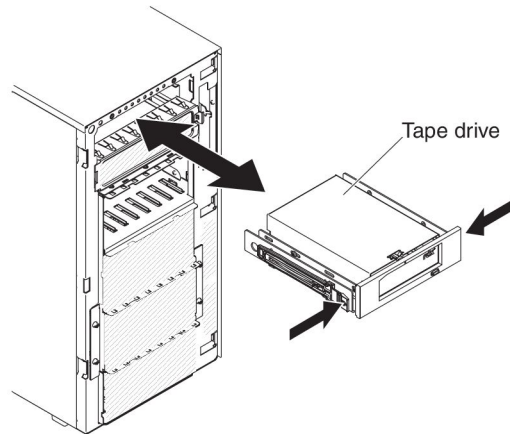
Tape drive

9. Note the location of the blue rails on the tape drive; then, remove the blue rails and save them for future use.

10. Gently pull the tape drive out of the server.

11. If you are instructed to return the tape drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional tape drive

To install an optional full-height tape drive, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel (see "Opening the bezel media door" on page 181).

5. Remove the air baffle if installed (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Remove the EMC shields from the drive bay, if installed.

8. Touch the static-protective package that contains the tape drive to any unpainted metal surface on the server; then, remove the tape drive from the package.

9. Install the blue rails on the tape drive.

10. Follow the instructions that come with the drive to set jumpers or switches, if there is any.

   Note: You might find it easier to install the new drive from the front and then attach the cables.

11. Align the rails on the tape drive with the guides in the drive bay; then, slide the tape drive into the drive bay until the rails click into place.

Tape drive
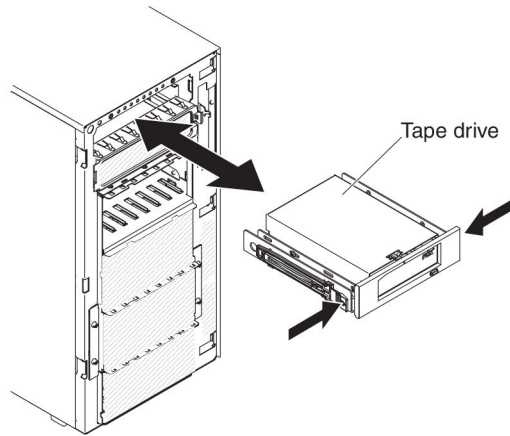
12. Connect the power and signal cables to the drive and the connectors on the system board (see Internal cable routing and connectors for more information).

13. Reinstall the fan cage assembly (see "Removing the fan cage assembly" on page 282).

14. Reinstall the air baffle is one is present (see "Installing the air baffle" on page 207).

15. Close the bezel (see "Closing the bezel media door" on page 182).

16. Reinstall and lock the left-side cover (see "Installing the left-side cover" on page 201).

17. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a SAS/SATA 8 Pac HDD option

To remove a SAS/SATA 8 Pac HDD option, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Remove the bezel (see "Removing the bezel" on page 202).

4. Remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Pull the hard disk drives and filler panels out of the server slightly to disengage them from the hard disk drive backplane.

6. Remove the 2.5-inch hot-swap SAS/SATA hard disk drive backplane (see "Removing a 2.5-inch disk drive backplane" on page 258).

Installing a SAS/SATA 8 Pac HDD option

You can install an IBM System x3500 M4 Hot-swap SAS/SATA 8 Pac HDD option to add eight additional 2.5-inch hot-swap hard disk drives in the server. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported optional devices. To order a SAS/SATA 8 Pac HDD option, contact your IBM marketing representative or authorized reseller.

Note: The 8 pac HDD option including structural parts and Tier 1 parts.

To install a SAS/SATA 8 Pac HDD option, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Remove the bezel (see "Removing the bezel" on page 202).

4. Remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the fillers if necessary.

6. Install the 2.5-inch hard disk drive cage if necessary.

   a. Align the 2.5-inch hard disk drive cage with the chassis to the area highlighted in grey as follows and install it in the server.

   Note: If you are upgrading the hard disk drive bays from 16 to 24 and the 2.5-inch hard disk drive cage is already installed, keep the new 2.5-inch hard disk drive cage comes with the option in a safe place for potential future use.

2.5" hard disk drive cage
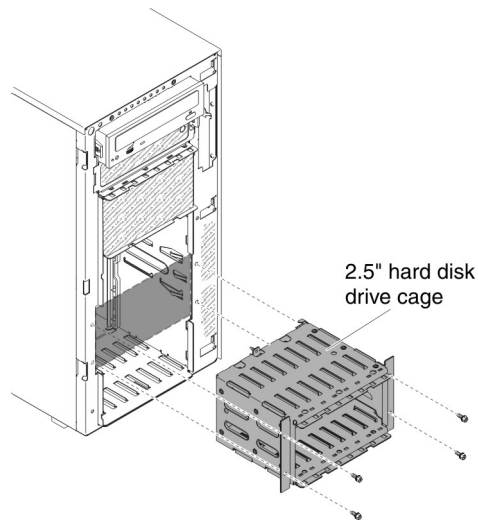
Note: The cage for the hard disk drive is installed only when you need to install more than eight hard disk drives. The cage is installed in the bays where the hard disk drive 16-23 will be installed.

Drive bay 7-0

Drive bay 15-8

Drive bay 23-16

Drive bay 31-24

2.5-inch hard disk drive cage
(installed by default)

2.5-inch hard disk drive cage
that comes with the option
upgrade kit
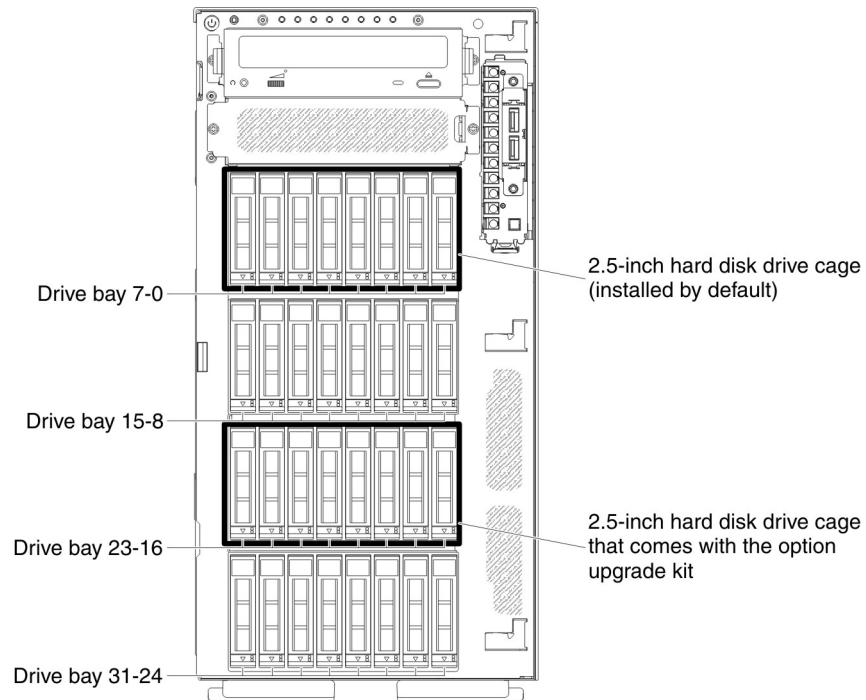
b. Fasten the four screws.

7. Install the 2.5-inch hot-swap hard disk drive backplane (see "Installing a
2.5-inch disk drive backplane" on page 260).

Install backplane for drive bay 8-15
when you are upgrading the number
of 2.5-inch hard disk drives to 16

Install backplane for drive bay 16-23
when you are upgrading the number
of 2.5-inch hard disk drives to 24
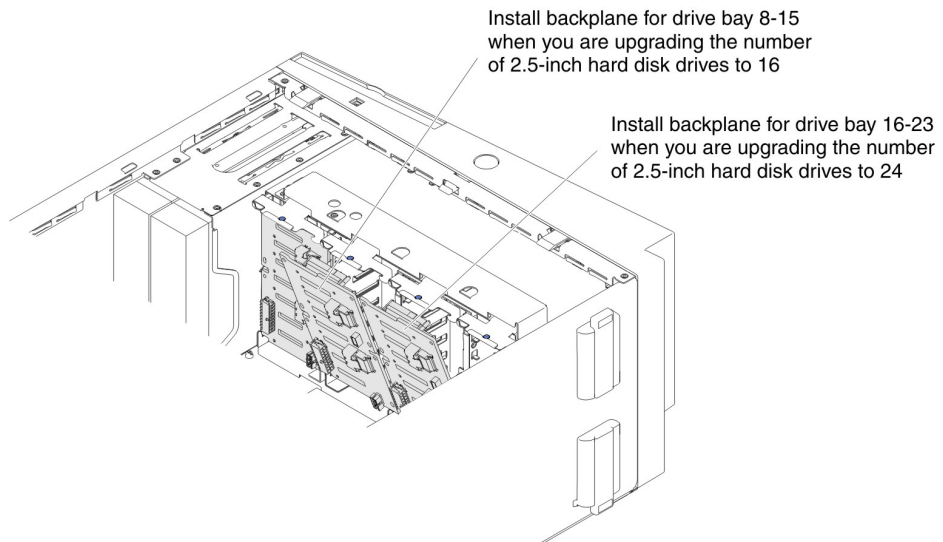
8. Install the EMC shields that come with the option.

9. Install the 2.5-inch hard disk drives (see "Installing a 2.5-inch hot-swap hard
disk drive" on page 216).

10. Install the drive bay filler panels that come with the option into empty drive
bays.

11. Connect the backplane configuration cable, power cable, signal cable, and the
configuration cable (see "Internal cable routing and connectors" on page 183).

Note: You may need to install the two screws on the backplane configuration
cable.

Backplane
configuration
cable

Signal connector
(backplane configuration)

Screws
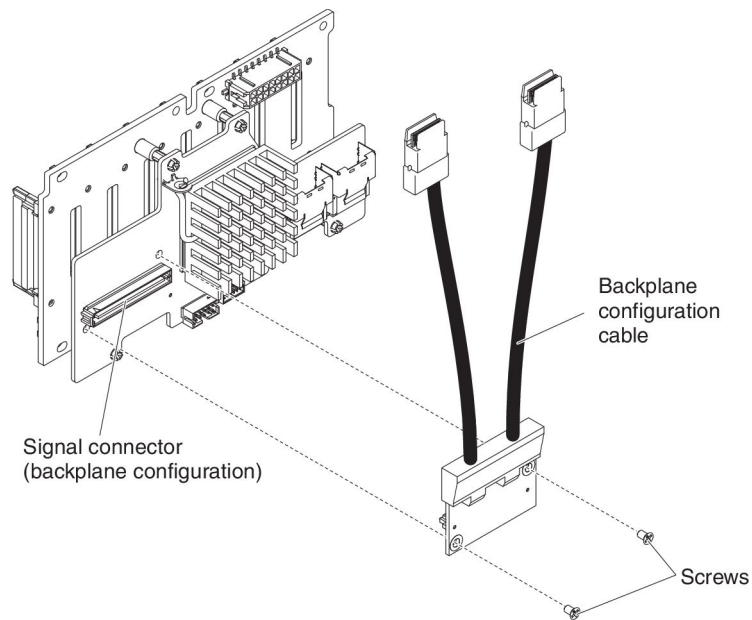
12. Reinstall the bezel (see "Installing the bezel" on page 203).

13. Reinstall the left-side cover (see "Installing the left-side cover" on page 201).

14. Reconnect the power cords and any cables that you removed.

15. Slide the server into the rack.

16. Turn on the peripheral devices and the server.

Removing an adapter

To remove an adapter, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Disconnect the cables from the adapter.

6. Rotate the adapter-retention brackets to the open position.

7. Pull the adapter out of the adapter connector; then, lift the adapter out of the server.
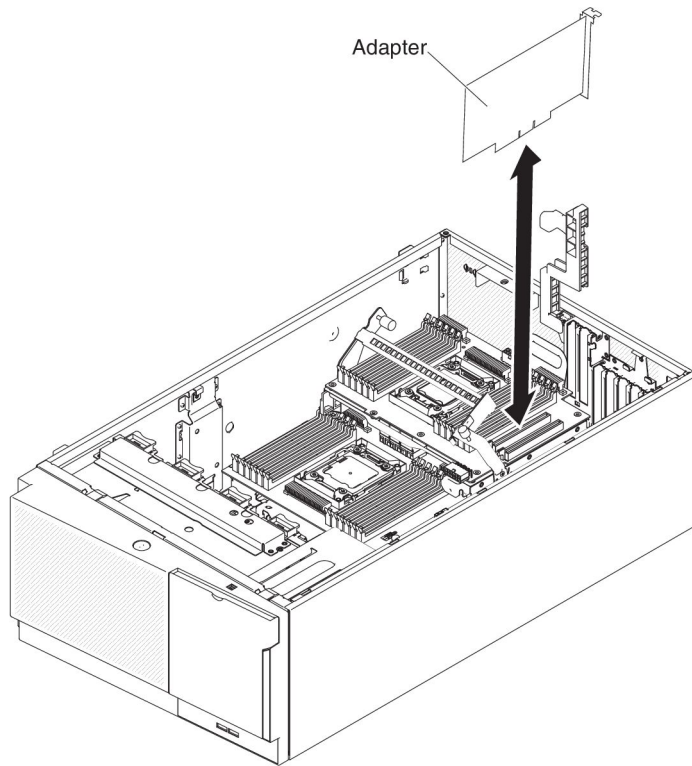
Adapter

Note: If you have installed the optional ServeRAID adapter memory module, remove it and keep it in future use (see "Removing an optional ServeRAID adapter memory module" on page 238).

8. Install the PCI slot filler.
9. Rotate the adapter-retention brackets to the close position.
10. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

To remove an adapter from the PCI-X bracket, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.
   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Disconnect the cables from the adapter.
6. Rotate the adapter-retention brackets on the PCI-X bracket to the open position.

Expansion-slot cover

Adapter

Adapter connectors
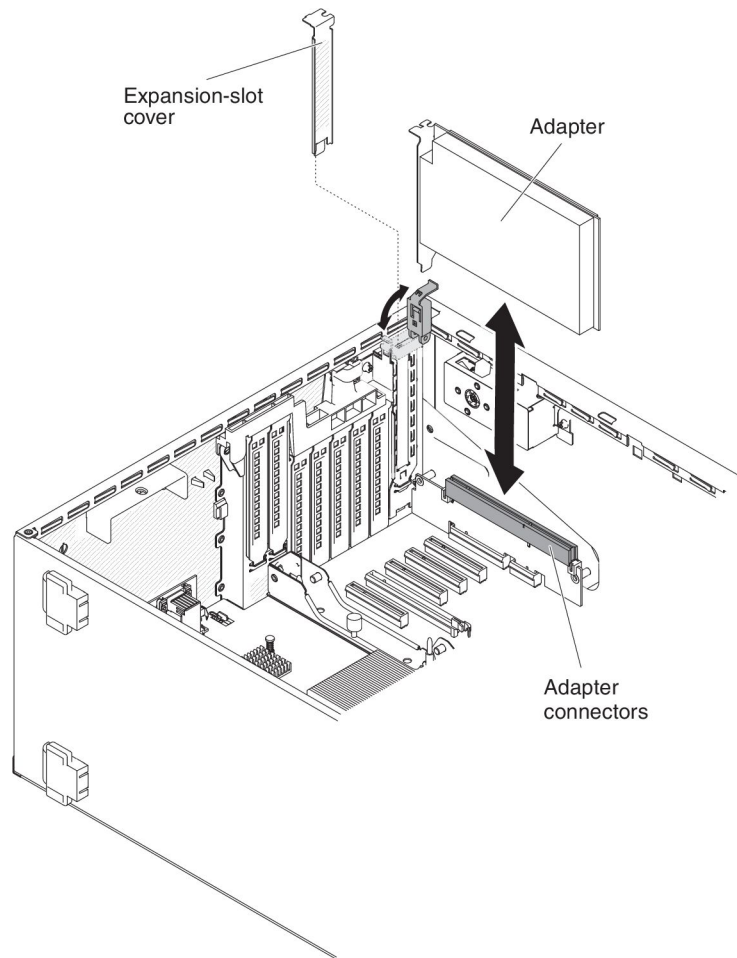
7. Pull the adapter out of the adapter connector; then, lift the adapter out of the server.

   Note: If you have installed the optional ServeRAID adapter memory module, remove it and keep it in future use (see "Removing an optional ServeRAID adapter memory module" on page 238).

8. Install the PCI slot filler.

9. Rotate the adapter-retention brackets to the close position.

10. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter:

- To confirm that the server supports the adapter that you are installing, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch or jumper settings on the adapter, follow the instructions that come with the adapter.

- Do not set the maximum digital video adapter resolution above 1600 x 1200 at 75 Hz for an LCD monitor. This is the highest resolution that is supported for any add-on video adapter that you install in the server.

- Avoid touching the components and gold-edge connectors on the adapter.
- The server uses a rotational interrupt technique to configure PCI adapters so that you can install PCI adapters that do not support sharing of PCI interrupts.
- The following table lists the option part numbers and CRU part numbers for the network adapters.

Table 10. Network adapters

Network Adapters		
Description	**Option part number**	**CRU part number**
NetXtreme II 1000 express Ethernet adapter	39Y6066	39Y6070
NetXtreme II 1000 express dual-port Ethernet adapter	42C1780	49Y7947
QLogic 10Gb CNA	42C1800	42C1802
QLogic 8Gb FC dual-port HBA	42D0510	42D0516
NetXtreme II 1000 express quad-port Ethernet adapter	49Y4220	49Y7949
Intel Ethernet dual-port server adapter I340-T2	49Y4230	49Y4232
Intel Ethernet quad-port server adapter I340-T4	49Y4240	49Y4242
Broadcom NetXtreme II dual-port 10GBaseT adapter	49Y7910	49Y7912
Intel X520-DA2 dual-port 10GbE SFP adapter	49Y7960	49Y7962
Intel X540-T2 dual-port 10GBaseT adapter	49Y7970	49Y7972
Broadcom NetXtreme I quad-port GbE adapter	90Y9352	90Y9355
Broadcom NetXtreme I dual-port GbE adapter	90Y9370	90Y9373
Emulex 10 GbE virtual fabric adapter III	95Y3762	9573766
Emulex 10 GbE virtual fabric adapter III lite	95Y3768	95Y3766

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install an adapter on the system board, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. See the documentation that comes with the adapter for any cabling instructions and information about jumper or switch settings. (It might be easier for you to route cables before you install the adapter.)
6. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server; then, remove the adapter from the package.
7. Determine the PCI slot into which you will install the adapter.

8. Rotate the adapter-retention brackets to the open position.

9. Remove the PCI slot filler, if installed. Keep the filler in a safe place for potential future use.
10. Press the adapter *firmly* into the expansion slot.
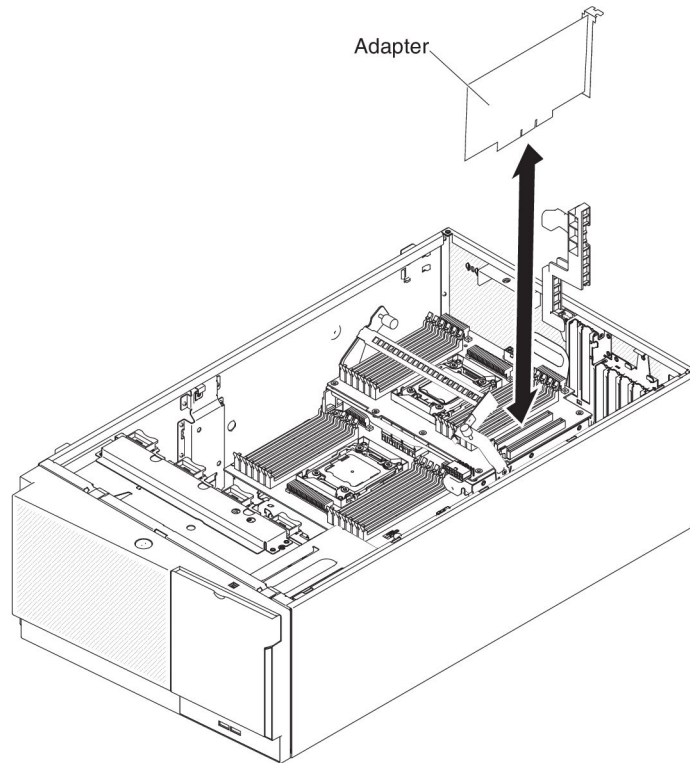
Adapter

Attention: Incomplete insertion might cause damage to the system board or the adapter.
11. Close the adapter-retention bracket.
12. Connect the adapter cables (see "Internal cable routing and connectors" on page 183).
13. Perform any configuration tasks that are required for the adapter.
14. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).
15. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Note: If the server is configured for RAID operation through an optional ServeRAID adapter, you might have to reconfigure your disk arrays after you install an adapter. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

To install an adapter on the PCI-X bracket, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. See the documentation that comes with the adapter for any cabling instructions and information about jumper or switch settings. (It might be easier for you to route cables before you install the adapter.)
6. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server; then, remove the adapter from the package.
7. Locate PCI slot 1 which you will install the adapter into.
8. Rotate the adapter-retention brackets on the PCI-X bracket to the open position.

   Note: Remove the expansion-slot cover if it is installed on the PCI-X bracket and save it for future use.
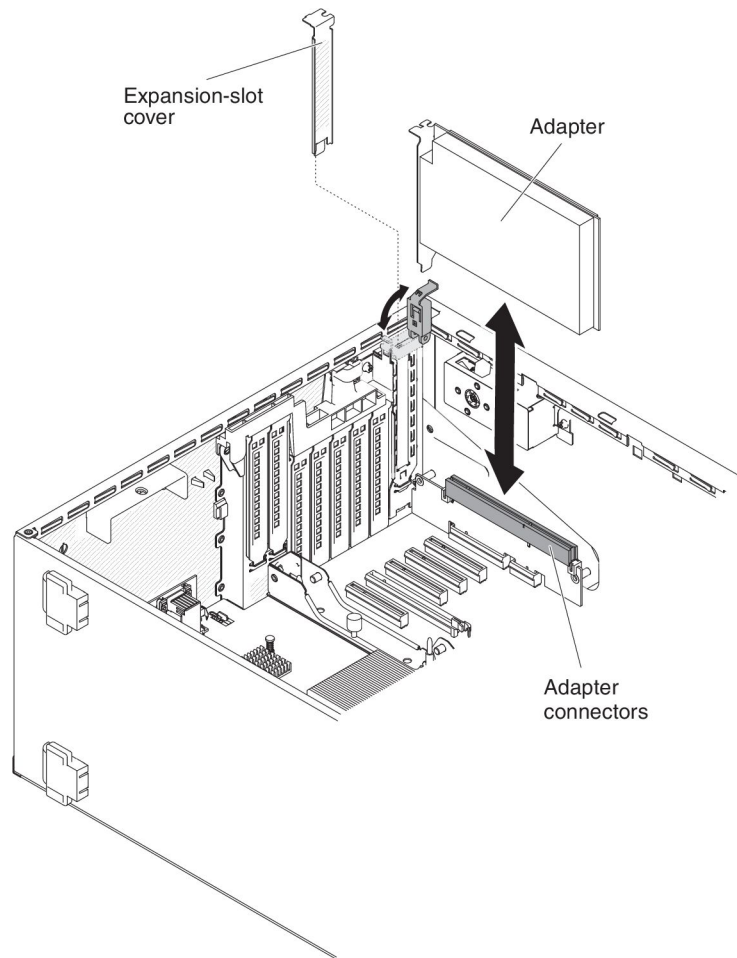
Expansion-slot cover

Adapter

Adapter connectors

9. Remove the PCI slot filler, if installed. Keep the filler in a safe place for potential future use.

10. Press the adapter *firmly* into the expansion slot.

    Attention: Incomplete insertion might cause damage to the system board or the adapter.

11. Close the adapter-retention on the PCI-X bracket.

12. Connect the adapter cables (see "Internal cable routing and connectors" on page 183).

13. Perform any configuration tasks that are required for the adapter.

14. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

15. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

    Note: If the server is configured for RAID operation through an optional ServeRAID adapter, you might have to reconfigure your disk arrays after you install an adapter. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

Removing a remotely installed RAID adapter battery

If a ServeRAID adapter battery is installed and you need to replace it, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices.
3. Disconnect all external cables and power cords.
4. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
5. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
6. Pull the release tab outward and unlock the battery retention clip.
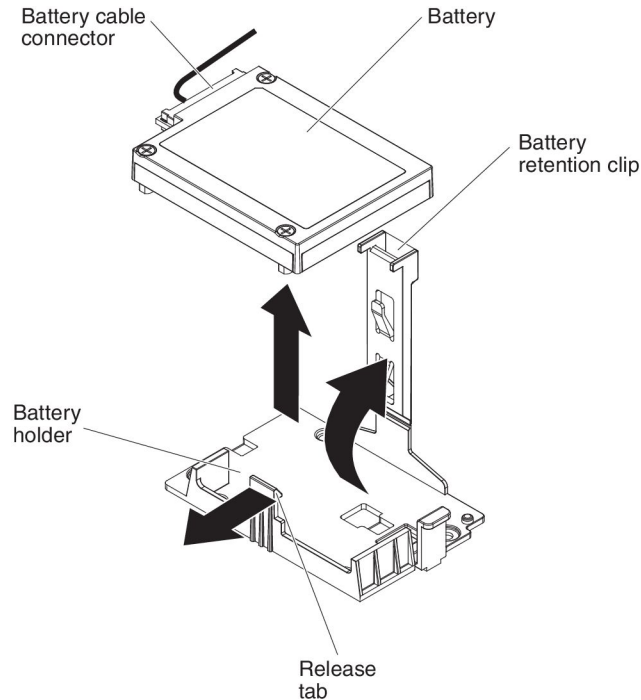
7. Disconnect the battery cable from the battery cable connector on the battery.
8. Lift the battery up to remove the battery from the battery holder.

If you are instructed to return the ServeRAID adapter battery, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a RAID adapter battery remotely in the server

To install the RAID adapter battery in the server, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices.
3. Disconnect all external cables and power cords.
4. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
5. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
6. Install the ServeRAID adapter on the system board (see "Installing an adapter" on page 231).

7. Connect one end of the battery cable to the RAID adapter battery connector.
8. Route the remote battery cable as shown in the following illustration.

Battery

ServeRAID adapter   RAID adapter battery cable
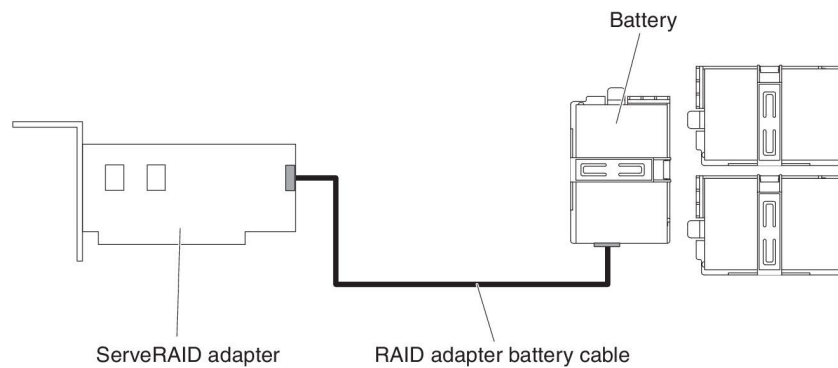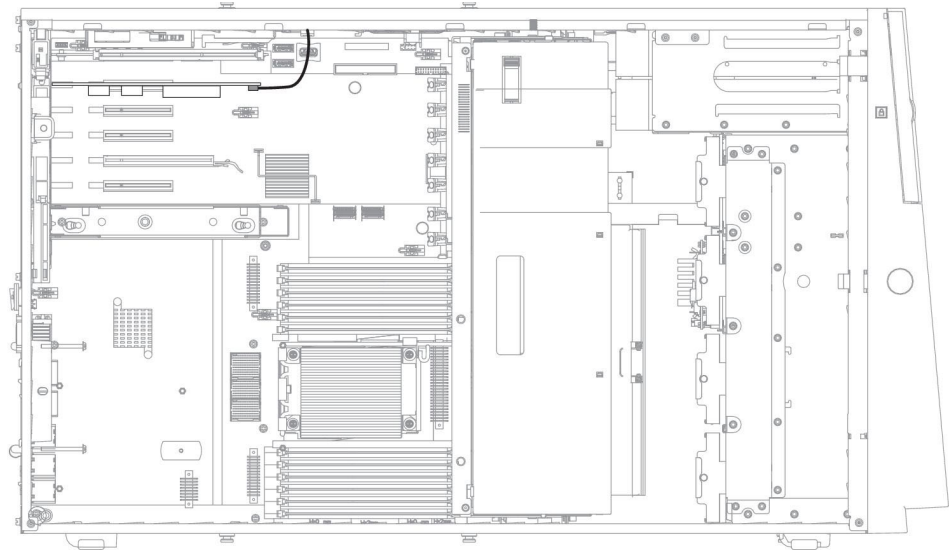
Attention: Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

9. Install the battery:

   a. Align the battery cable connector with the slot on the battery holder. Place the battery into the battery holder and make sure that the battery holder engages the battery securely.

Battery cable
connector

Battery

Battery
retention clip

Battery
holder

Release
tab
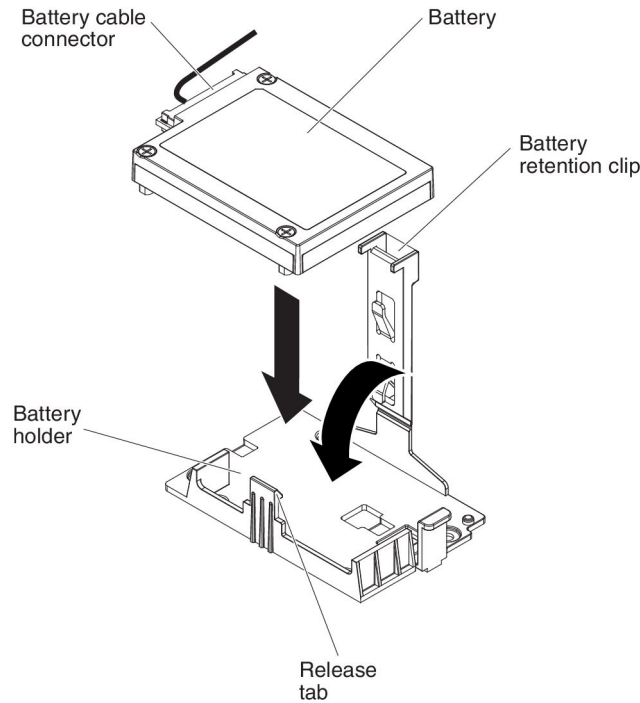
Note: The positioning of the remote battery depends on the type of the remote batteries that you install.

b. Connect the other end of the battery cable to the battery cable connector on the battery.

c. Lower and press down on the retention clip until it snaps in place to hold the battery firmly in place.

10. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Note: You must wait approximately 3 minutes after you connect the server power cord to an electrical outlet before the power-control button becomes active.

Removing an optional ServeRAID adapter memory module

To install an optional ServeRAID adapter memory module, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and all attached devices.

3. Disconnect all external cables and power cords.

4. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

5. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

6. Remove the adapter (see "Removing an adapter" on page 229).

7. Grasp the memory module and lift to remove it from the connector on the ServeRAID adapter.

ServeRAID adapter

ServeRAID memory module

Board to board connectors

Retention bracket
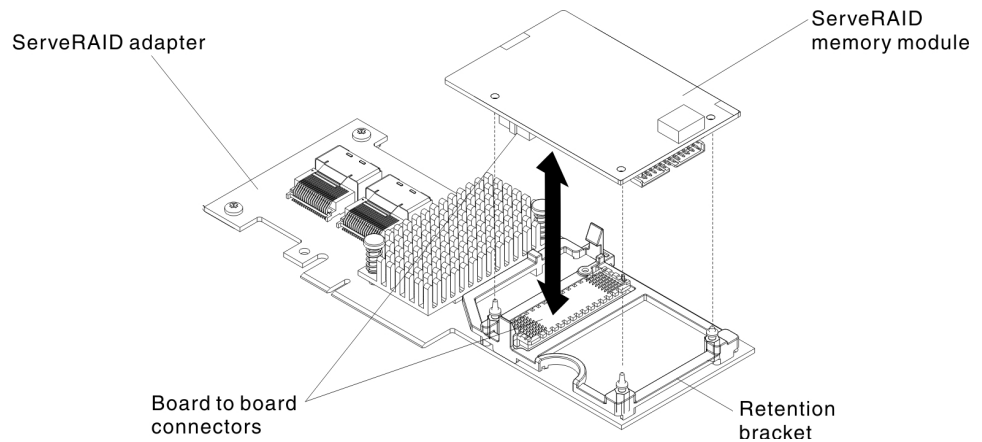
If you are instructed to return the ServeRAID adapter memory module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional ServeRAID adapter memory module

To install the optional ServeRAID adapter memory module, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices.
3. Disconnect all external cables and power cords.
4. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
5. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
6. Remove the ServeRAID adapter if necessary (see "Removing an adapter" on page 229).
7. Touch the static-protective package that contains the memory card to any unpainted metal surface on the server; then, remove the memory card from the package.
8. Align the memory module with the connector on the ServeRAID adapter and push it into the connector until it is firmly seated.

ServeRAID adapter

ServeRAID
memory module

Board to board
connectors

Retention
bracket
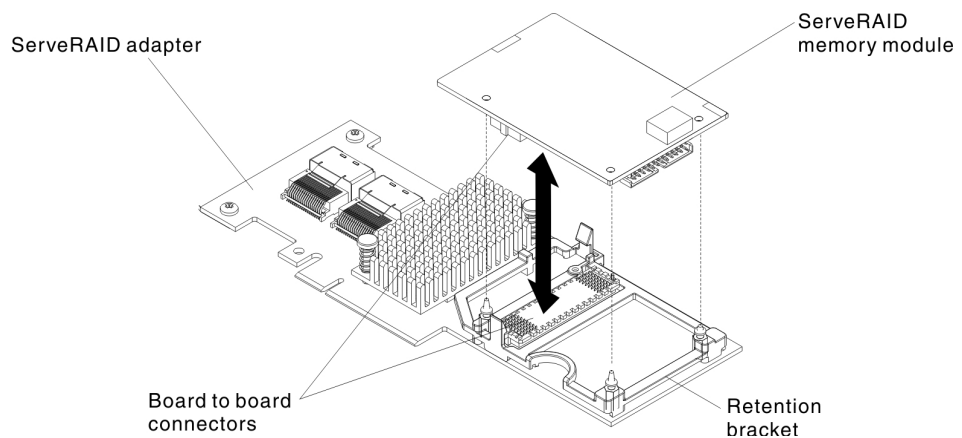
9. Reinstall the ServeRAID adapter (see "Installing an adapter" on page 231).

10. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.
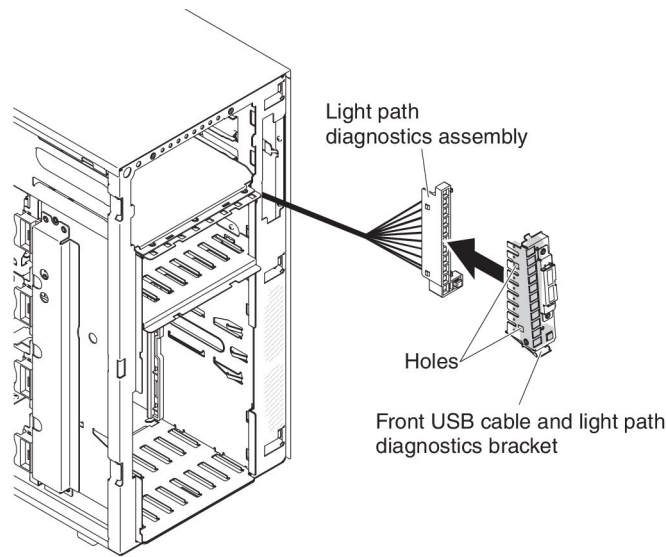
Removing a PCI-X bracket

To remove a PCI-X bracket, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

    Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the adapter if one is installed on the PCI-X bracket (see "Removing an adapter" on page 229).

6. Remove the screw that secures the PCI-X bracket to the server chassis.

7. Pull the PCI-X bracket out of PCI slot 1 and save it for future use.
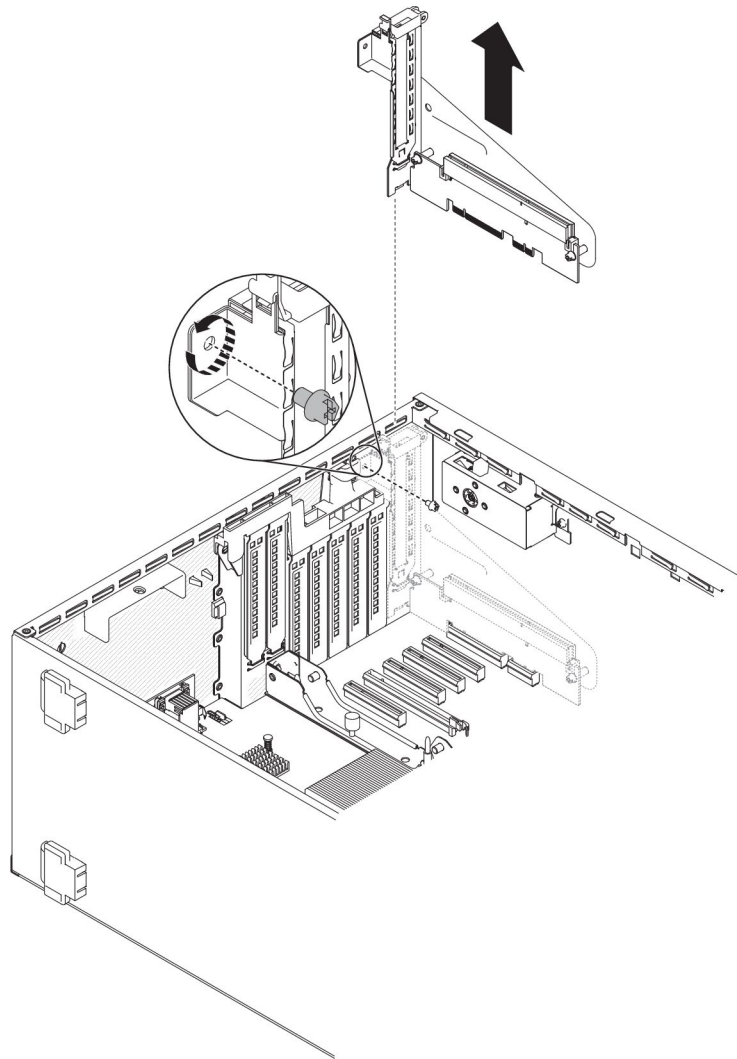
8. If you are instructed to return the PCI-X bracket, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a PCI-X bracket

To install a PCI-X bracket, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

    Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server; then, remove the adapter from the package.
6. Locate PCI slot 1 which you will install the PCI-X bracket.
7. Remove the screw that secures the expansion-slot cover.

Expansion-slot cover kit
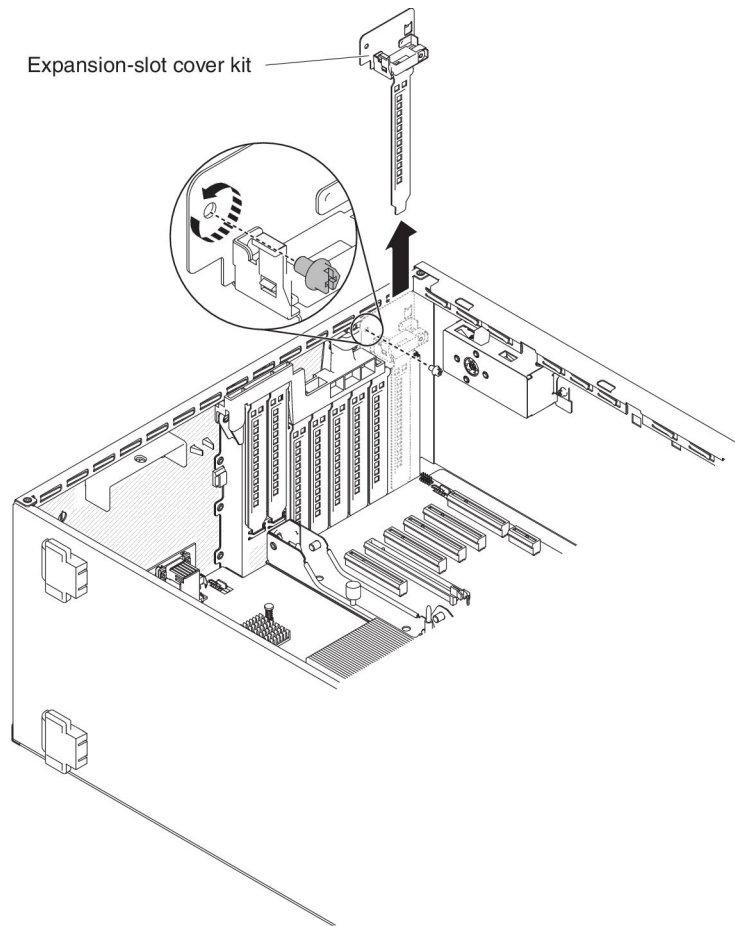
8. Remove the expansion-slot cover kit in PCI slot 1 and save it for future use.
9. Press the PCI-X bracket *firmly* into PCI slot 1.

   Attention: Incomplete insertion might cause damage to the system board or the adapter.
10. Make sure the latch on the side of the PCI-X bracket is secured to the rear of the server chassis.

Back view

Latch
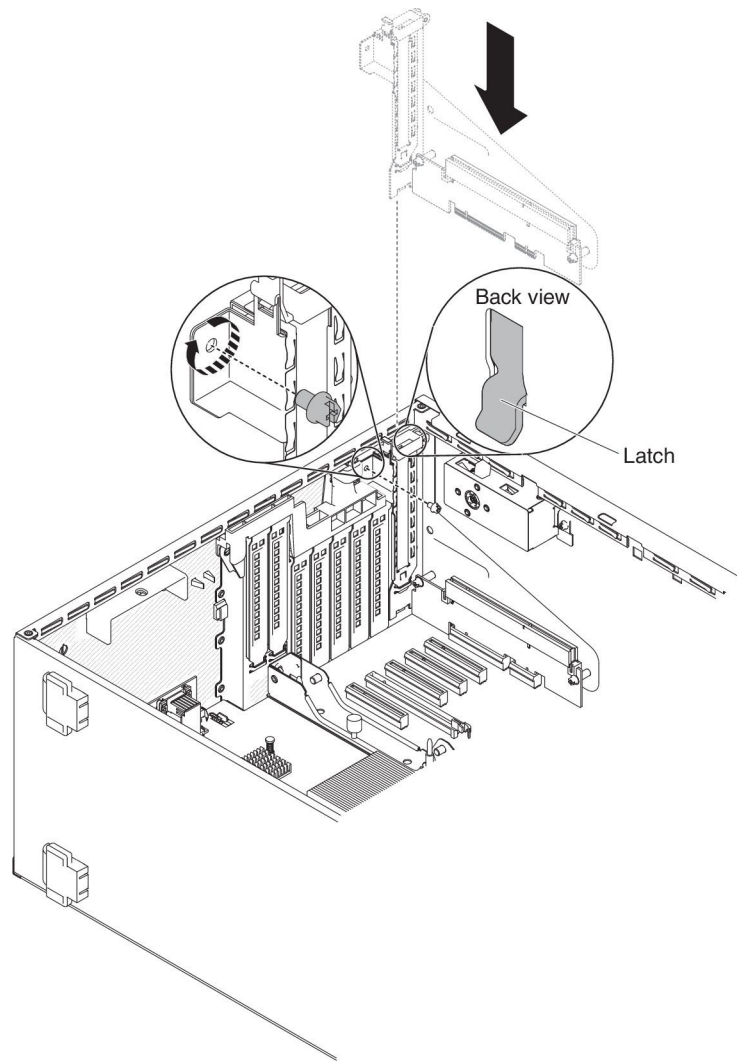
11. Install the screw that secures the PCI-X bracket to the server.

12. Reinstall and lock the left-side cover (see "Installing the left-side cover" on page 201).

13. Reconnect the power cords and any cables that you removed.

14. Turn on the peripheral devices and the server.

Removing a simple-swap fan

The server comes with two 120 mm x 38 mm simple-swap fans in the fan cage assembly. The following instructions can be used to remove any simple-swap fan in the server.

Notes:

1. When you install the second microprocessor, you must also install fan 2 and the air baffle that come with the second microprocessor upgrade kit. The fan filler can only be removed when fan 2 is installed. Otherwise, the fan filler must be installed for proper cooling.
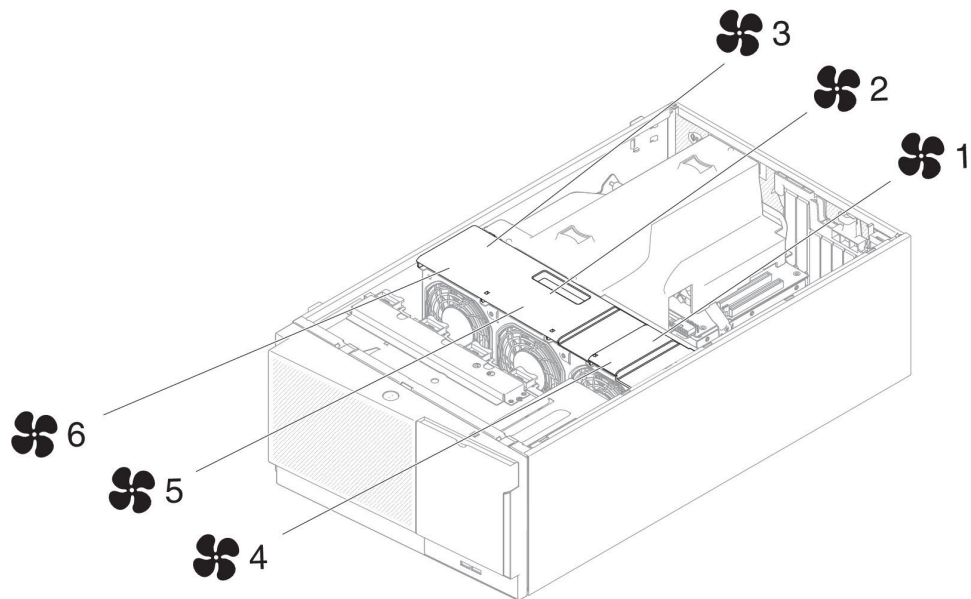
2. You can order the three additional fans for redundant cooling.

To remove a simple-swap fan, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Open the fan cage cover.

5. Open the fan-locking handle by sliding the blue release latch in the direction of the arrow.

Fan
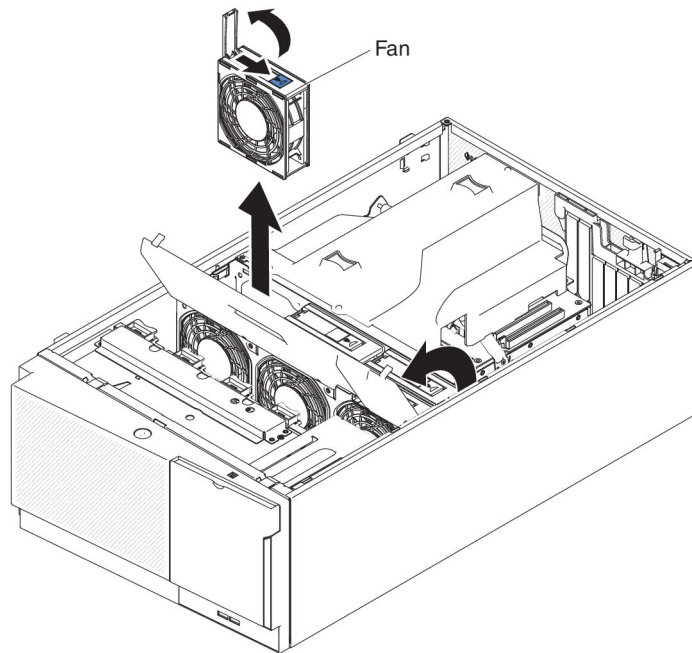
6. Pull outward on the free end of the handle to remove the fan from the server.
7. If you are instructed to return the simple-swap fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a simple-swap fan

The server comes with two 120 mm x 38 mm simple-swap fans in the fan cage assembly. The following instructions can be used to install any simple-swap fan in the server.

Notes:

1. When you install the second microprocessor, you must also install fan 2 and the air baffle that come with the second microprocessor upgrade kit. The fan filler can only be removed when fan 2 is installed. Otherwise, the fan filler must be installed for proper cooling.
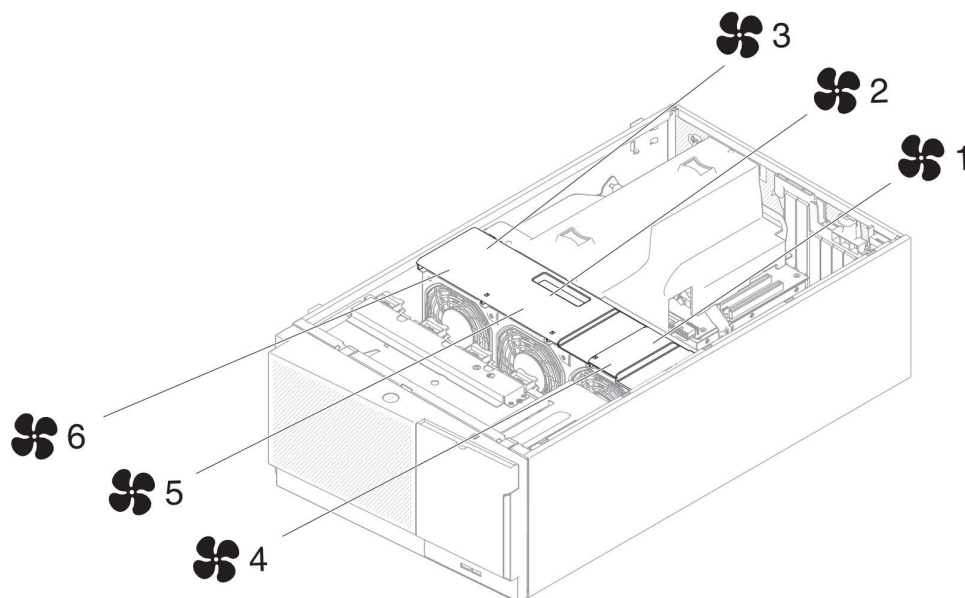
2. You can order the three additional fans for redundant cooling.

To install a simple-swap fan, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Touch the static-protective package that contains the simple-swap fan to any unpainted metal surface on the server; then, remove the fan from the package.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Open the fan cage cover.

6. Perform the following steps only if you want to install the simple swap fan in the Fan 2 compartment:

   a. Unfasten and open the release lever (see "Removing the fan cage assembly" on page 282).

   b. Press and release the clip on the fan filler to remove the fan filler from the server.

Fan filler
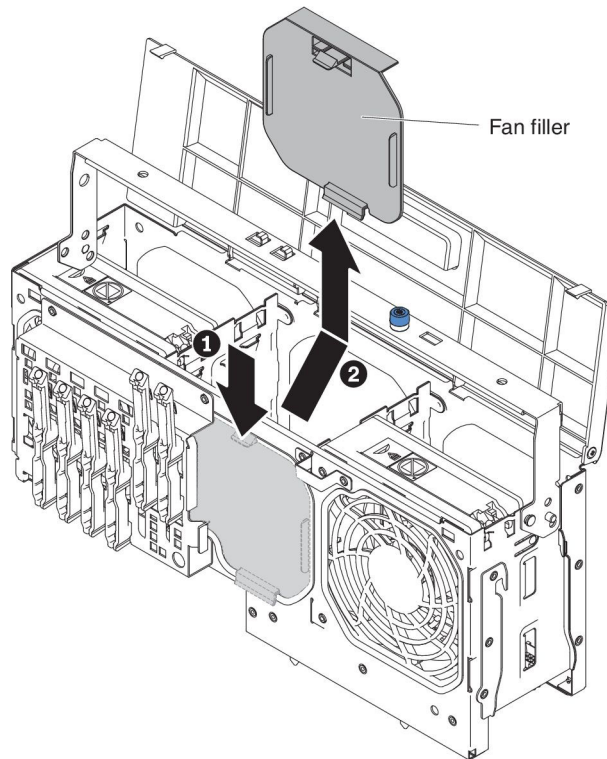
c. Close and fasten the release lever.

7. Open the fan-locking handle on the replacement fan.

8. Insert the fan into the socket and close the handle to the locked position.

Fan
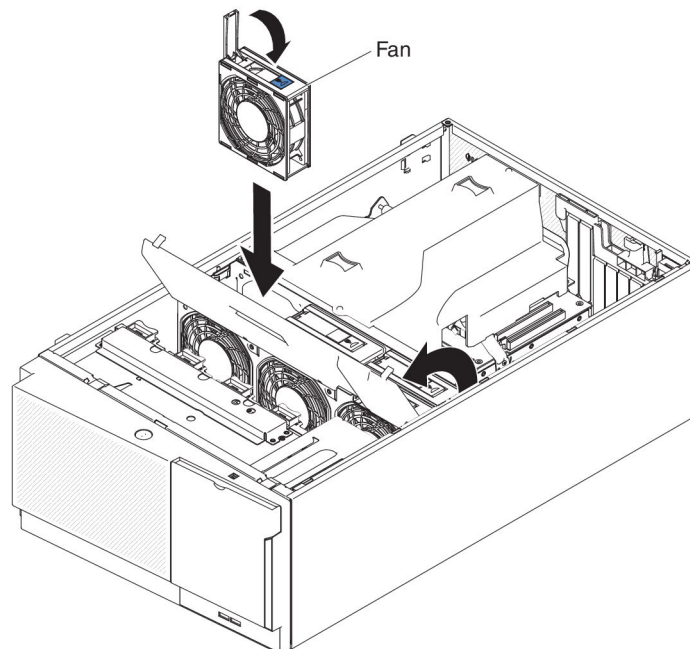
9. Close the fan cage cover.

10. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

11. Reconnect the power cords and any cables that you removed.

12. Turn on the peripheral devices and the server.

Removing the system battery
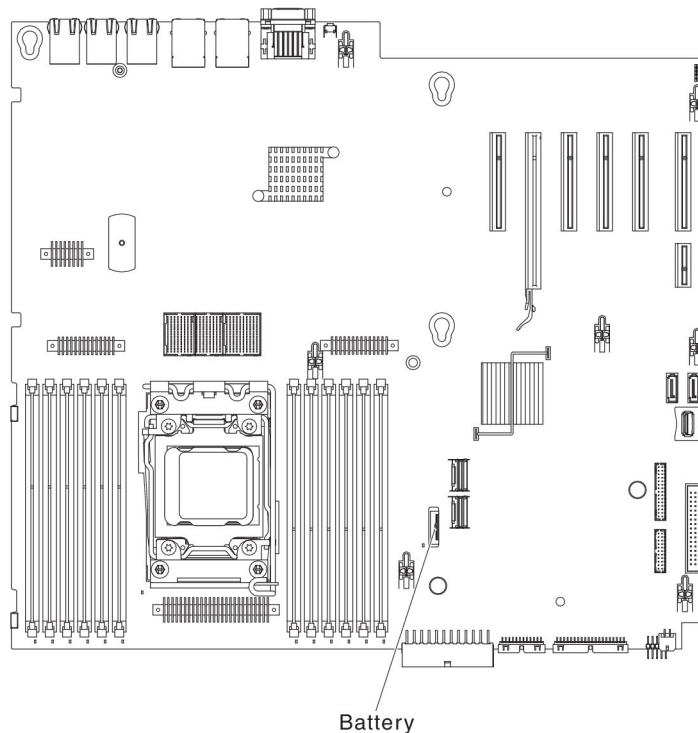
Battery

To remove the battery, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices.
3. Disconnect all external cables and power cords.
4. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
5. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
6. Remove the system battery:

   a. If there is a rubber cover on the battery holder, use your fingers to lift the battery cover from the battery connector.

   b. Use one finger to tilt the battery horizontally out of its socket, pushing it away from the socket.

      Attention: Neither tilt nor push the battery by using excessive force.

   c. Use your thumb and index finger to lift the battery from the socket.
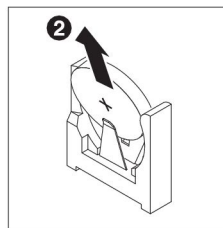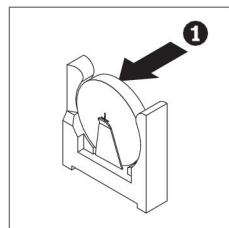
   Attention: Do not lift the battery by using excessive force. Failing to remove the battery properly may damage the socket on the system board. Any damage to the socket may require replacing the system board.

7. Dispose of the battery as required by local ordinances or regulations (see the *Environmental Notices and User Guide* for more information).

Installing the system battery

The following notes describe information that you must consider when you replace the battery in the server:
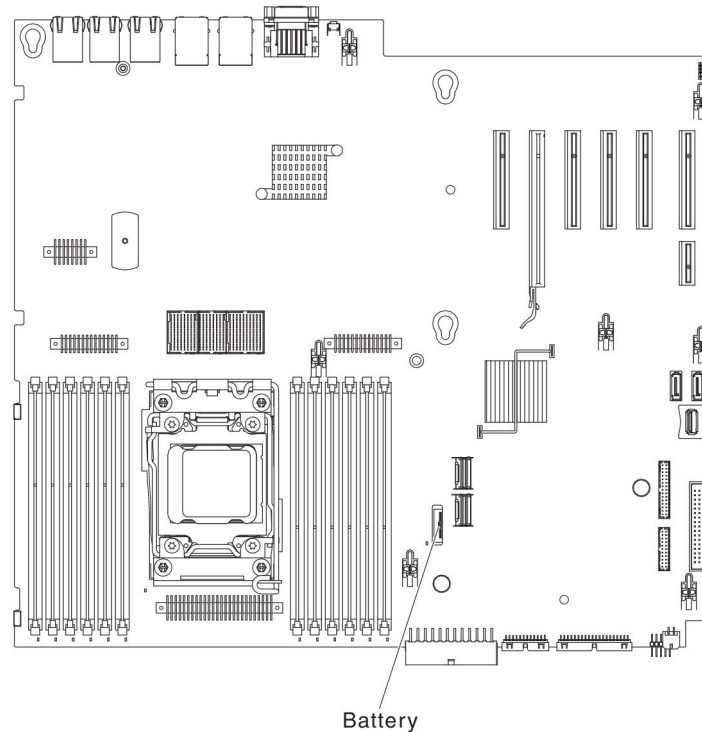
Battery

- You must replace the battery with a lithium battery of the same type from the same manufacturer.
- To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM marketing representative or authorized reseller.
- After you replace the battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Positive (+) side
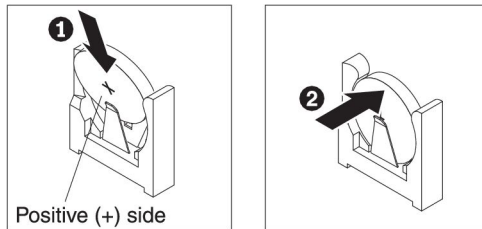
To install the replacement battery, complete the following steps:

1. Follow any special handling and installation instructions that come with the replacement battery.

2. Insert the new battery:

   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
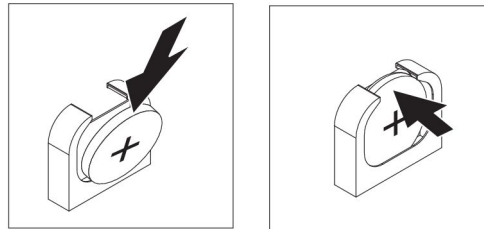
   b. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.

   c. If you removed a rubber cover from the battery holder, use your fingers to install the battery cover on top of the battery connector.

3. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

4. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

   Note: You must wait approximately 3 minutes after you connect the server power cord to an electrical outlet before the power-control button becomes active.

5. Start the Setup utility and reset the configuration:
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

   See "Starting the Setup utility" on page 322 for details.

Removing the USB cable and light path diagnostics assembly

To remove the USB cable and light path diagnostics assembly from the server, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices; then, disconnect the power cords and all external cables.

3. Carefully lay the server down on its side.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Disconnect the light path diagnostics cable from the system board (see "System-board internal connectors" on page 16 and "Internal cable routing and connectors" on page 183).

8. Stand the server back up in its vertical position.

9. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

10. Press down on the release latch on the bottom of the USB cable and light path diagnostics assembly bracket; then, rotate the top of the mounting bracket away from the server.

Latch

11. Remove the light path diagnostics assembly (see "Removing the light path diagnostics assembly" on page 253).

12. Remove the USB cable assembly (see "Removing the USB cable assembly" on page 256).

13. If you are instructed to return the USB cable and light path diagnostics assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

# Installing the USB cable and light path diagnostics assembly

To install the USB cable and light path diagnostics assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices; then, disconnect the power cords and all external cables.

3. Carefully lay the server down on its side.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Stand the server back up in its vertical position.

8. Touch the static-protective package that contains the USB cable and light path diagnostics assembly to any unpainted metal surface on the server; then, remove the assembly from the package.

9. Install the light path diagnostics assembly (see "Installing the light path diagnostics assembly" on page 254).

10. Install the USB cable assembly (see "Installing the USB cable assembly" on page 257).

11. Position the top of the USB cable and light path diagnostics assembly mounting bracket into the opening and rotate the bottom of the bracket toward the server until it clicks into place.

Hinge
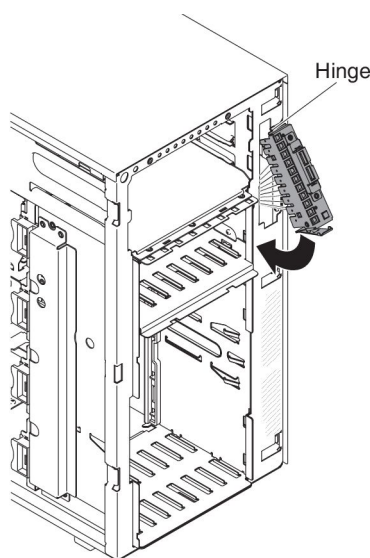
12. Connect the USB and light path diagnostics cable to the system board (see "System-board internal connectors" on page 16 and "Internal cable routing and connectors" on page 183).

13. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).

14. Install the air baffle (see "Installing the air baffle" on page 207).

15. Install the hot-swap power supply or power supplies (see "Installing a hot-swap power supply" on page 268).

16. Install the bezel (see "Installing the bezel" on page 203).

17. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

18. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.
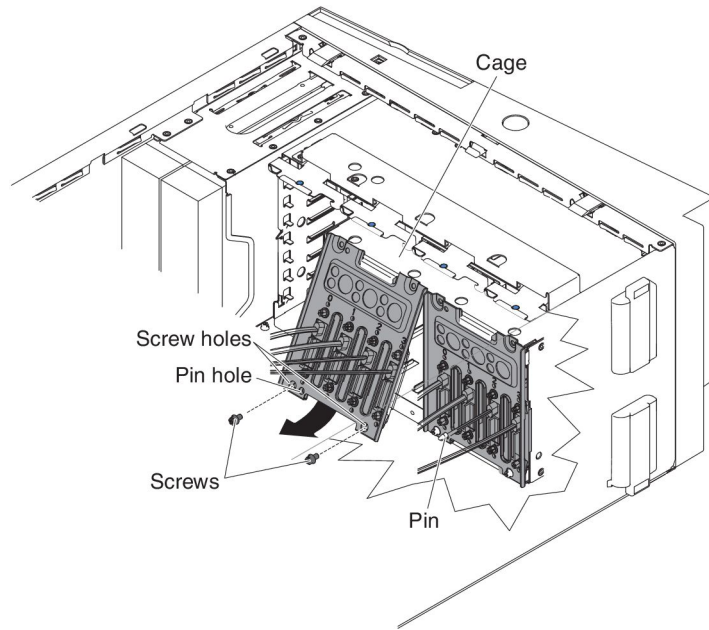
Removing the light path diagnostics assembly

To remove the light path diagnostics assembly from the server, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices; then, disconnect the power cords and all external cables.

3. Carefully lay the server down on its side.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Disconnect the light path diagnostics cable from the system board (see "System-board internal connectors" on page 16 and "Internal cable routing and connectors" on page 183).

8. Stand the server back up in its vertical position.

9. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

10. Press down on the release latch on the bottom of the USB cable and light path diagnostics assembly bracket; then, rotate the top of the mounting bracket away from the server.

Latch

11. Pry the holes on the light path diagnostics assembly bracket to release the light path diagnostics assembly.

Light path
diagnostics assembly

Holes

Front USB cable and light path
diagnostics bracket

12. If you are instructed to return the light path diagnostics assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the light path diagnostics assembly

To install the light path diagnostics assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices; then, disconnect the power cords and all external cables.

3. Carefully lay the server down on its side.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Stand the server back up in its vertical position.

8. Remove the USB cable and light path diagnostics assembly (see "Removing the USB cable and light path diagnostics assembly" on page 251).

9. Touch the static-protective package that contains the light path diagnostics assembly to any unpainted metal surface on the server; then, remove the assembly from the package.

10. Install the light path diagnostics assembly into the mounting bracket.
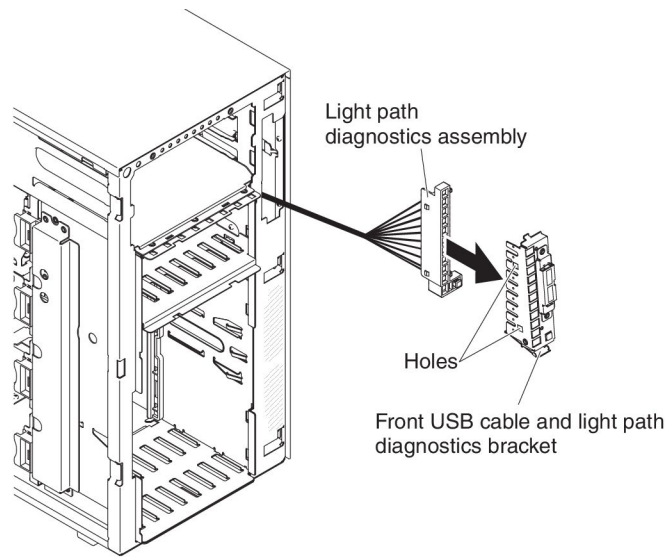
Light path
diagnostics assembly

Holes

Front USB cable and light path
diagnostics bracket

11. Position the top of the USB cable and light path diagnostics assembly
    mounting bracket into the opening and rotate the bottom of the bracket toward
    the server until it clicks into place.

Hinge
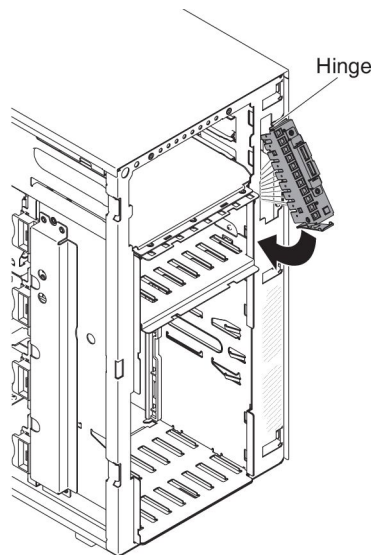
12. Install the USB cable and light path diagnostics assembly (see "Installing the
    USB cable and light path diagnostics assembly" on page 252).

13. Connect the light path diagnostics cable to the system board. See
    "System-board internal connectors" on page 16 and"Internal cable routing and
    connectors" on page 183 to locate the USB and light path diagnostics
    connectors on the system board.

14. Install the fan cage assembly (see "Installing the fan cage assembly" on page
    284).

15. Install the air baffle (see "Installing the air baffle" on page 207).

16. Install the bezel (see "Installing the bezel" on page 203).

17. Install and lock the left-side cover (see "Installing the left-side cover" on page
    201).

18. Reconnect the external cables and power cords; then, turn on the attached
    devices and turn on the server.

Removing the USB cable assembly

To remove the USB cable assembly from the server, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices; then, disconnect the power cords and all external cables.
3. Carefully lay the server down on its side.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).
7. Disconnect the USB assembly cable from the system board (see "System-board internal connectors" on page 16 and "Internal cable routing and connectors" on page 183).
8. Stand the server back up in its vertical position.
9. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.
10. Press down on the release latch on the bottom of the USB cable and light path diagnostics assembly bracket; then, rotate the top of the mounting bracket away from the server.

Latch
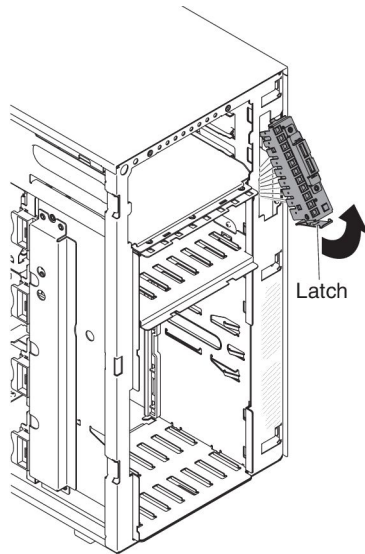
11. Squeeze the retaining clips on each side of the USB cable connectors and pull the USB cable away from the mounting bracket.

Front USB
cable assembly

Retention clips

Front USB cable and light path
diagnostics bracket
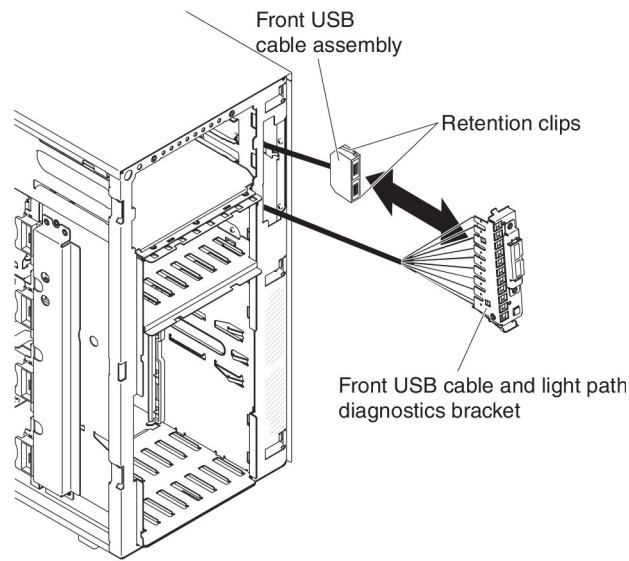
12. If you are instructed to return the USB cable assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the USB cable assembly

To install the USB cable assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices; then, disconnect the power cords and all external cables.

3. Carefully lay the server down on its side.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Stand the server back up in its vertical position.

8. Remove the USB cable and light path diagnostics assembly (see "Removing the USB cable and light path diagnostics assembly" on page 251).

9. Touch the static-protective package that contains the USB cable assembly to any unpainted metal surface on the server; then, remove the assembly from the package.

10. Squeeze the retaining clips on each side of the USB cable connectors and align the key on the cable connector with the notch on the mounting bracket.

Front USB
cable assembly

Retention clips

Front USB cable and light path
diagnostics bracket
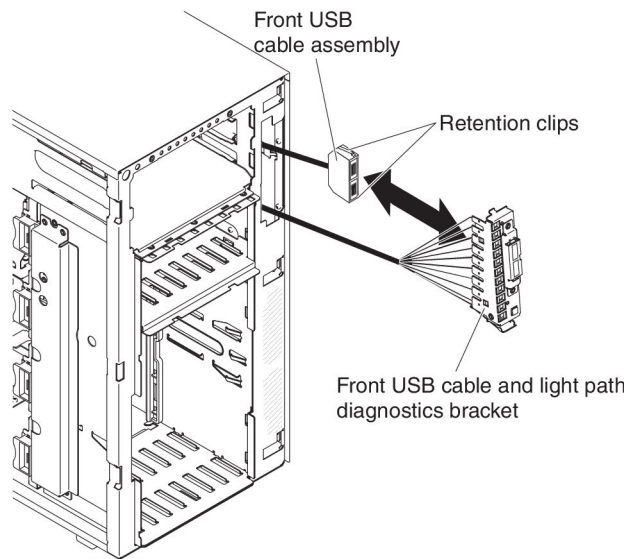
11. Insert the USB cable assembly into the mounting bracket; then, release the retaining clips.

12. Position the bottom of the USB cable and light path diagnostics assembly mounting bracket into the opening and rotate the top of the bracket toward the server until it clicks into place.

13. Install the USB cable and light path diagnostics assembly (see "Installing the USB cable and light path diagnostics assembly" on page 252).

14. Connect the USB cable to the system board (see "System-board internal connectors" on page 16 and"Internal cable routing and connectors" on page 183 for more information).

15. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).

16. Install the air baffle (see "Installing the air baffle" on page 207).

17. Install the bezel (see "Installing the bezel" on page 203).

18. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

19. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a 2.5-inch disk drive backplane

To remove a 2.5-inch hard disk drive backplane, complete the following steps.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button
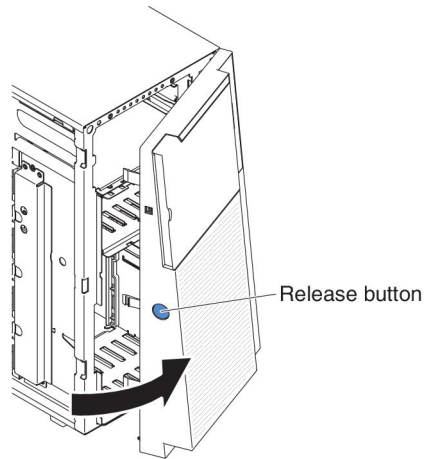
5. Remove the 2.5-inch hot-swap hard disk drives (see "Removing a 2.5-inch hot-swap hard disk drive" on page 215).

6. Remove the air baffle (see "Removing the air baffle" on page 205).

7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

8. Note where the power, signal, and configuration cables are connected to the 2.5-inch hard disk drive backplane; then, disconnect them (see "Internal cable routing and connectors" on page 183).

9. Lift the retention latches that hold the backplane in place; then, grasp the top edge of the backplane and rotate it toward the rear of the server. When the backplane is clear of the drive-cage retention tabs, remove it from the server.
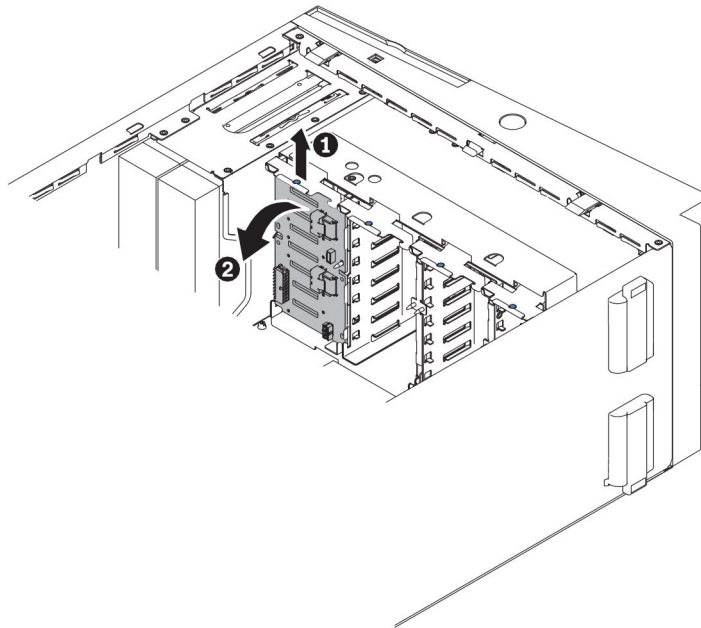
10. If you are removing another SAS backplane, repeat steps 8 and 9 to remove the remaining backplane.

11. If you are instructed to return the 2.5-inch hard disk drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 2.5-inch disk drive backplane

To install a 2.5-inch hard disk drive backplane, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Touch the static-protective package that contains the hard disk drive backplane to any unpainted metal surface on the server; then, remove the backplane from the package.

8. Position the 2.5-inch hard disk drive backplane in the drive-cage retention tabs; then, rotate the top of the backplane toward the locator pins until the latches click into place.

Align pin
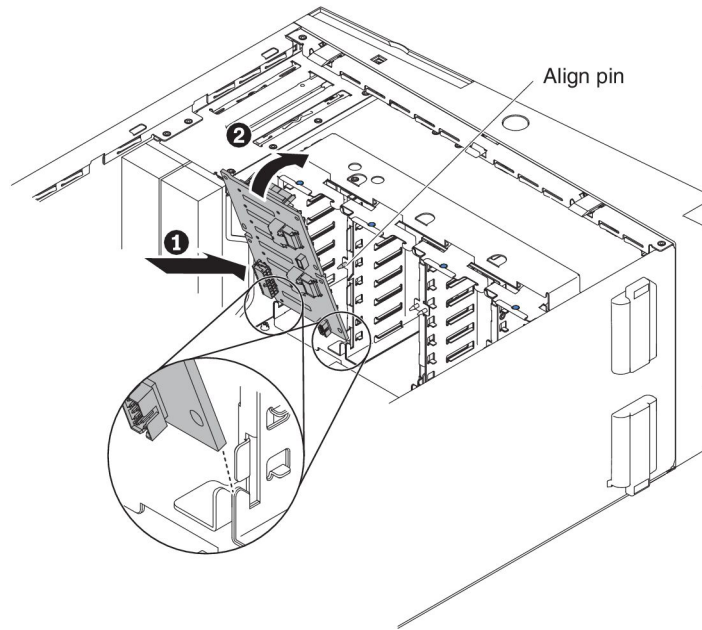
9. Connect the power, signal, and configuration cables to the 2.5-inch hard disk drive backplane (see "Hard disk drive backplane connectors" on page 21 and "Internal cable routing and connectors" on page 183).

10. If you are replacing another 2.5-inch hard disk drive backplane, repeat steps 7 on page 260 through 9 to install the additional backplane.

11. Install the 2.5-inch hot-swap hard disk drives (see "Installing a 2.5-inch hot-swap hard disk drive" on page 216).

12. Close the bezel.

13. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).

14. Install the air baffle (see "Installing the air baffle" on page 207).

15. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the 3.5-inch hard disk drive backplane

To remove the 3.5-inch hot-swap hard disk drive backplane, complete the following steps.

1. Read the safety information that begins on page viiand "Installation guidelines" on page 177.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button
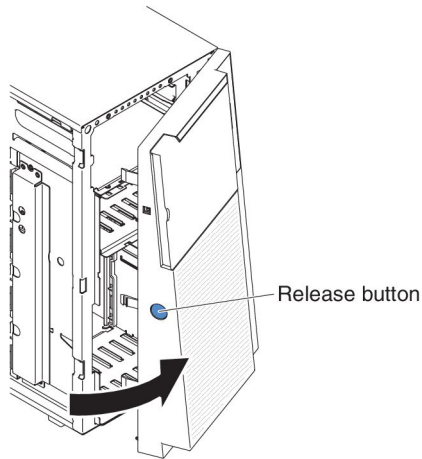
5. Remove the 3.5-inch hot-swap hard disk drives (see "Removing a 3.5-inch hot-swap hard disk drive" on page 218).

6. Remove the air baffle (see "Removing the air baffle" on page 205).

7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

8. Note where the power, signal, and configuration cables are connected to the 3.5-inch hard disk drive backplane; then, disconnect them (see "Internal cable routing and connectors" on page 183).

9. Remove the screws on the backplane.

10. Rotate the backplane away from the bottom side of the drive cage until the guide pins on the drive cage disengage from the backplane.
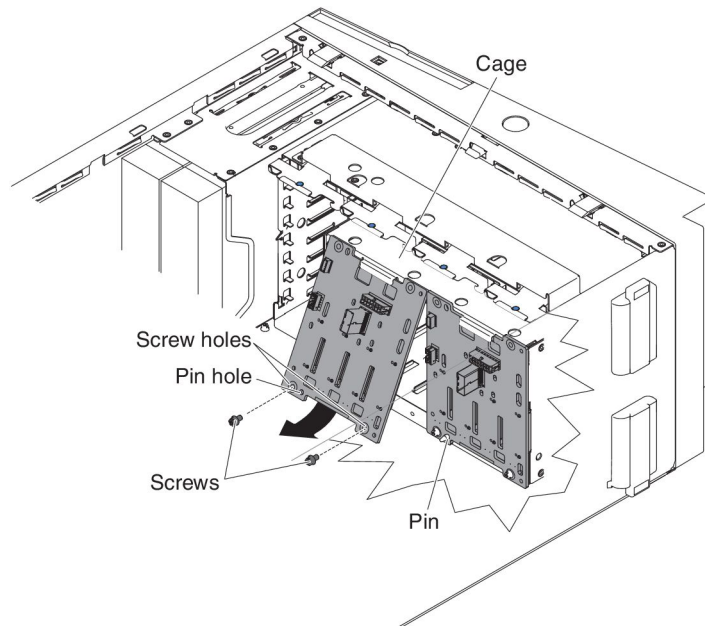
Cage

Screw holes

Pin hole

Screws

Pin

11. If you are instructed to return the 3.5-inch hot-swap hard disk drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 3.5-inch hard disk drive backplane

To install the 3.5-inch hard disk drive backplane, complete the following steps.

1. Read the safety information that begins on page viiand "Installation guidelines" on page 177.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).
4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button

5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).
7. Insert the bottom tabs of the 3.5-inch hard disk drive backplane onto the lower lip of the drive cage.

Cage

Screw holes
Pin hole

Screws

Pin
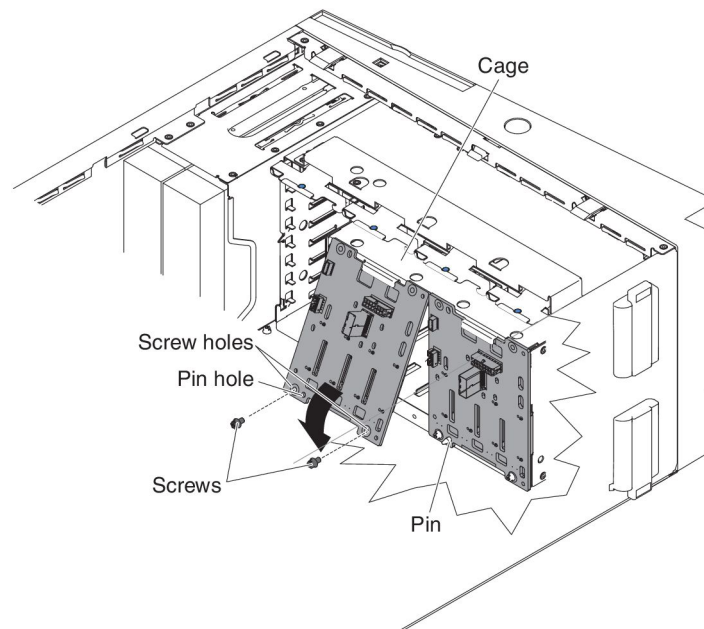
8. Rotate the backplane toward the drive cage until the guide pins on the drive cage insert securely to the holes on the backplane.
9. Fasten the screws on the backplane.
10. Reconnect the power, configuration, and signal cables to the 3.5-inch hard disk drive backplane (see "Internal cable routing and connectors" on page 183).

11. Install the 3.5-inch hot-swap hard disk drives that were removed from the hard disk drive cage (see "Installing a 3.5-inch hot-swap hard disk drive" on page 218).

12. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).

13. Install the air baffle (see "Installing the air baffle" on page 207).

14. Close the bezel.

15. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the 3.5-inch hard disk drive backplate assembly

To remove the 3.5-inch simple-swap hard disk drive backplate assembly, complete the following steps.

1. Read the safety information that begins on page viiand "Installation guidelines" on page 177.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button
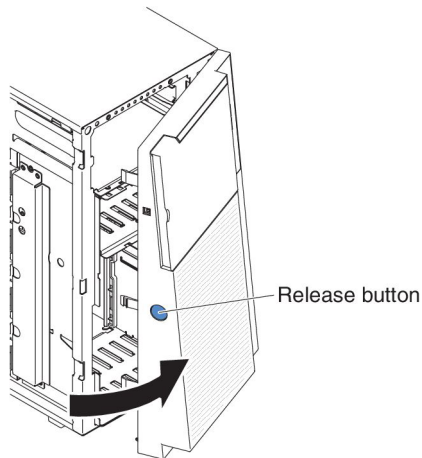
5. Remove the 3.5-inch simple-swap hard disk drives that are installed in the hard disk drive cage (see "Removing a 3.5-inch simple-swap hard disk drive" on page 220).

6. Remove the air baffle (see "Removing the air baffle" on page 205).

7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

8. Note where the power, signal, and configuration cables are connected to the 3.5-inch hard disk drive backplate assembly; then, disconnect them (see "Internal cable routing and connectors" on page 183).

9. Remove the screws on the backplate assembly.

10. Rotate the backplate assembly away from the bottom side of the drive cage until the guide pins on the drive cage disengage from the backplate assembly.

Cage

Screw holes

Pin hole

Screws

Pin

11. If you are instructed to return the 3.5-inch simple-swap hard disk drive backplate assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 3.5-inch hard disk drive backplate assembly

To install the 3.5-inch hard disk drive backplate assembly, complete the following steps.

1. Read the safety information that begins on page viiand "Installation guidelines" on page 177.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).

4. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.

Release button

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Insert the bottom tabs of the 3.5-inch hard disk drive backplate assembly onto the lower lip of the drive cage.
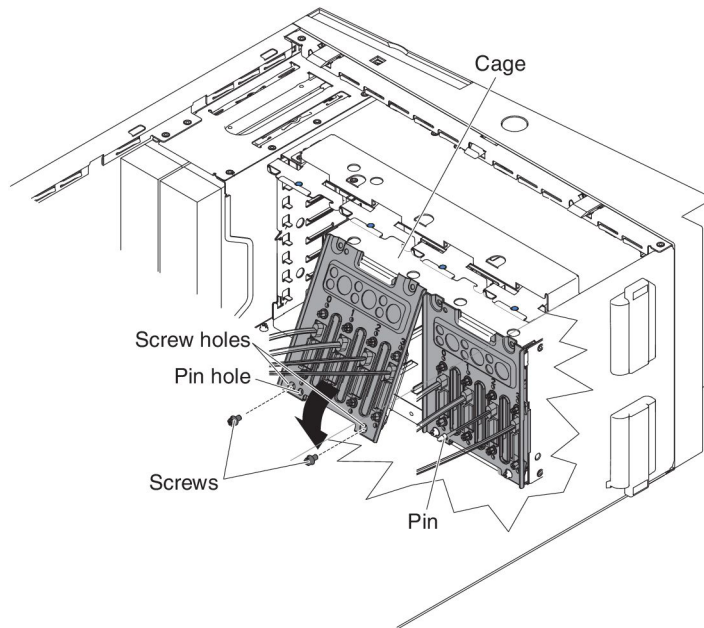
8. Rotate the backplate assembly toward the drive cage until the guide pins on the drive cage insert securely to the holes on the backplate assembly.
9. Fasten the screws on the backplate assembly.
10. Reconnect the power, configuration, and signal cables to the 3.5-inch hard disk drive backplate assembly (see Internal cable routing and connectors).
11. Install the 3.5-inch simple-swap hard disk drives that were removed from the hard disk drive cage (see "Installing a 3.5-inch simple-swap hard disk drive" on page 220).
12. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).
13. Install the air baffle (see "Installing the air baffle" on page 207).
14. Close the bezel.
15. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).
16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a hot-swap power supply

When you remove or install a hot-swap power supply, observe the following precautions.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2 ⊞ ➡ ▭
1 ⊞ ➡ ▭
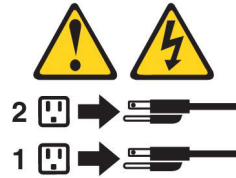
Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

To remove a hot-swap power supply, complete the following steps:

Notes:

1. If only one hot-swap power supply is installed in the server, you must turn off the server before removing the power supply.

2. You must install the fan cage assembly before removing or installing the power supply.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

2. Disconnect the power cord from the connector on the back of the power supply that you are removing.

3. Press the release latch on the hot-swap power supply and pull it out from the server.

Hot-swap
power-supply
filler panel

Power supply 1

Release
latch

Power supply 2

Hot-swap
power supply
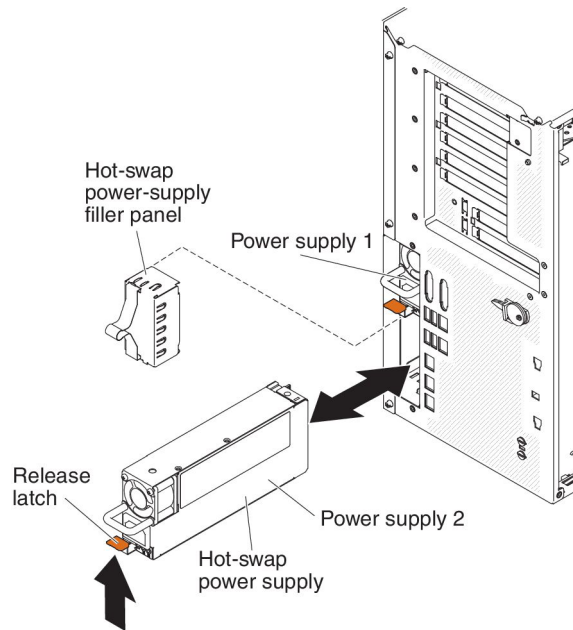
4. If you are instructed to return the hot-swap power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap power supply

The following notes describe the type of ac power supply that the server supports and other information that you must consider when you install a power supply:

- Make sure that the devices that you are installing are supported. For a list of supported optional devices for the server, see http://www.ibm.com/systems/info/ x86servers/serverproven/compat/us/.

- Before you install an additional power supply or replace a power supply with one of a different wattage, you may use the IBM Power Configurator utility to determine current system power consumption. For more information and to download the utility, go to http://www-03.ibm.com/systems/bladecenter/resources/ powerconfig.html.

- The server comes with one hot-swap 12-volt output power supply that connects to power supply bay 1. The input voltage is 110 V ac or 220 V ac auto-sensing.

- Power supplies in the server must be with the same power rating or wattage to ensure that the server will operate correctly.

- Power supply 1 is the default/primary power supply. If power supply 1 fails, you must replace the power supply with the same wattage immediately.

- You can order an optional power supply for redundancy.

- These power supplies are designed for parallel operation. In the event of a power-supply failure, the redundant power supply continues to power the system. The server supports a maximum of two power supplies.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
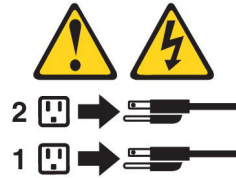
Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

To install a hot-swap power supply, complete the following steps:

Note: You must install the fan cage assembly before removing or installing the power supply.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

   Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

2. Touch the static-protective package that contains the power supply to any unpainted metal surface on the server; then, remove the power supply from the package.

3. Remove the power-supply filler panel from the power bay, if one is installed.
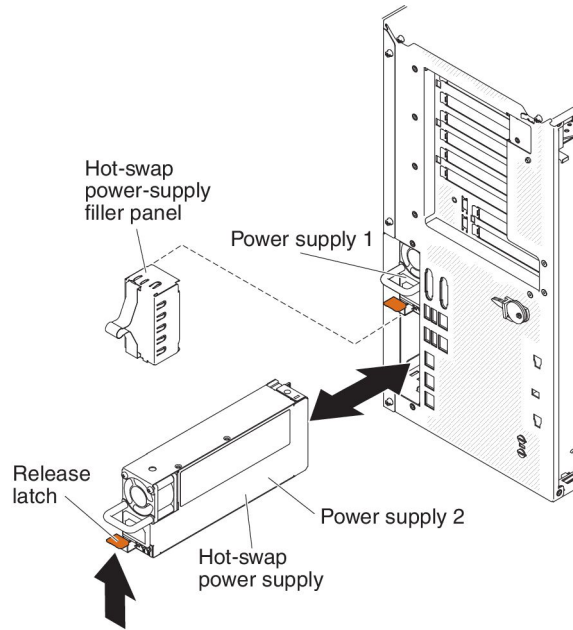
4. Install the power supply and push it in until it locks into place.

   Notes:

   a. If only one hot-swap power supply is installed in the server, a power-supply filler must be installed in the empty power bay.

   b. Do not mix power supplies with different wattage in the server.

5. Route the power cord through the handle and cable tie if any, so that it does not accidentally become unplugged.

6. Connect one end of the power cord for the new power supply into the connector on the back of the power supply; then, connect the other end of the power cord to a properly grounded electrical outlet.

   Note: If the server has been turned off, you must wait approximately 3 minutes after you connect the server power cord to an electrical outlet before the power-control button becomes active.

7. Make sure that the ac power LED and the dc power LED on the ac power supply are lit, indicating that the power supply is operating correctly. The two green LEDs are to the right of the power-cord connector.

8. If you are replacing a power supply with one of a different wattage, apply the power information label provided with the new power supply over the existing power information label on the server.

9. If you are adding a power supply to the server, attach the redundant power information label that comes with this option on the server cover near the power supplies.

Power supplies

Removing the operator information panel assembly

To remove the operator information panel assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

4. Remove the air baffle (see "Removing the air baffle" on page 205).

5. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

6. Disconnect the drive cables from the back of the drive bay 1.

7. Remove the DVD drive (see "Removing a DVD drive" on page 221) or the tape drive (see "Removing an optional tape drive" on page 224) which is installed in drive bay 1.

8. Disconnect the operator information panel assembly cable from the system board (see "System-board internal connectors" on page 16).

9. Locate the operator information panel assembly release latch just above the DVD drive.

Handle

Operator information
panel assembly
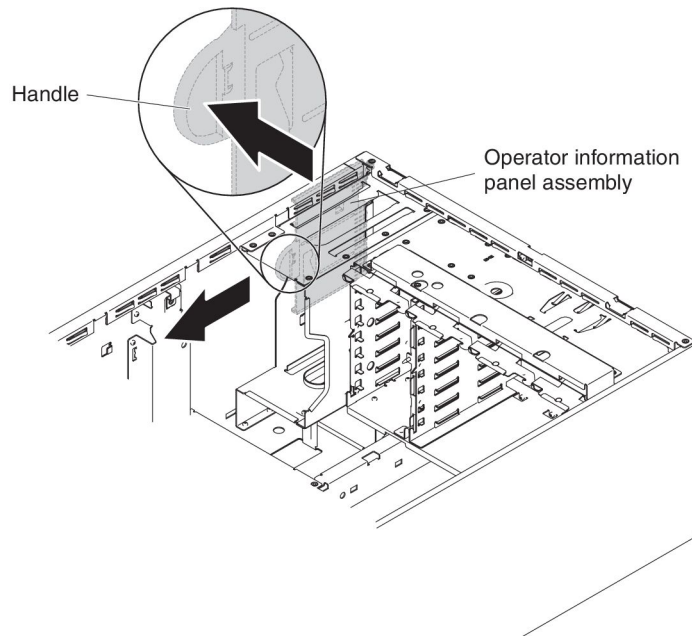
10. Push up on the release latch while you pull the operator information panel
    assembly toward the rear of the server; then, angle the back of the assembly
    toward the system board and remove the assembly from the server.

11. If you are instructed to return the operator information panel assembly, follow
    all packaging instructions, and use any packaging materials for shipping that
    are supplied to you.

Installing the operator information panel assembly

To install the operator information panel assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling
   static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords
   and all external cables.

3. Unlock and remove the left-side cover (see "Removing the left-side cover" on
   page 201).

4. Remove the air baffle (see "Removing the air baffle" on page 205).

5. Remove the fan cage assembly (see "Removing the fan cage assembly" on
   page 282).

6. Disconnect the drive cables from the back of the drive bay 1.

7. Remove the DVD drive (see "Removing a DVD drive" on page 221) or the tape
   drive (see "Removing an optional tape drive" on page 224) which is installed in
   drive bay 1.

8. Touch the static-protective package that contains the operator information
   panel assembly to any unpainted metal surface on the server; then, remove
   the assembly from the package.

9. Angle the operator information panel assembly so that the edge of the
   assembly is in the guide slot.

Operator information
panel assembly
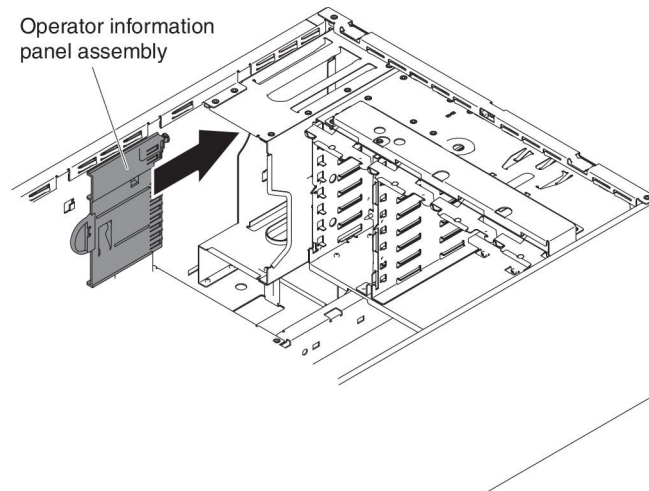
10. Slide the operator information panel assembly forward until the release latch
    clicks into place.

11. Connect the operator information panel assembly cable to the system board
    (see "System-board internal connectors" on page 16 and "Internal cable routing
    and connectors" on page 183).

12. Reinstall the DVD drive (see "Removing a DVD drive" on page 221) or the
    tape drive (see "Removing an optional tape drive" on page 224) which you
    removed before in drive bay 1.

13. Connect the drive cables to the back of the drive bay 1.

14. Reinstall the fan cage assembly (see "Installing the fan cage assembly" on
    page 284).

15. Reinstall the air baffle (see "Installing the air baffle" on page 207).

16. Install and lock the left-side cover (see "Installing the left-side cover" on page
    201).

17. Reconnect the external cables and power cords; then, turn on the attached
    devices and turn on the server.

Removing a memory module

To remove a dual inline memory module (DIMM), complete the following steps:

1. Read the safety information that begins on page vii and "Handling
   static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and
   all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing
   up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on
   page 201).

5. Remove the air baffle if installed (see "Removing the air baffle" on page 205).

6. Locate the DIMM connectors on the system board (see "System-board internal
   connectors" on page 16).

   Attention: To avoid breaking the retaining clips or damaging the DIMM
   connectors, handle the clips gently.

7. Move the DIMM retaining clips on the side of the DIMM connector to the open
   position by pressing the retaining clips away from the center of the DIMM

connector.

Alignment slot

DIMM

Retaining clip

Alignment tab
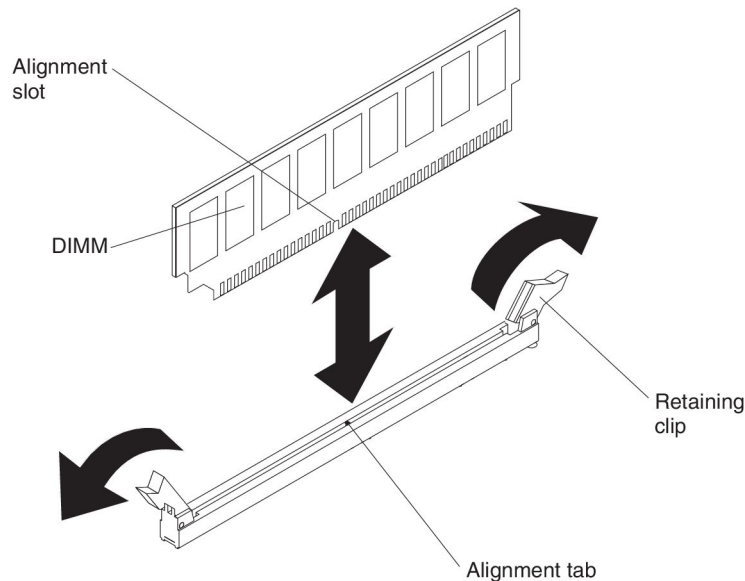
8. Using your fingers, lift the DIMM out of the DIMM connector.
9. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module

The following notes describe the types of DIMMs that the server supports and other information that you must consider when you install DIMMs.

- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

- The server supports only industry-standard double-data-rate 3 (DDR3), 800, 1066, 1333, or 1600 MHz, PC3-6400, PC3-8500, PC3-10600, or PC3-12800 registered or unbuffered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported memory modules for the server.

  – The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

  ggggg eRxff PC3*v*-*wwwwwm*-*aa*-*bb*-*ccd*

  where:

  > *ggggg* is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)
  >
  > *eR* is the number of ranks
  >
  >> 1R = single-rank
  >>
  >> 2R = dual-rank
  >>
  >> 4R = quad-rank
  >
  > *xff* is the device organization (bit width)
  >
  >> x4 = x4 organization (4 DQ lines per SDRAM)
  >>
  >> x8 = x8 organization
  >>
  >> x16 = x16 organization
  >
  > *v* is the SDRAM and support component supply voltage (VDD)
  >
  >> Blank = 1.5 V specified

L = 1.35 V specified, 1.5 V operable

Note: Values for these voltages are 'specified' which means the device characteristics such as timing are supported at this voltage. Values are 'operable' which means that the devices can be operated safely at this voltage. However, device characteristics such as timing may not be guaranteed. All devices must be 'tolerant' of the highest DDR3 nominal voltage of 1.5 V, meaning that they may not operate at 1.5 V but may be powered at that voltage without damage to the devices.

wwwww is the DIMM bandwidth, in MBps

6400 = 6.40 GBps (DDR3-800 SDRAMs, 8-byte primary data bus)

8500 = 8.53 GBps (DDR3-1066 SDRAMs, 8-byte primary data bus)

10600 = 10.66 GBps (DDR3-1333 SDRAMs, 8-byte primary data bus)

12800 = 12.80 GBps (DDR3-1600 SDRAMs, 8-byte primary data bus)

m is the DIMM type

E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

L = Load Reduction DIMM (LRDIMM)

R = Registered DIMM (RDIMM)

U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

aa is the CAS latency, in clocks at maximum operating frequency

bb is the JEDEC SPD Revision Encoding and Additions level

cc is the reference design file for the design of the DIMM

d is the revision number of the reference design of the DIMM

Note: To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3v-xxxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1), dual-rank (n=2), or quad-rank (n=4).

- The following rules apply to DDR3 RDIMM speed as it relates to the number of RDIMMs in a channel:
  – When you install 1 RDIMM per channel, the memory runs at 1600 MHz
  – When you install 2 RDIMMs per channel, the memory runs at 1600 MHz
  – When you install 3 RDIMMs per channel, the memory runs at 1066 MHz
  – All channels in a server run at the fastest common frequency
  – Do not install registered, unbuffered, and load reduction DIMMs in the same server
- The maximum memory speed is determined by the combination of the microprocessor, DIMM speed, DIMM type, Operating Modes in UEFI settings, and the number of DIMMs installed in each channel.
- In two-DIMM-per-channel configuration, a server with an Intel Xeon™ E5-2600 series microprocessor automatically operates with a maximum memory speed of up to 1600 MHz when the following condition is met:
  – Two 1.35 V single-rank, dual-ranl, or quad-rank UDIMMs, RDIMMs or LRDIMMs are installed in the same channel. In the Setup utility, **Memory speed** is set to **Max performance** and **LV-DIMM power** is set to **Enhance performance** mode. The 1.35 V UDIMMs, RDIMMs or LRDIMMs will function at 1.5 V.
- The server supports a maximum of 16 dual-rank UDIMMs. The server supports up to two UDIMMs per channel.

- The server supports a maximum of 24 single-rank, dual-rank, or 16 quad-rank RDIMMs. The server does not support three quad-rank RDIMMs in the same channel.
- The following table shows an example of the maximum amount of memory that you can install using ranked DIMMs:

Table 11. Maximum memory installation using ranked DIMMs

Number of DIMMs	DIMM type	DIMM size	Total memory
16	Single-rank UDIMMs	2 GB	32 GB
24	Single-rank RDIMMs	2 GB	48 GB
24	Single-rank RDIMMs	4 GB	96 GB
24	Dual-rank RDIMMs	8 GB	192 GB
24	Dual-rank RDIMMs	16 GB	384 GB
16	Quad-rank RDIMMs	16 GB	256 GB
24	Quad-rank LRDIMMs	32 GB	768 GB

- The UDIMM option that is available for the server is 2 GB. The server supports a minimum of 2GB and a maximum of 32 GB of system memory using UDIMMs.
- The RDIMM options that are available for the server are 2 GB, 4 GB, 8 GB, and 16 GB. The server supports a minimum of 2 GB and a maximum of 384 GB of system memory using RDIMMs.
- The LRDIMM option that is available for the server is 32 GB. The server supports a minimum of 32 GB and a maximum of 768 GB of system memory using LRDIMMs.

  Note: The amount of usable memory is reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility. For additional information, see "Configuring the server" on page 318.
- A minimum of one DIMM must be installed for each microprocessor. For example, you must install a minimum of two DIMMs if the server has two microprocessors installed. However, to improve system performance, install a minimum of four DIMMs for each microprocessor.
- DIMMs in the server must be the same type (RDIMM, UDIMM, or LRDIMM) to ensure that the server will operate correctly.
- When you install one quad-rank DIMM in a channel, install it in the DIMM connector furthest away from the microprocessor.
- For UDIMMs, DIMM connectors 3, 6, 7, and 10 for microprocessor 1 and DIMM connectors 15, 18, 19, and 22 for microprocessor 2 are not used.

Note: You can install DIMMs for microprocessor 2 as soon as you install microprocessor 2; you do not have to wait until all of the DIMM slots for microprocessor 1 are filled.

The following illustration shows the location of the DIMM connectors on the system board.

Microprocessor 2

DIMM 24 DIMM 23 DIMM 22 DIMM 21 DIMM 20 DIMM 19   DIMM 18 DIMM 17 DIMM 16 DIMM 15 DIMM 14 DIMM 13

Microprocessor 1

DIMM 12 DIMM 11 DIMM 10 DIMM 9 DIMM 8 DIMM 7   DIMM 6 DIMM 5 DIMM 4 DIMM 3 DIMM 2 DIMM 1
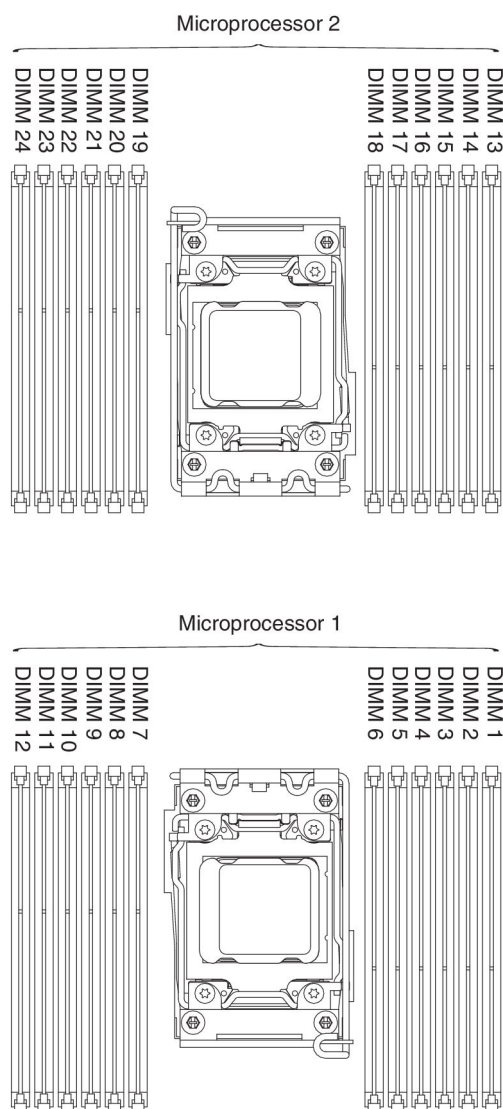
DIMM installation sequence

Depending on the server model, the server may come with a minimum of one 2 GB or 4 GB DIMM installed in slot 1. When you install additional DIMMs, install them in the order shown in the following table to optimize system performance. In general, all three channels on the memory interface for each microprocessor can be populated in any order and have no matching requirements.

Table 12. Independent mode DIMM installation sequence

Number of installed microprocessor	DIMM connector population sequence
One microprocessor installed	1, 4, 9, 12, 2, 5, 8, 11, 10, 7, 6, 3
Two microprocessors installed	1, 13, 4, 16, 9, 21, 12, 24, 2, 14, 5, 17, 8, 20, 11, 23, 22, 10, 19, 7, 18, 6, 15, 3

Memory mirrored channel

Memory mirrored channel mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller

switches from the primary pair of memory DIMMs to the backup pair of DIMMs. You can enable memory mirrored in the Setup utility (see "Starting the Setup utility" on page 322). When you use the memory mirrored channel feature, consider the following information:

- When you use memory mirrored channel, you must install a pair of DIMMs at a time. The two DIMMs in each pair must be identical in size, type, and rank (single, dual, or quad), and organization, but not in speed. The channels run at the speed of the slowest DIMM in any of the channels.

- The maximum available memory is reduced to half of the installed memory when memory mirrored is enabled. For example, if you install 64 GB of memory using RDIMMs, only 32 GB of addressable memory is available when you use memory mirrored.

The following diagram lists the DIMM connectors on each memory channel.

Microprocessor 2

DIMM 24 DIMM 23 DIMM 22 DIMM 21 DIMM 20 DIMM 19   DIMM 18 DIMM 17 DIMM 16 DIMM 15 DIMM 14 DIMM 13

────────Channel────────

Microprocessor 1

DIMM 12 DIMM 11 DIMM 10 DIMM 9 DIMM 8 DIMM 7   DIMM 6 DIMM 5 DIMM 4 DIMM 3 DIMM 2 DIMM 1
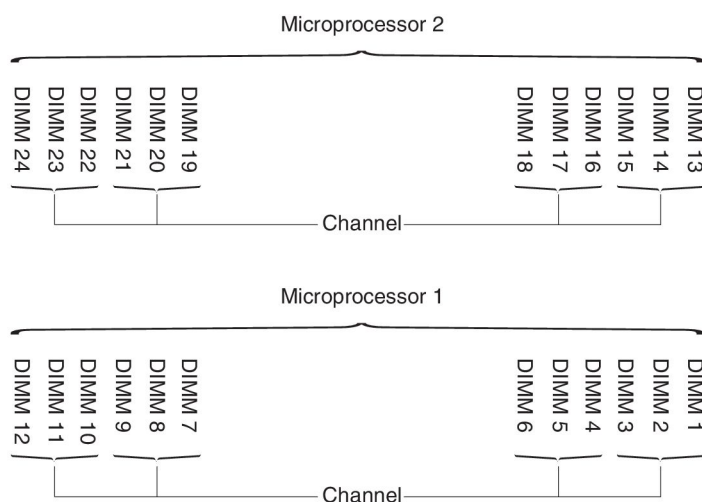
────────Channel────────

Figure 13. Connectors on each memory channel

Note: You can install DIMMs for microprocessor 2 as soon as you install microprocessor 2; you do not have to wait until all of the DIMM connectors for microprocessor 1 are filled.

The following table shows the installation sequence for memory mirrored mode:

Table 13. Memory mirrored channel mode DIMM population sequence

Number of DIMMs	Number of installed microprocessor	DIMM connector
First pair of DIMMs	1	1, 4
Second pair of DIMMs	1	9, 12
Third pair of DIMMs	1	2, 5
Fourth pair of DIMMs	1	8, 11
Fifth pair of DIMMs	1	7, 10
Sixth pair of DIMMs	1	3, 6
Seventh pair of DIMMs	2	13, 16
Eighth pair of DIMMs	2	21, 24
Ninth pair of DIMMs	2	14, 17

Table 13. Memory mirrored channel mode DIMM population sequence (continued)

Number of DIMMs	Number of installed microprocessor	DIMM connector
Tenth pair of DIMMs	2	20, 23
Eleventh pair of DIMMs	2	19, 22
Twelfth pair of DIMMs	2	15, 18
Note: DIMM connectors 3, 6, 7, 10, 15, 18, 19, and 22 are not used in memory mirrored mode when UDIMMs are installed in the server.		

When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

Memory rank sparing

Sparing enables a failing rank to be replaced by ranks installed in an unoccupied space. An unused spare rank on the channel can be used to copy the contents of a failing rank on that channel. You can enable rank sparing memory in the Setup utility, select **System Settings → Memory**. For more information, see "Using the Setup utility" on page 321.

The following diagram lists the DIMM connectors on each memory channel.
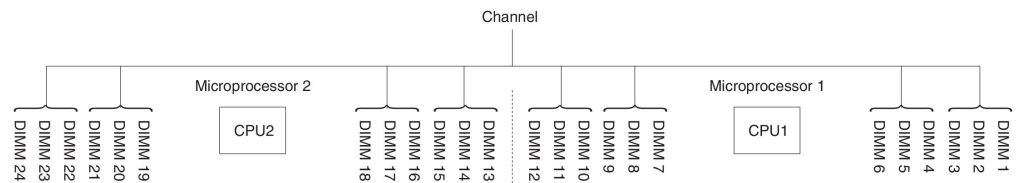
Figure 14. Connectors on each memory channel

You can install DIMMs for the microprocessor 2 once the microprocessor 2 is installed. You do not need to wait until all of the DIMM connectors for microprocessor 1 are filled. The following table shows the installation sequence for memory rank sparing mode:

Table 14. Memory rank sparing mode DIMM population sequence

Number of DIMMs	Number of installed microprocessor	DIMM connector
First pair of DIMMs	1	1, 2
Second pair of DIMMs	1	4, 5
Third pair of DIMMs	1	8, 9
Fourth pair of DIMMs	1	11, 12
Fifth pair of DIMMs	1	7, 10
Sixth pair of DIMMs	1	3, 6
Seventh pair of DIMMs	2	13, 14
Eighth pair of DIMMs	2	16, 17
Ninth pair of DIMMs	2	20, 21
Tenth pair of DIMMs	2	23, 24
Eleventh pair of DIMMs	2	19, 22

Table 14. Memory rank sparing mode DIMM population sequence (continued)

Number of DIMMs	Number of installed microprocessor	DIMM connector
Twelfth pair of DIMMs	2	15, 18
Note: DIMM connectors 3, 6, 7, 10, 15, 18, 19, and 22 are not used in memory rank sparing mode when UDIMMs are installed in the server.		

Installing a DIMM

To install a memory module, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle if installed (see "Removing the air baffle" on page 205).

6. Locate the DIMM connectors on the system board (see "System-board internal connectors" on page 16). Determine the connectors into which you will install the DIMMs.

7. Open the retaining clip on each end of the DIMM connector.

8. Touch the static-protective package containing the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.

9. Turn the DIMM so that the DIMM keys align correctly with the connector.

10. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.
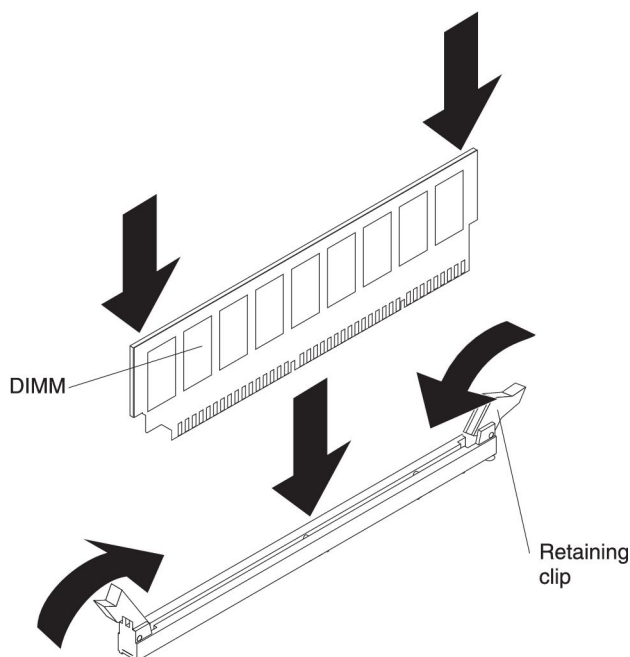
11. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

    Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

12. Reinstall the air baffle if it was removed before (see "Installing the air baffle" on page 207).
13. Reinstall and lock the left-side cover (see "Installing the left-side cover" on page 201).
14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a USB embedded hypervisor flash device

To remove a hypervisor flash device, complete the following steps:

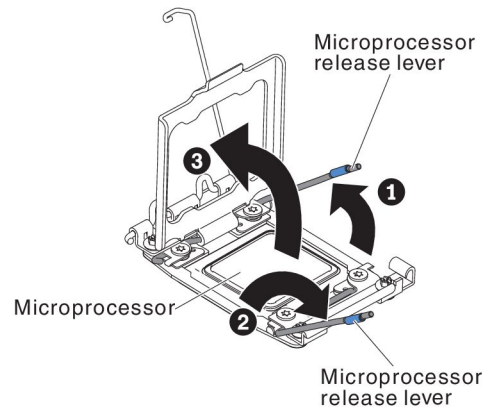1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
4. Unlock the retention latch by pushing it down toward the system board.
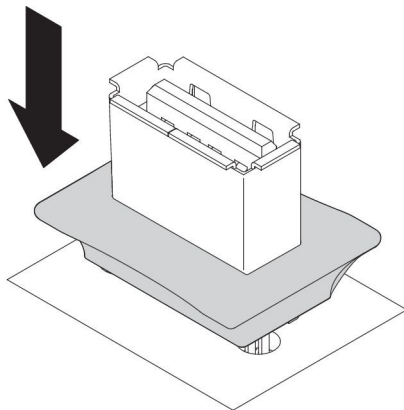
5. Grasp the flash device and pull to remove it from the connector.
6. Return the retention latch to the locked position by pulling it away from the system board.
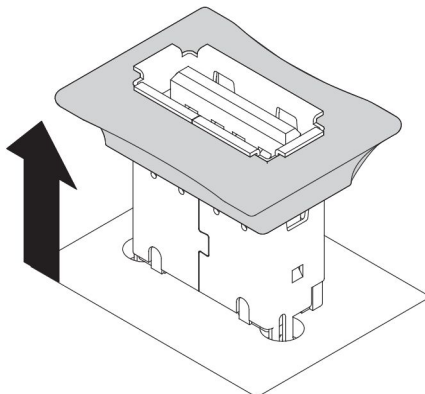
7. If you are instructed to return the flash device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a USB embedded hypervisor flash device

To install a hypervisor flash device, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 177.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
4. Unlock the retention latch by pushing it down toward the system board.
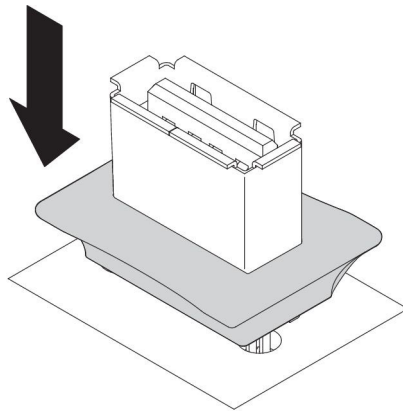
5. Align the flash device with the USB connector on the system board and push it into the USB connector until it is firmly seated.
6. Return the retention latch to the locked position by pulling it away from the system board.
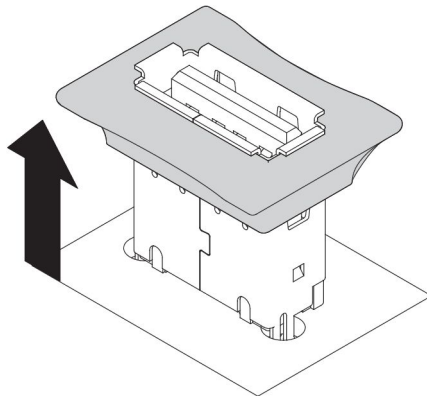
7. Reconnect the power cord and any cables that you removed.
8. Reinstall the left-side cover (see "Installing the left-side cover" on page 201).
9. Turn on the peripheral devices and the server.

Removing the fan cage assembly

To remove the fan cage assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove all long cards from the system board.

7. Disconnect the fan cage power cable from the system board (see "Internal cable routing and connectors" on page 183).

8. Loosen the thumb screw on the fan cage release latch.
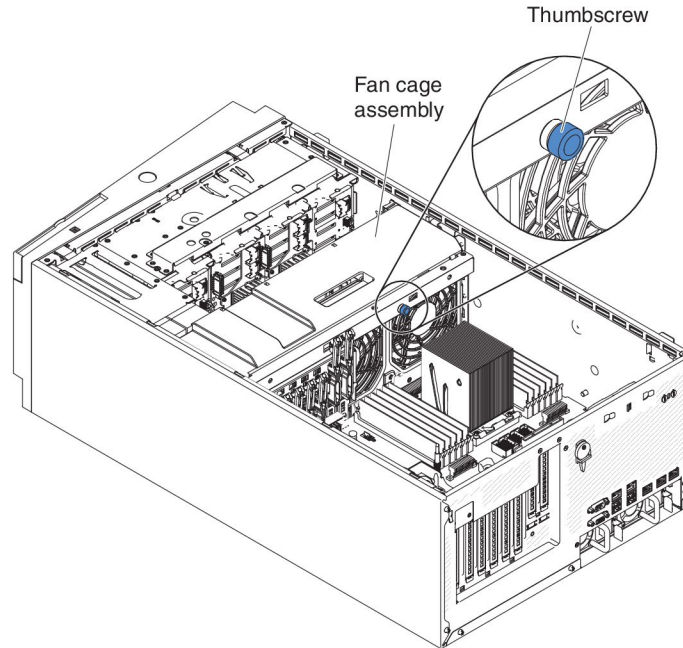
9. Rotate the fan cage release latch to the open position. The fan cage will lift up slightly when the release latch is fully open.

Thumbscrew
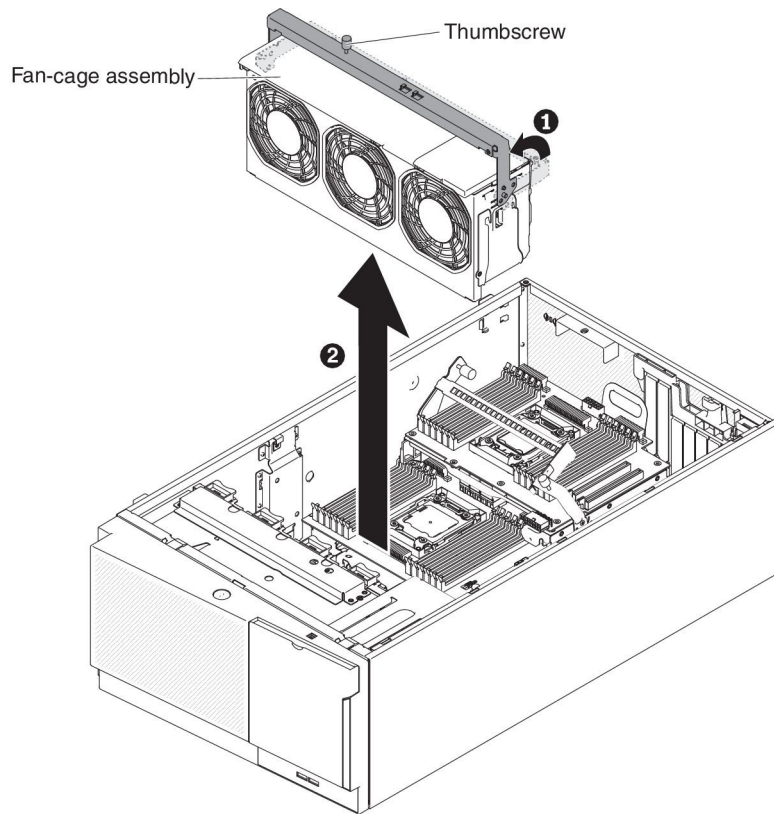
Fan-cage assembly

10. Grasp the fan cage assembly and lift it out of the server.

11. If you are instructed to return the fan cage assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the fan cage assembly

To install the fan cage assembly, complete the following steps.

Attention: Make sure that all wires and cables inside the server are routed correctly before you install the fan cage assembly. Wiring that is not properly routed might be damaged or might prevent the fan cage assembly from seating properly in the server.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Align the guides on the fan cage with the release latch to the open position on each side.

6. Push the fan cage assembly into the server.

   Note: Make sure that the fan cage is fully seated.

7. Rotate the fan cage release latch to the close position. The fan cage will be fully seated when it is secured.

Thumbscrew

Fan-cage assembly

8. Fasten the thumb screw on the fan cage release latch.
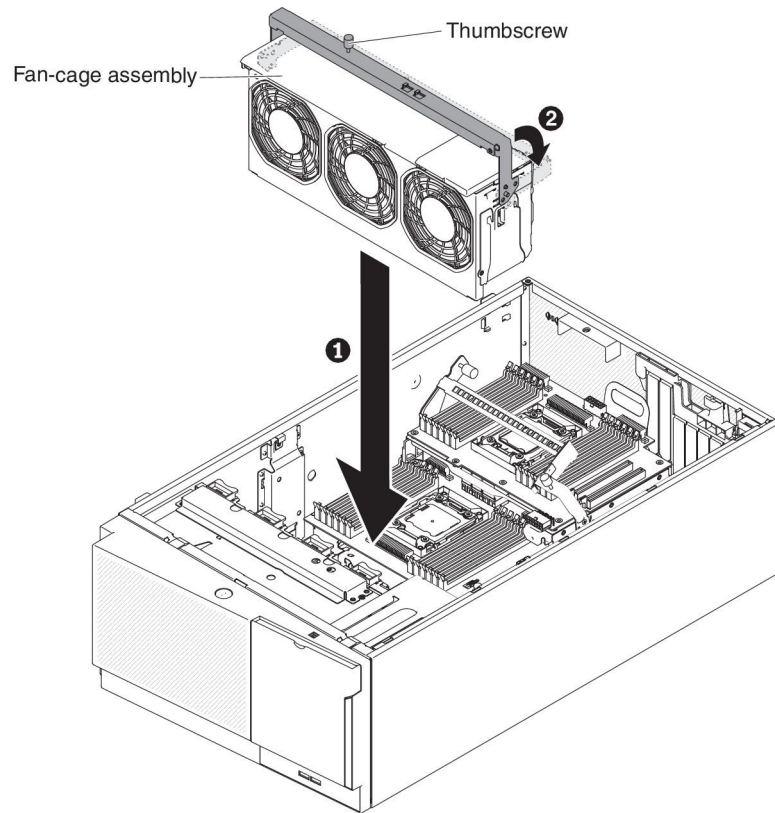
Thumbscrew
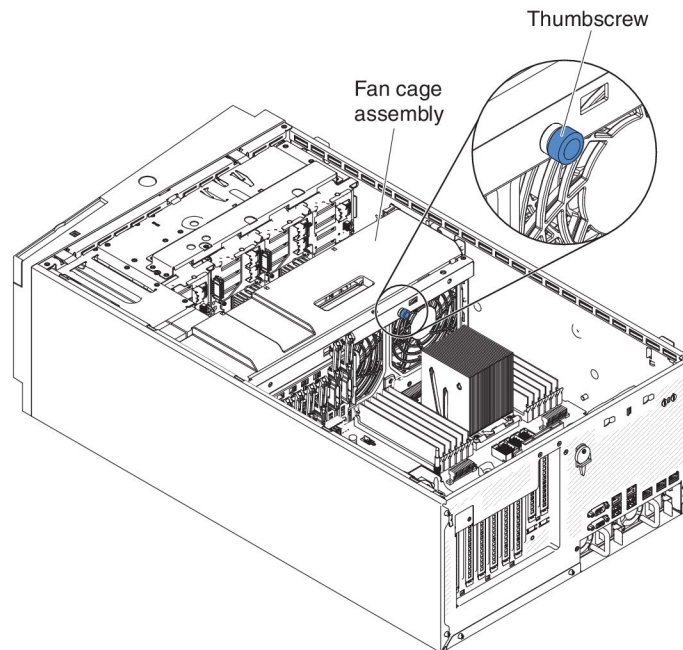
Fan cage assembly

9. Connect the fan cage assembly power cable to the system board (see "Internal cable routing and connectors" on page 183).
10. Install the air baffle (see "Installing the air baffle" on page 207).

11. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

12. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the left-side cover/power cut-off switch assembly

To remove the left-side cover/power cut-off switch assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the cable from the system board (see "Internal cable routing and connectors" on page 183).

6. Remove the screw that secures the power cut-off switch assembly from the chassis wall.
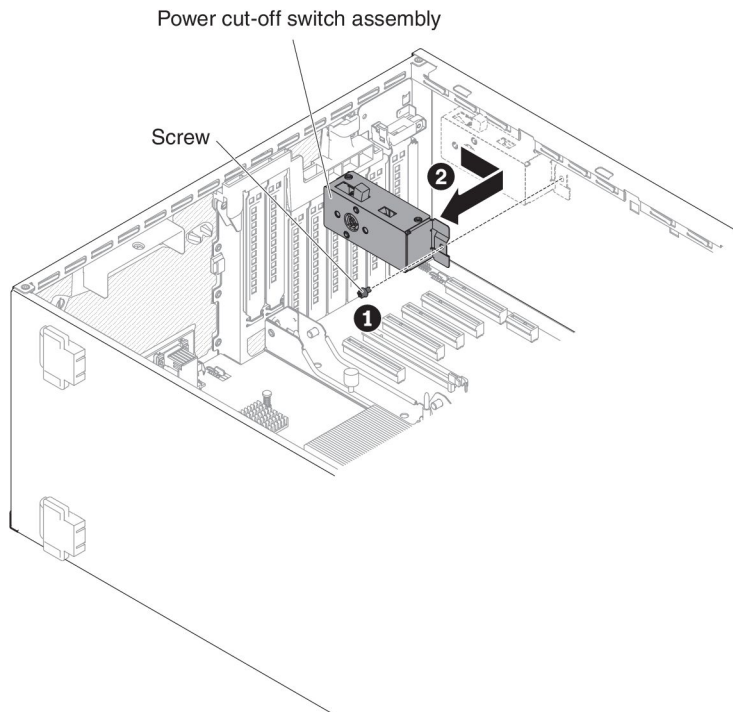
7. Pull the switch assembly toward the front of the server to release it from the server.

8. If you are instructed to return the power cut-off switch assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the left-side cover/power cut-off switch assembly

To install the left-side cover/power cut-off switch assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Touch the static-protective package that contains the power cut-off switch assembly to any unpainted metal surface on the server; then, remove the power cut-off switch assembly from the package.

6. Align the power cut-off switch assembly with the hole on the chassis wall and push the assembly toward the rear of the server.
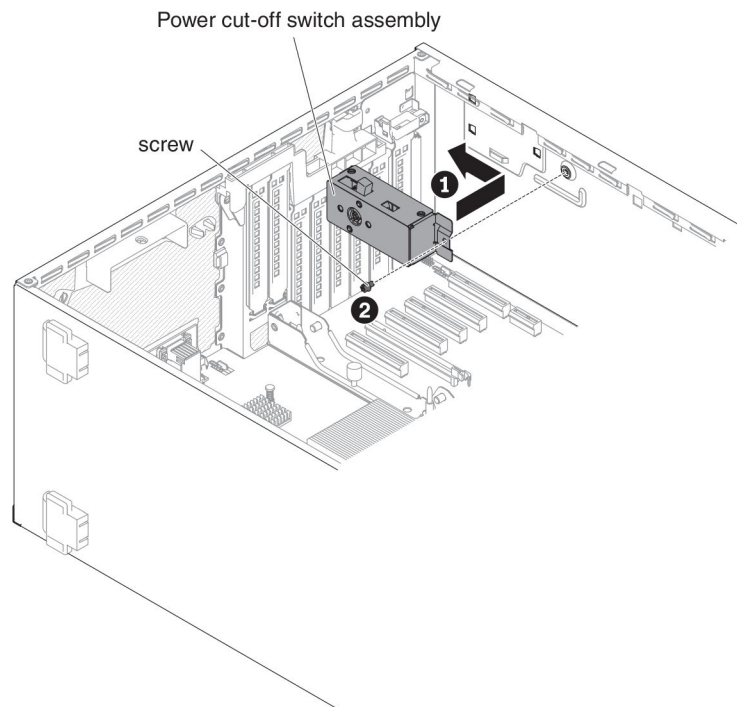
7. Install the screw that secures the power cut-off switch assembly on the chassis wall.

8. Connect the cable along the chassis to the system board (see "Internal cable routing and connectors" on page 183).

9. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing and replacing Tier 2 CRUs

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.

Removing the power paddle card

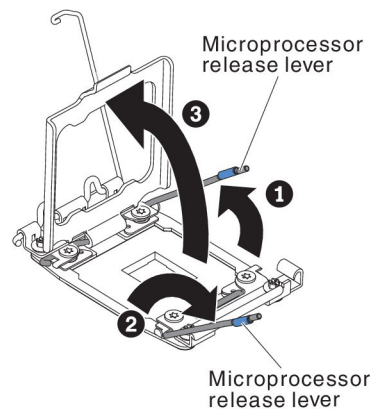To remove the power paddle card, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove all long cards from the system board.

7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

8. Disconnect all connected cables from the power paddle card cage assembly.

9. Remove the power supplies (see "Removing a hot-swap power supply" on page 266).

10. Rotate the power supply air baffle up.

Power supply air baffle
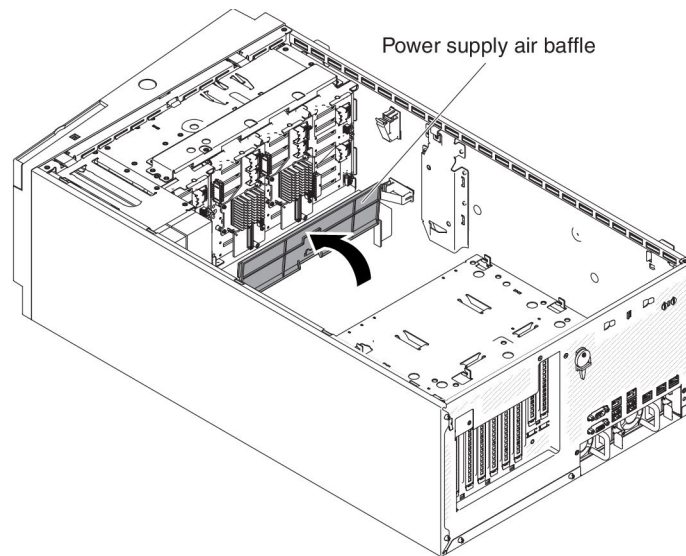
11. Grasp on the handle of paddle card cage assembly and pull it out of the server.
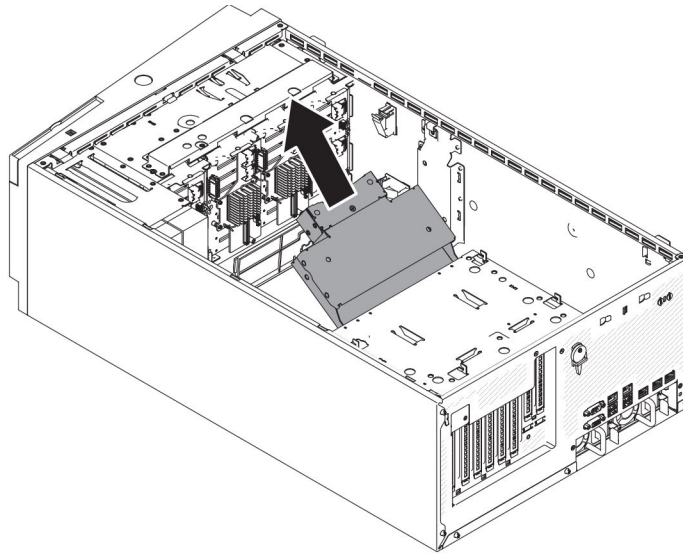
12. Loosen the screw to release the power paddle card top cover.
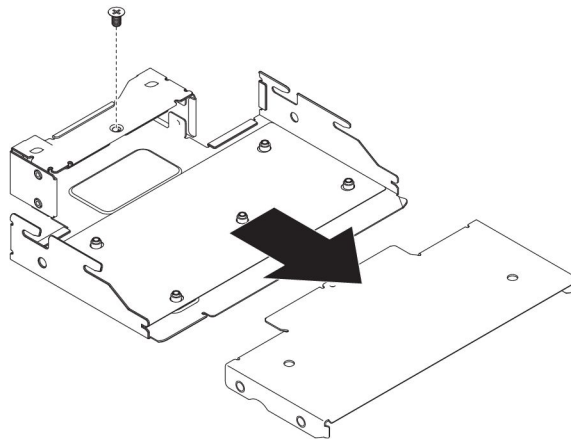
13. Loosen the five screws to release the power paddle card.
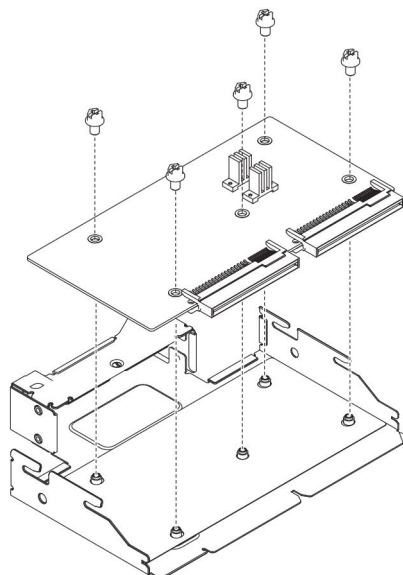
14. If you are instructed to return the power paddle card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the power paddle card

To install the power paddle card, complete the following steps.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Remove all long cards from the system board.
7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).
8. Align the power paddle card with the cage assembly. Then, fasten the five screws to secure the power paddle card.
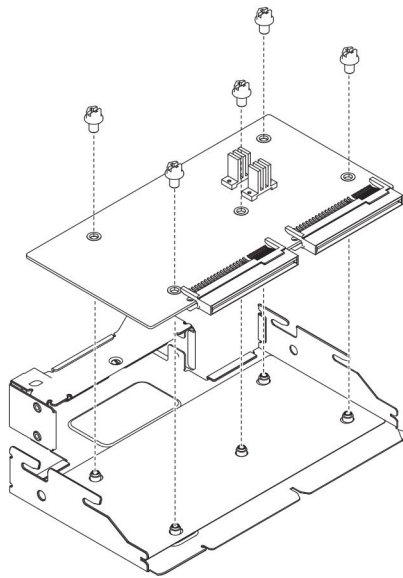
9. Align the power paddle card top cover with the cage assembly. Then, fasten the screw to secure the power paddle card top cover.

10. Rotate the power supply air baffle up.
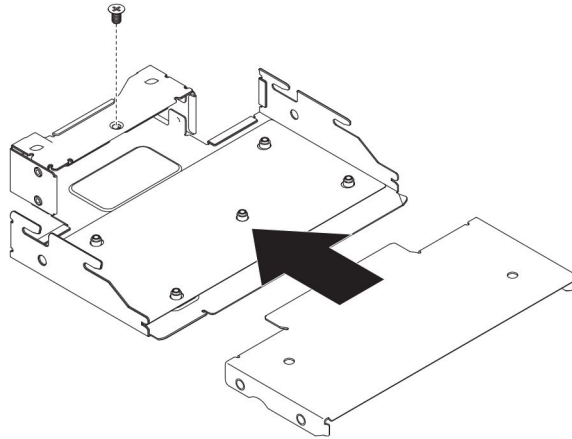
Power supply air baffle
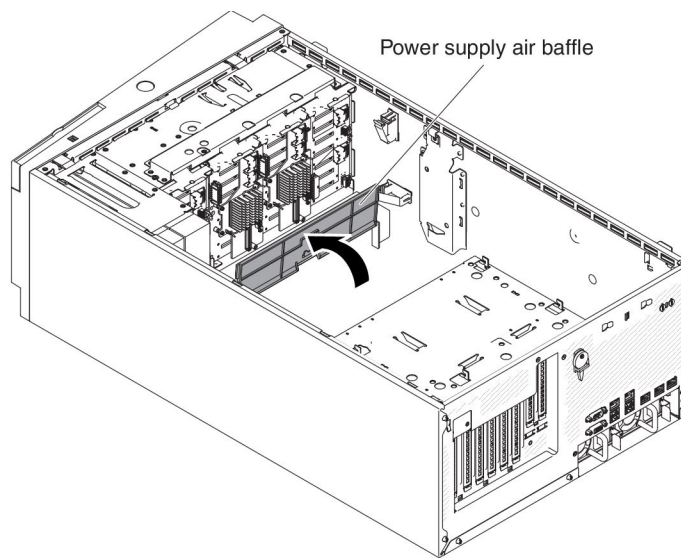
11. Push the power paddle card cage assembly into the server till it clicks into place.
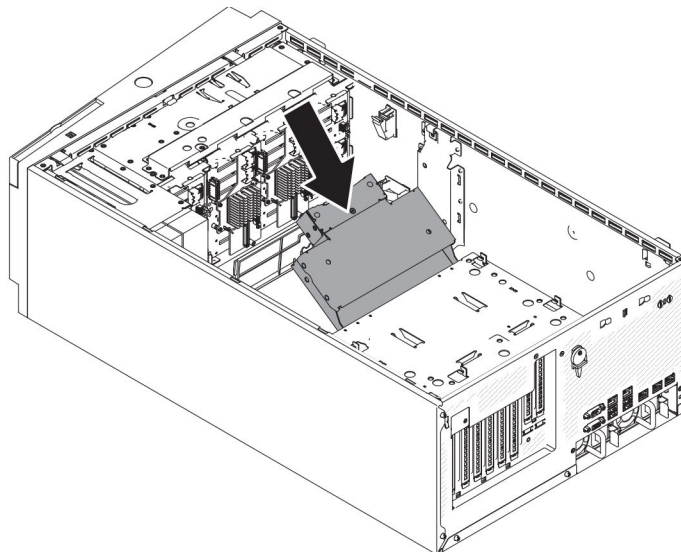
12. Reconnect the internal power cables to the power paddle card cage assembly.

13. Reinstall the fan cage assembly "Installing the fan cage assembly" on page 284.

14. Reinstall the power supplies (see "Installing a hot-swap power supply" on page 268).

15. Reinstall the air baffle (see "Installing the air baffle" on page 207)

16. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

17. Stand the server back up in its vertical position.

18. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a microprocessor and heat sink

- Microprocessors are to be removed only by trained technicians.

  Important: Always use the microprocessor installation tool to remove a microprocessor. Failing to use the microprocessor installation tool may damage the microprocessor sockets on the system board. Any damage to the microprocessor sockets may require replacing the system board.

- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.

- Dropping the microprocessor during installation or removal can damage the contacts.

- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

To remove a microprocessor, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the heat sink:

   Attention: Do not touch the thermal material on the bottom of the heat sink. Touching the thermal material will contaminate it. If the thermal material on the microprocessor or heat sink becomes contaminated, you must wipe off the contaminated thermal material on the microprocessor or heat sink with the alcohol wipes and reapply clean thermal grease to the heat sink.

   a. Open the heat sink retention module release lever to the fully open position.

   b. Lift the heat sink out of the server. After removal, place the heat sink (with the thermal grease side up) on a clean, flat surface.
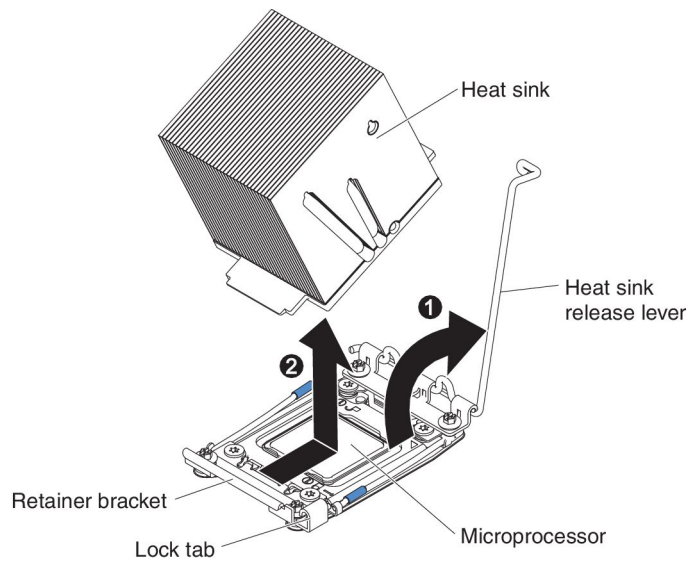
Heat sink

Heat sink
release lever

Retainer bracket

Lock tab

Microprocessor

7. Open the microprocessor socket release levers and retainer:

Microprocessor
release lever

Microprocessor

Microprocessor
release lever

a. Identify which release lever is labeled as the first release lever to open and open it.

b. Open the second release lever on the microprocessor socket.

c. Open the microprocessor retainer.

Attention: Do not touch the microprocessor contacts. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

8. Install the microprocessor on the microprocessor installation tool:

Note: If you are replacing a microprocessor, use the empty installation tool that comes with the new microprocessor to remove the microprocessor.

a. Twist the handle on the microprocessor tool counterclockwise so that it is in the open position.

Handle
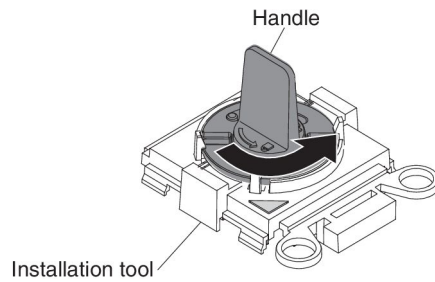
Installation tool

b. Align the installation tool with the alignment pins on the microprocessor socket and lower the tool on the microprocessor. The installation tool rests flush on the socket only if aligned correctly.

Installation tool

Microprocessor

Alignment pins
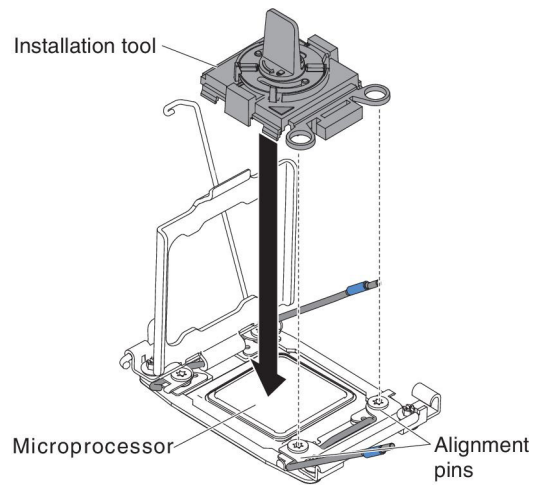
c. Twist the handle on the installation tool clockwise.

Handle

Installation tool
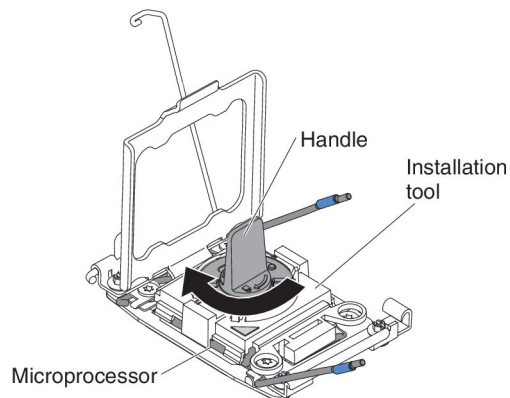
Microprocessor

d. Lift the microprocessor out of the socket.

Installation tool
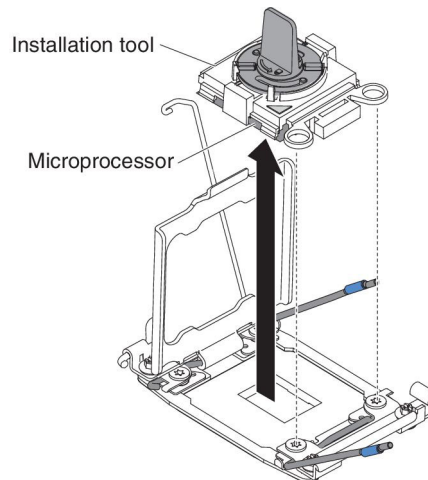
Microprocessor

9. If you do not intend to install a microprocessor on the socket, install the socket cover that you removed before on the microprocessor socket.

   Attention: The pins on the socket are fragile. Any damage to the pins may require replacing the system board.

10. If you are instructed to return the microprocessor, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a microprocessor and heat sink

The following notes describe the types of microprocessor that the server supports and other information that you must consider when you install a microprocessor:

- Microprocessors are to be installed only by trained technicians.

  Important: Always use the microprocessor installation tool to install a microprocessor. Failing to use the microprocessor installation tool may damage the microprocessor sockets on the system board. Any damage to the microprocessor sockets may require replacing the system board.

- The server supports certain Intel Xeon scalable multi-core microprocessors, which are designed for the LGA 2011 socket. These microprocessors are 64-bit dual-core or quad-core microprocessors with an integrated memory controller, quick-path interconnect, and shared last cache. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported microprocessors.

- Do not mix microprocessors with different cores in the same server.

- The server supports up to two microprocessors when the microprocessor 2 expansion board is installed.

  Note: Microprocessor 2 expansion board is supported when the second microprocessor is installed.

- When two microprocessors are installed, the air baffle and fan 2 must be installed to provide proper system cooling.

- When you install the second microprocessor, you must also install additional memory, the air baffle, and fan 2. See "Installing a memory module" on page 274 for details about the installation sequence.

- To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same QuickPath Interconnect (QPI) link speed, integrated memory controller frequency, core frequency, power segment, internal cache size, and type.

- Mixing microprocessors of different stepping levels within the same server model is supported.
- When mixing microprocessors with different stepping levels within the same server model, you do not have to install the microprocessor with lowest stepping level and features in microprocessor socket 1.
- Read the documentation that comes with the microprocessor to determine whether you have to update the server firmware. To download the latest level of server firmware and other code updates for the server, go to http://www.ibm.com/support/fixcentral/.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- To order additional microprocessor optional devices, contact your IBM marketing representative or authorized reseller.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink. For more information about applying or working with thermal grease, see "Thermal grease" on page 301.

  Note: Removing the heat sink from the microprocessor destroys the even distribution of the thermal grease and requires replacing the thermal grease.
- Do not remove the first microprocessor from the system board to install the second microprocessor.
- To order an additional optional microprocessor, contact your IBM marketing representative or authorized reseller.

To install a microprocessor, complete the following steps:
1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Rotate the heat sink retention module release lever to the open position.
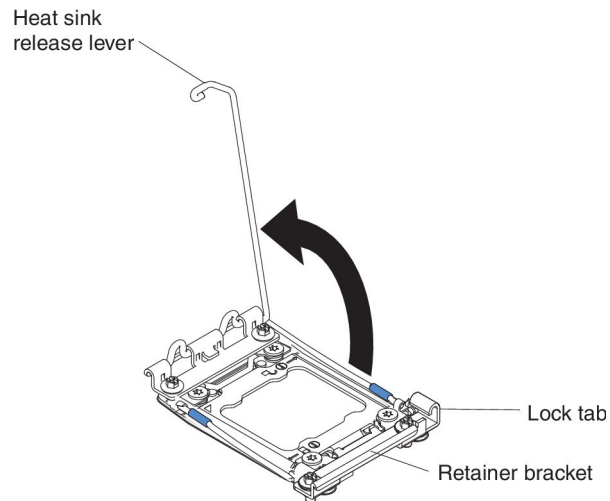
Heat sink
release lever

Lock tab

Retainer bracket

7. Open the microprocessor socket release levers and retainer:

Microprocessor
release lever

Microprocessor
release lever

a. Identify which release lever is labeled as the first release lever to open and open it.

b. Open the second release lever on the microprocessor socket.

c. Open the microprocessor retainer.

    Attention: Do not touch the connectors on the microprocessor and the microprocessor socket.

8. Install the microprocessor on the microprocessor socket:

a. Touch the static-protective package that contains the new microprocessor to any *unpainted* on the chassis or any *unpainted* metal surface on any other grounded rack component; then, carefully remove the microprocessor from the package.

b. Release the sides of the cover and remove the cover from the installation tool. The microprocessor is preinstalled on the installation tool.

Installation tool

Microprocessor

Cover
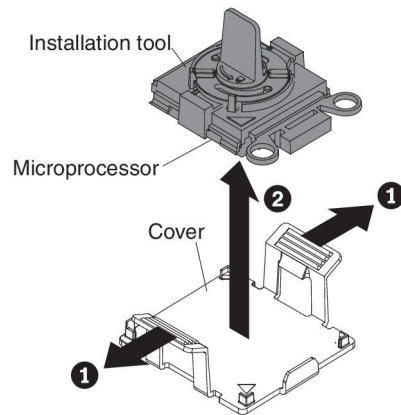
Note: Do not touch the microprocessor contacts. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

c. Align the installation tool with the microprocessor socket. The installation tool rests flush on the socket only if properly aligned.

Installation tool

Microprocessor

Alignment pins
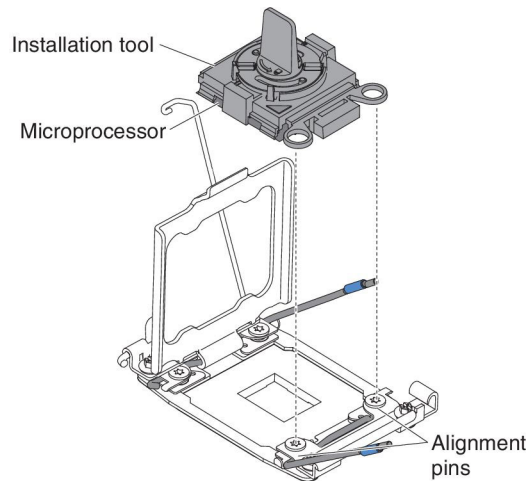
d. Twist the handle on the microprocessor tool counterclockwise to insert the microprocessor into the socket. The microprocessor is keyed to ensure that the microprocessor is installed correctly. The microprocessor rests flush on the socket only if properly installed.
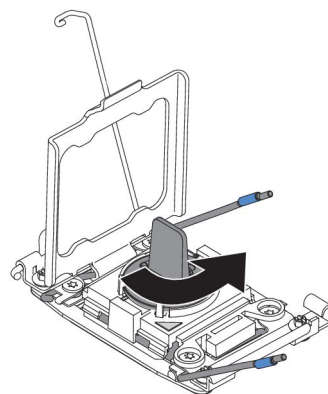
Attention:

• Do not press the microprocessor into the socket.

- Make sure that the microprocessor is oriented and aligned correctly in the socket before you try to close the microprocessor retainer.
- Do not touch the thermal material on the bottom of the heat sink or on top of the microprocessor. Touching the thermal material will contaminate it.

9. Remove the microprocessor socket dust cover, tape, or label from the surface of the microprocessor socket, if one is present. Store the socket cover in a safe place.
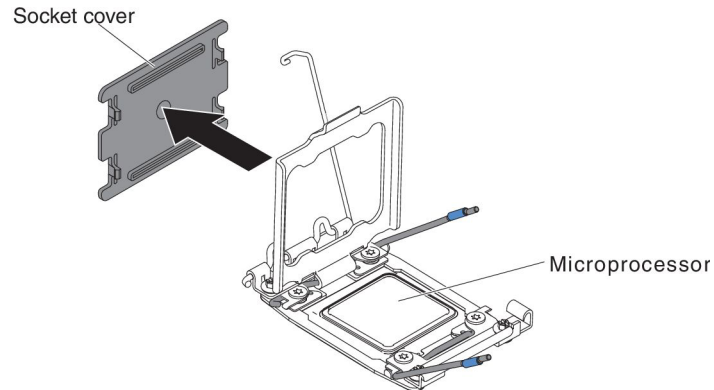
Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 179.

10. Close the microprocessor socket release levers and retainer:

   a. Close the microprocessor retainer on the microprocessor socket.

   b. Identify which release lever is labeled as the first release lever to close and close it.

   c. Close the second release lever on the microprocessor socket.
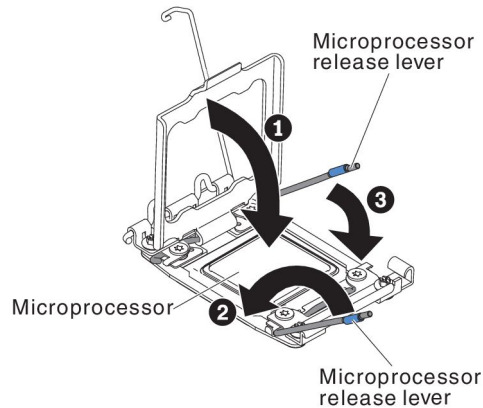
11. Install a heat sink:

Attention:

- Do not set down the heat sink after you remove the plastic cover.
- Do not touch the thermal grease on the bottom of the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it. See "Thermal grease" on page 301 for more information.
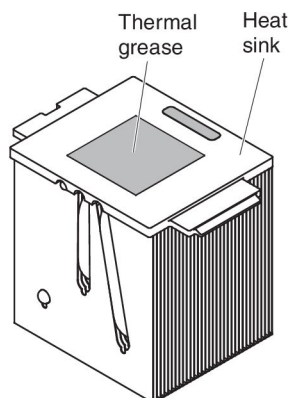
a. Remove the plastic protective cover from the bottom of the heat sink.

b. Position the heat sink over the microprocessor. The heat sink is keyed to assist with proper alignment.

c. Align and place the heat sink on top of the microprocessor in the retention bracket, thermal material side down.

d. Press firmly on the heat sink.

e. Rotate the heat sink retention module release lever to the closed position and hook it underneath the lock tab.
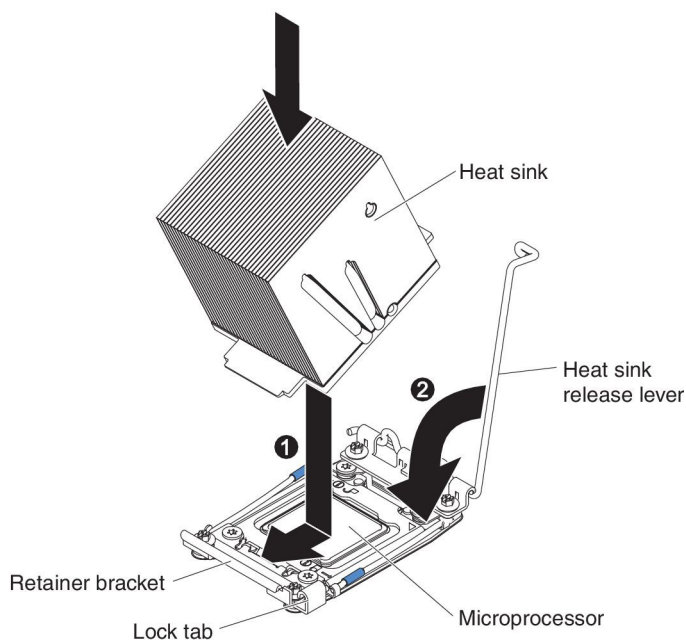
12. If you installed the second microprocessor, install the air baffle (see "Installing the air baffle" on page 207) and fan 2 (see "Installing a simple-swap fan" on page 245).

13. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Thermal grease

The thermal grease must be replaced whenever the heat sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

When you are installing the heat sink on the same microprocessor that it was removed from, make sure that the following requirements are met:

- The thermal grease on the heat sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the heat sink and microprocessor.

Notes:

- Read the safety information that begins on page vii.
- Read the "Installation guidelines" on page 177.
- Read "Handling static-sensitive devices" on page 179.

To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

1. Place the heat sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

   Note: Make sure that all of the thermal grease is removed.
4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.
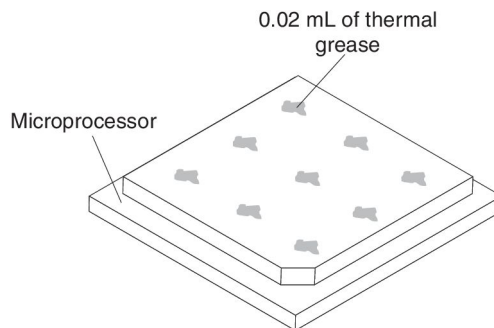
5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge. This is to ensure uniform distribution.

   Note: 0.01 mL is one tick mark on the syringe. If the grease is properly applied, approximately half (0.22 mL) of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in "Installing a microprocessor and heat sink" on page 295.

Removing the microprocessor 2 expansion board

To remove the microprocessor 2 expansion board, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   **Attention:** Do not allow the server to fall over.
4. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).
7. Note where the cables are connected to the microprocessor 2 expansion board; then, disconnect them.

   Attention: Disengage all latches, release tabs or locks on cable connectors when you disconnect all cables from the system board (see "Internal cable routing and connectors" on page 183 for more information). Failing to release them before removing the cables will damage the cable sockets on the microprocessor 2 expansion board. The cable sockets on the microprocessor 2 expansion board are fragile. Any damage to the cable sockets may require replacing the microprocessor 2 expansion board.
8. Remove any of the following components that are installed on the microprocessor 2 expansion board and put them in a safe, static-protective place:
   - Adapters (see "Removing an adapter" on page 229).
   - DIMMs (see "Removing a memory module" on page 273).
   - Microprocessors and heat sinks (see "Removing a microprocessor and heat sink" on page 292).

     Attention: Remove the socket cover from the microprocessor socket on the new microprocessor 2 expansion board and place it on the microprocessor socket of the microprocessor 2 expansion board you are removing.
9. Loosen the two thumb screws on the release lever and rotate the lever toward the back of the chassis till the stop point. The microprocessor 2 expansion board will lift up slightly when the release lever is fully open.

Thumbscrew

Thumbscrew
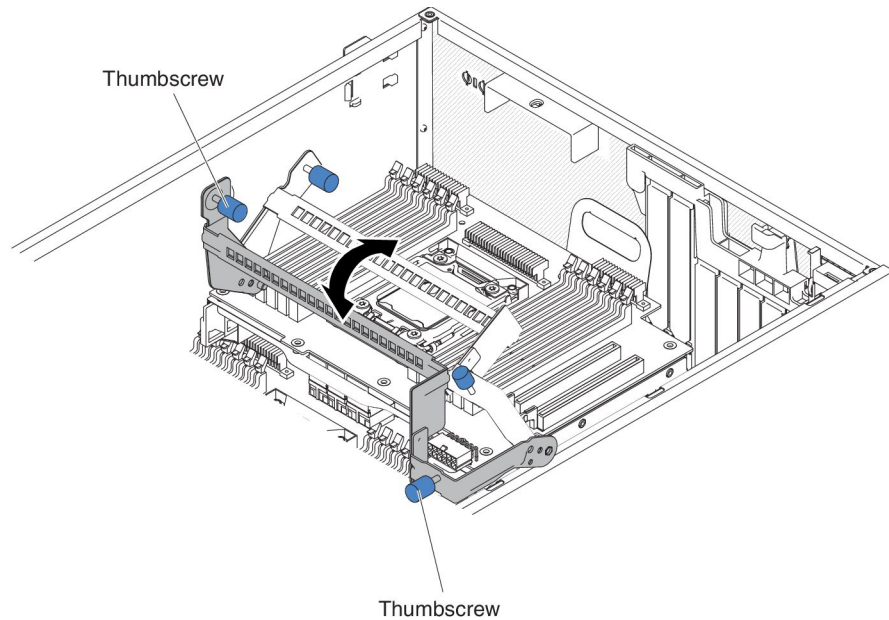
10. Grasp the release lever and the handle and carefully lift the microprocessor 2 expansion board out of the server.

Microprocessor 2 expansion board connector
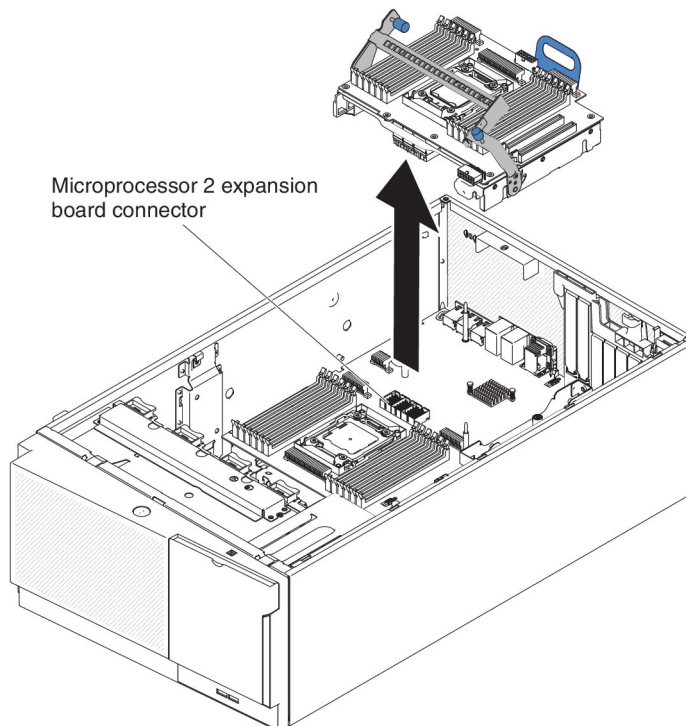
11. If you are instructed to return the microprocessor 2 expansion board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

   Attention: Make sure to place the socket cover for the microprocessor socket on the microprocessor 2 expansion board before returning the microprocessor 2 expansion board.

Installing the microprocessor 2 expansion board

To install the microprocessor 2 expansion board, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).
7. Touch the static-protective package that contains the microprocessor 2 expansion board to any unpainted metal surface on the server; then, remove the microprocessor 2 expansion board from the package.
8. Install the microprocessor 2 expansion board side bracket.
   a. Align the side bracket with the holes on the chassis and install the side bracket on the system board.
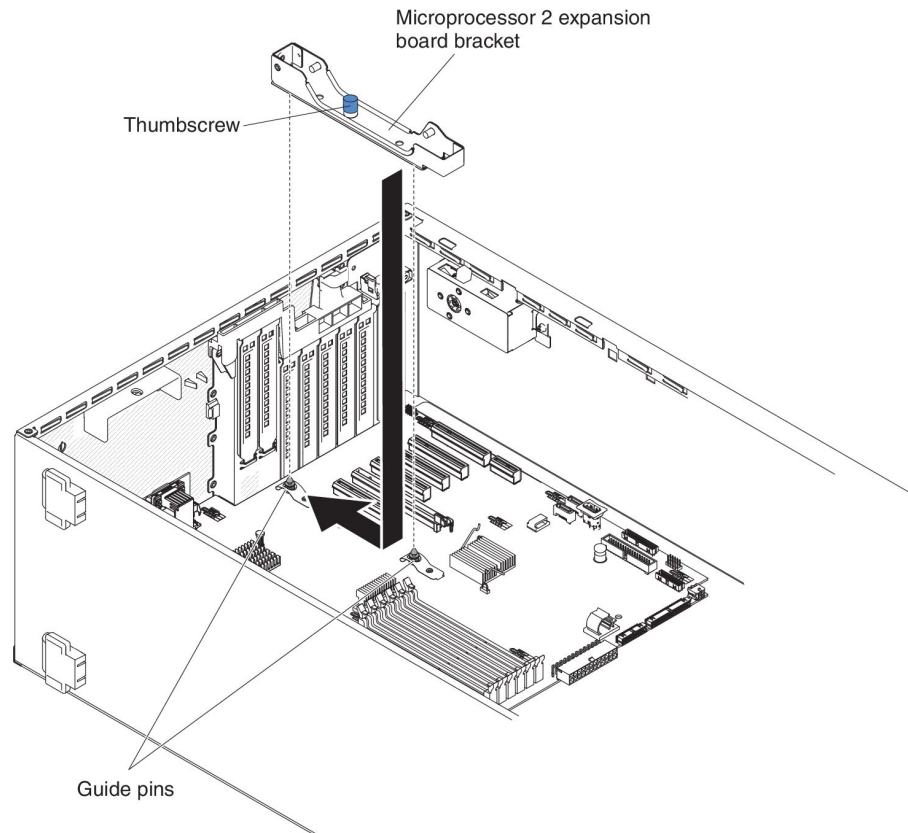
b. Slide the side bracket toward the rear of the server.
   c. Fasten the thumbscrew on the side bracket.
9. Install the two guide pins on the system board.

Guide pins
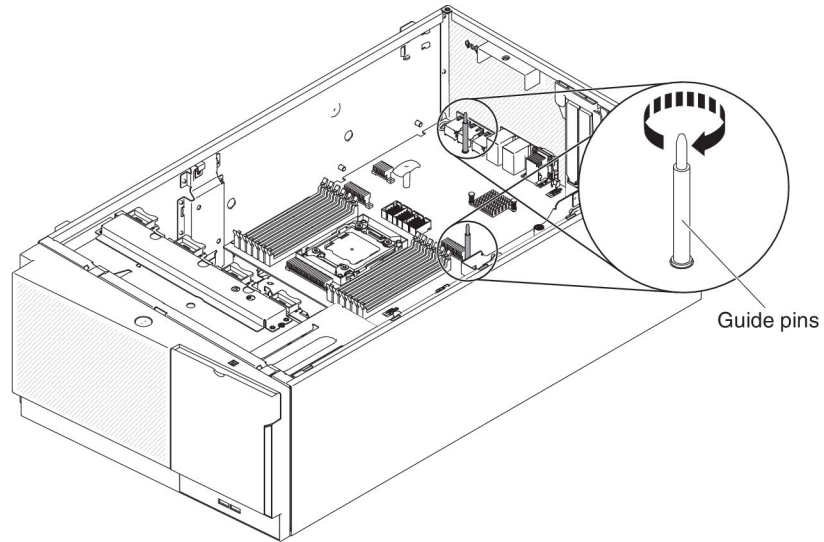
10. Remove the cover on the microprocessor 2 expansion board connector from the system board.

cover
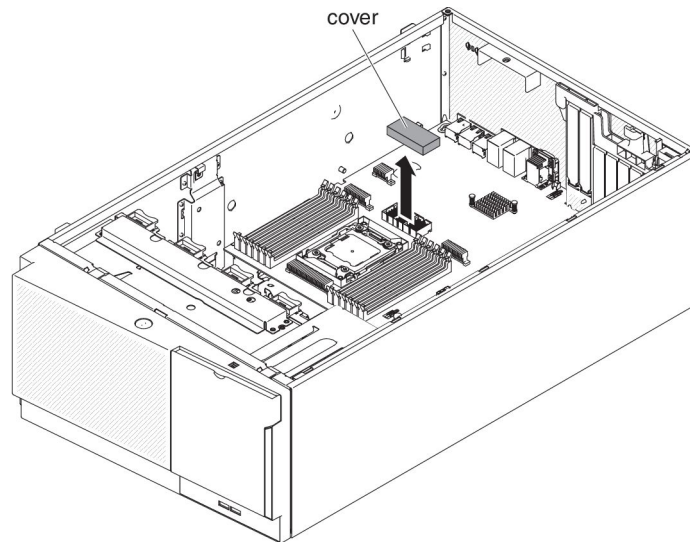
11. Make sure the microprocessor 2 expansion board release lever is in the open position.

Release lever
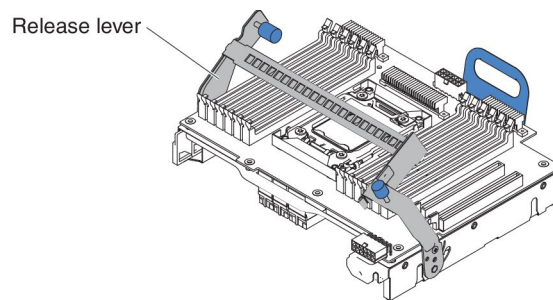
12. Align the microprocessor 2 expansion board to the guide pins on the bottom of the chassis and the side bracket.
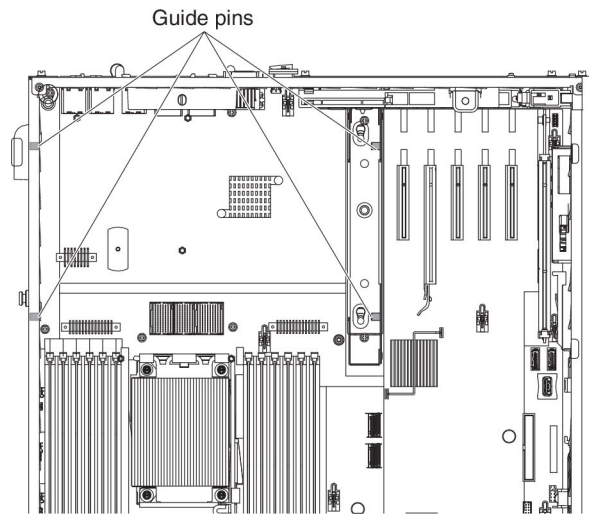
Guide pins

13. Align the holes on the microprocessor 2 expansion board to the guide pins on the system board. Install the microprocessor 2 expansion board on the system board.

Guide pins
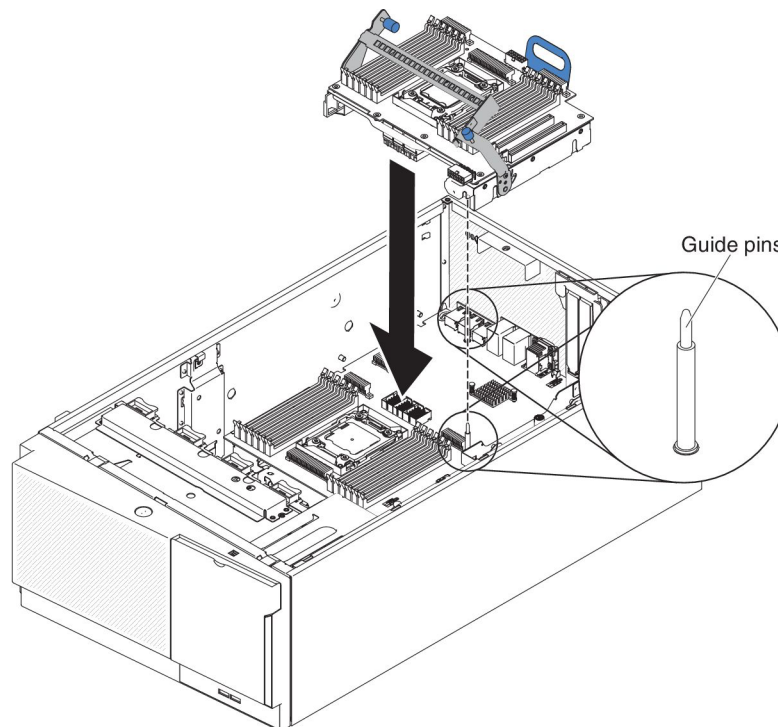
14. Press the microprocessor 2 expansion board firmly and horizontally to the system board.

Microprocessor 2 expansion
board connector
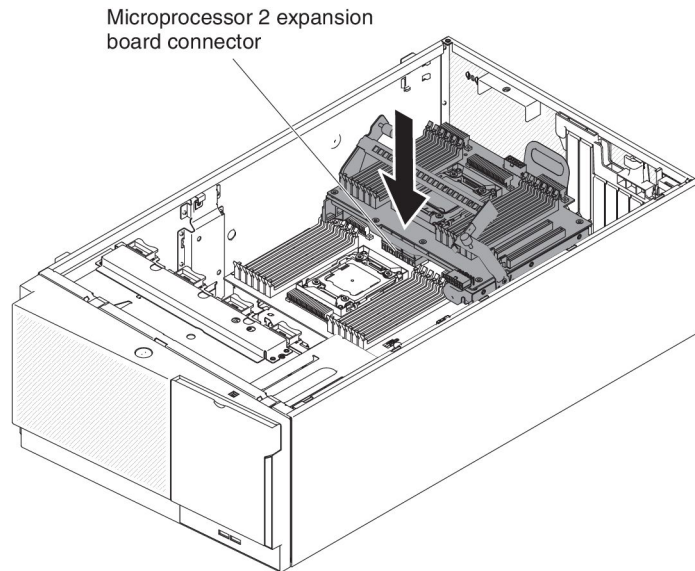
Notes:

a. Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

b. Make sure that none of the server cables are caught under the microprocessor 2 expansion board.

15. Rotate the release lever toward the front of the server to secure the microprocessor 2 expansion board in place.

Thumbscrew
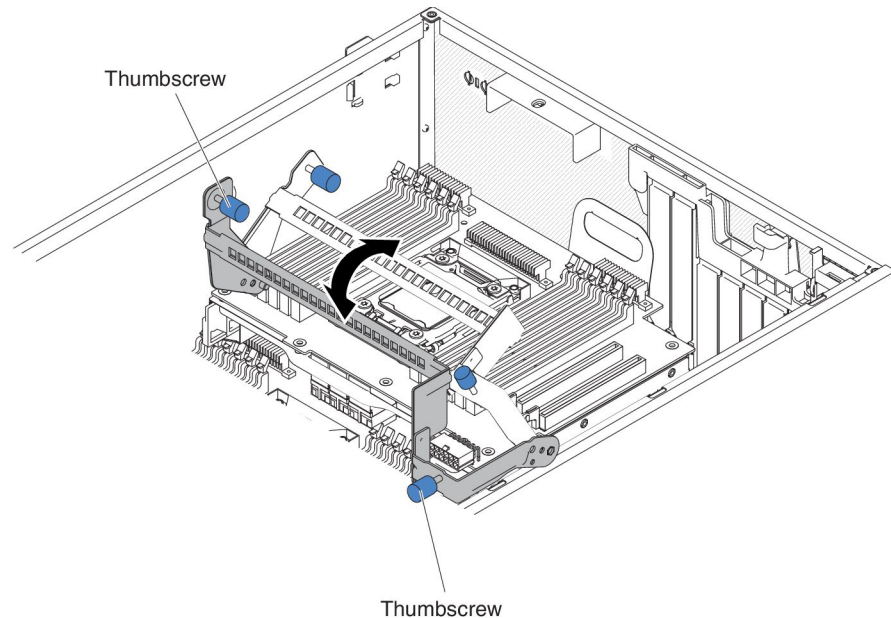
Thumbscrew

Note: Press the microprocessor 2 expansion board connector to make sure the connector is seated securely on the system board.

16. Fasten the two thumbscrews on the release lever.

17. Route the power cable to the microprocessor 2 expansion board power connector from the power paddle card.

Power cable
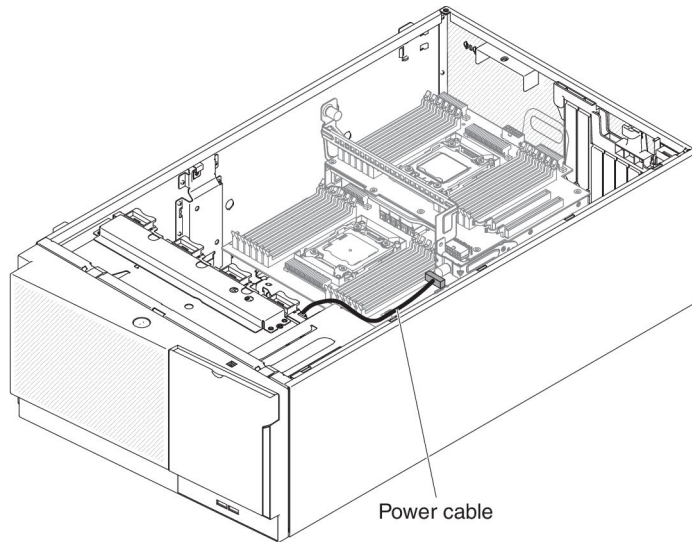
18. Install any of the following components that you removed from the microprocessor 2 expansion board:
    - Microprocessor and heat sink (see "Installing a microprocessor and heat sink" on page 295).
    - DIMMs (see "Installing a DIMM" on page 280).
    - Adapters (see "Installing an adapter" on page 231)

19. Reconnect any cable to the microprocessor 2 expansion board that you disconnected during removal (see "System-board internal connectors" on page 16 and "Internal cable routing and connectors" on page 183).

    Notes:
    a. Connect the power cable to the microprocessor 2 expansion board power connector from the power paddle card.
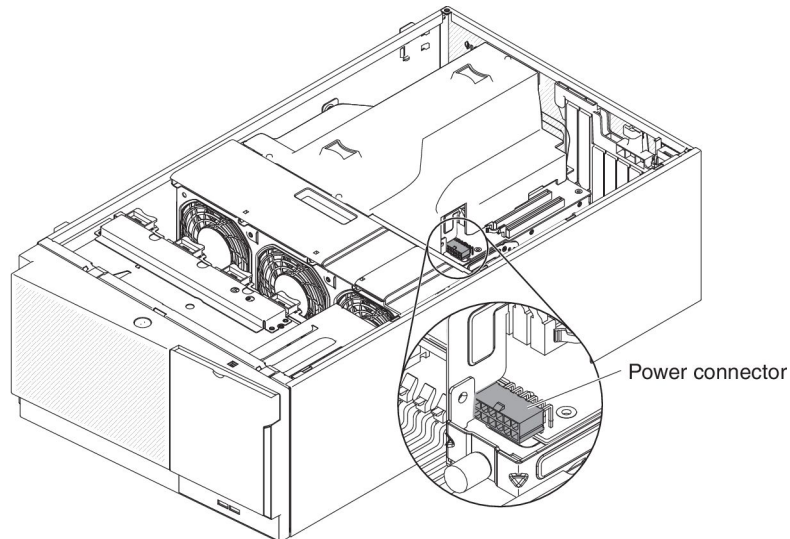
Power connector

    b. You might need to install the air baffle before connecting the power cable.
20. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).

21. Install the air baffle (see "Installing the air baffle" on page 207).
22. Install the power supplies (see "Installing a hot-swap power supply" on page 268).
23. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).
24. Stand the server back up in its vertical position.
25. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a heat-sink retention module

To remove a heat-sink retention module, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).
5. Remove the air baffle (see "Removing the air baffle" on page 205).
6. Remove the heat sink (see "Removing a microprocessor and heat sink" on page 292).

   Attention: When you remove a microprocessor and heat sink, be sure to keep each heat sink with its microprocessor for reinstallation.
7. Use a screwdriver and remove the four screws that secure the retention module to the system board; then, lift the retention module from the system board.

Heat-sink retention module
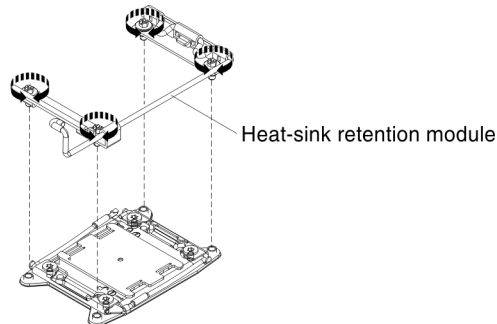
8. If you are instructed to return the heat-sink retention module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a heat-sink retention module

To install a heat-sink retention module, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

Attention: Do not allow the server to fall over.

4. Unlock and remove the left-side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Align the retention module with the holes on the system board.

7. Use a screwdriver to reinstall the four screws.

Heat-sink retention module
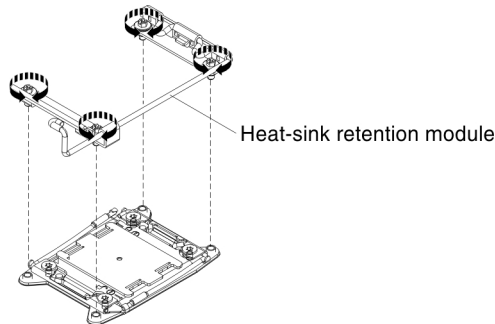
8. Reinstall the heat sink (see "Installing a microprocessor and heat sink" on page 295).

   Attention: Make sure that you install each heat sink with its paired microprocessor.

9. Reinstall the air baffle (see "Installing the air baffle" on page 207).

10. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the system board

To remove the system board, complete the following steps:

Notes:

1. Before you replace the system board, make sure that you backup any features on demand (FoD) keys that were enabled. Reactivate any Features on Demand features after replacing the system board. Instructions for automating the activation of features and installing activation keys is in the *IBM Features on Demand User's Guide*. To download the document, go to http://www.ibm.com/systems/x/fod/, log in, and click **Help**.

2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.

3. When you replace the system board, make sure that you remove the Integrated Management Module Advanced Upgrade and place it on the new system board. For information about the Advanced Upgrade, see "Using the remote presence capability and blue-screen capture" on page 331.

   Note: You have to reactivate the Features on Demand (FoD) after replacing the system board.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

Note: When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.

3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.

4. Unlock and remove the side cover (see "Removing the left-side cover" on page 201).

5. Remove the air baffle (see "Removing the air baffle" on page 205).

6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 282).

7. Note where the cables are connected to the system board; then, disconnect them.

   Attention: Disengage all latches, release tabs or locks on cable connectors when you disconnect all cables from the system board (see "Internal cable routing and connectors" on page 183 for more information). Failing to release them before removing the cables will damage the cable sockets on the system board. The cable sockets on the system board are fragile. Any damage to the cable sockets may require replacing the system board.

8. Remove any of the following components that are installed on the system board and put them in a safe, static-protective place:

   • Adapters (see "Removing an adapter" on page 229).

   • DIMMs (see "Removing a memory module" on page 273).

   • Microprocessors and heat sinks (see "Removing a microprocessor and heat sink" on page 292).

   Notes:

   a. Remove the socket covers from the microprocessor sockets on the new system board and place them on the microprocessor sockets of the system board you are removing.

   b. Do not allow the thermal grease to come in contact with anything, and keep each heat sink paired with its microprocessor for reinstallation. Contact with any surface can compromise the thermal grease and the microprocessor socket. A mismatch between the microprocessor and its original heat sink can require the installation of a new heat sink.

   • Microprocessor 2 expansion board (see "Removing the microprocessor 2 expansion board" on page 302).

   • Battery (see "Removing the system battery" on page 248).

   • Hypervisor (see "Removing a USB embedded hypervisor flash device" on page 281).

   • Remote RAID battery holder (see "Removing a RAID adapter battery holder" on page 207).

9. Pull the release pin up while holds the handle on the system board and slide the system board toward the front of the server to disengage the tab from the chassis; then, grasp the handles and carefully lift the system board out of the server.

Standoff

Handle

Release pin
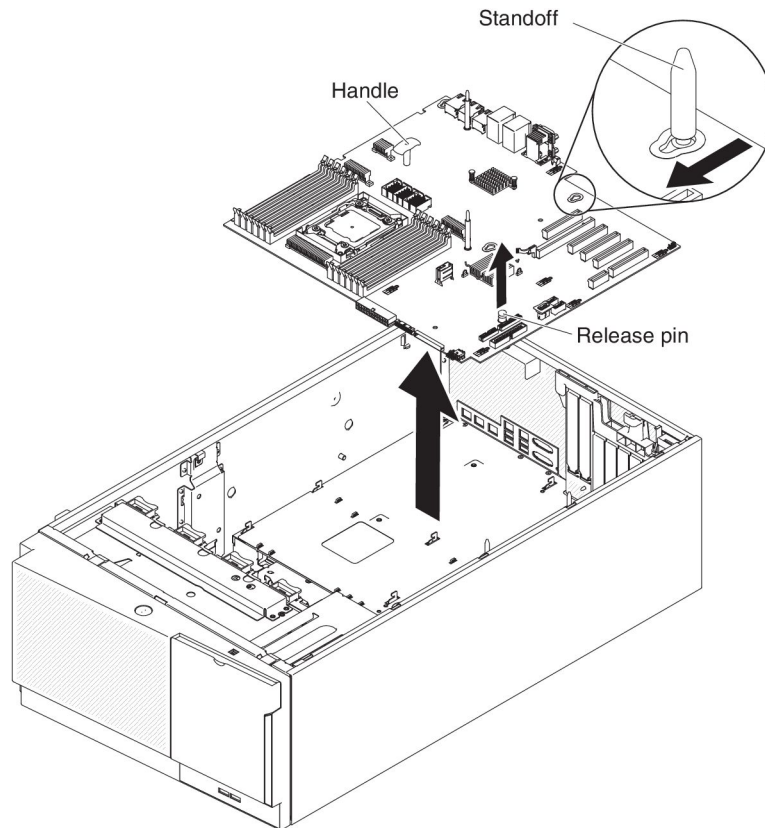
10. Remove the socket dust covers from the microprocessor sockets on the new system board and place them on the microprocessor sockets of the old system board that you are removing.

11. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

   Attention: Make sure to place the socket cover for the microprocessor socket on the system board before returning the system board.

Installing the system board

Notes:

1. When you reassemble the components in the server, be sure to route all cables carefully so that they are not exposed to excessive pressure.

2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware from a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed. See "Updating the firmware" on page 317, "Updating the Universal Unique Identifier (UUID)" on page 334, and "Updating the DMI/SMBIOS data" on page 337 for more information.

3. When you replace the system board, make sure that you remove the Integrated Management Module Advanced Upgrade and place it on the new system board. For information about the Advanced Upgrade, see "Using the remote presence capability and blue-screen capture" on page 331.

4. Reactivate any Features on Demand features after replacing the system board. Instructions for automating the activation of features and installing activation

keys is in the *IBM Features on Demand User's Guide*. To download the document, go to http://www.ibm.com/systems/x/fod/, log in, and click **Help**.

To install the system board, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 179.

2. Touch the static-protective package that contains the system board to any unpainted metal surface on the server; then, remove the system board from the package.

3. Align the guide pins on the chassis with the holes on the system board. Then, insert the system board.
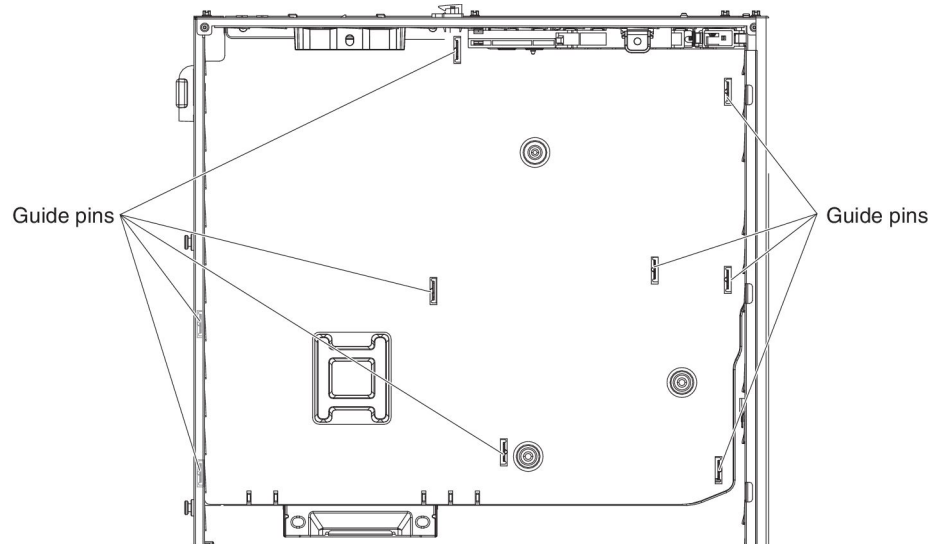
Note: Make sure that none of the server cables are caught under the system board.

4. Slightly pull up the release pin and slide the system board toward the rear of the server.

Standoff

Handle

Release pin
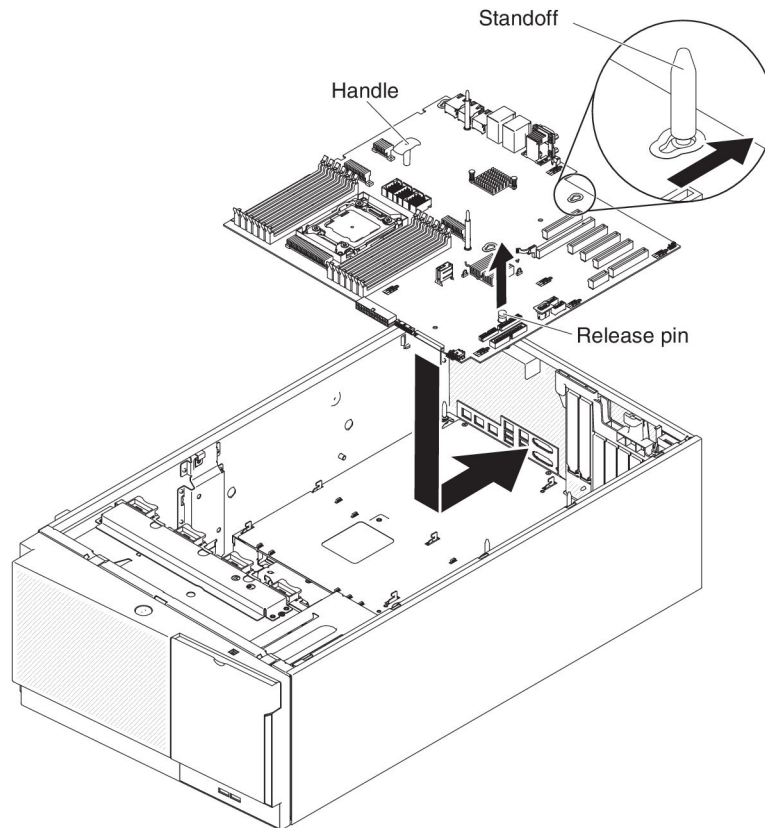
> **Note:** Make sure that none of the server cables are caught under the system board.

5. Install any of the following components that you removed from the system board:

   - Microprocessor 2 expansion board (see "Installing the microprocessor 2 expansion board" on page 303).
   - Microprocessors and heat sinks (see "Installing a microprocessor and heat sink" on page 295).
   - DIMMs (see "Installing a DIMM" on page 280).
   - Adapters (see "Installing an adapter" on page 231)
   - Battery (see "Installing the system battery" on page 249).
   - Hypervisor (see "Installing a USB embedded hypervisor flash device" on page 282).

6. Reconnect any cables to the system board that you disconnected during removal (see "System-board internal connectors" on page 16 and "Internal cable routing and connectors" on page 183).

7. Install the fan cage assembly (see "Installing the fan cage assembly" on page 284).

8. Install the air baffle (see "Installing the air baffle" on page 207).

9. Install the power supplies (see "Installing a hot-swap power supply" on page 268).

10. Install and lock the left-side cover (see "Installing the left-side cover" on page 201).

11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

12. Start the Setup utility and reset the configuration.
    - Set the system date and time.
    - Set the power-on password.
    - Reconfigure the server.

    See "Using the Setup utility" on page 321 for details.
13. Either update the server with the latest RAID firmware or restore the pre-existing firmware from a diskette or CD image.
14. Update the UUID (see "Updating the Universal Unique Identifier (UUID)" on page 334).
15. Update the DMI/SMBIOS (see "Updating the DMI/SMBIOS data" on page 337).
16. Reactivate any Features on Demand features.

Chapter 6. Configuration information and instructions

This chapter provides information about updating the firmware and using the configuration utilities.

Updating the firmware

Attention:

1. Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

2. Before you update the firmware, be sure to back up any data that is stored in the Trusted Platform Module (TPM), in case any of the TPM characteristics are changed by the new firmware. For instructions, see your encryption software documentation.

You can install code updates that are packaged as an Update*Xpress* System Pack or Update*Xpress* CD image. An Update*Xpress* System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server. Use Update*Xpress* System Pack Installer to acquire and apply Update*Xpress* System Packs and individual firmware and device-driver updates. For additional information and to download the Update*Xpress* System Pack Installer, go to the ToolsCenter for System x and BladeCenter at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp and click **UpdateXpress System Pack Installer**.

When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

Be sure to separately install any listed critical updates that have release dates that are later than the release date of the Update*Xpress* System Pack or Update*Xpress* image.

The firmware for the server is periodically updated and is available for download from the IBM website. To check for the latest level of firmware, such as UEFI firmware, vital product data (VPD) code, device drivers, and integrated management module firmware, go to http://www.ibm.com/support/fixcentral/ .

Attention: Before you update the firmware, be sure to back up any data that is stored in the Trusted Platform Module (TPM), in case any of the TPM characteristics are changed by the new firmware. For instructions, see your encryption software documentation.

Download the latest firmware for the server; then, install the firmware, using the instructions that are included with the downloaded files.

When you replace a device in the server, you might have to either update the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

- UEFI firmware is stored in ROM on the system board.
- IMM2 firmware is stored in ROM on the IMM2 on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the ServeRAID adapter.

- SATA firmware is stored in ROM on the integrated SATA controller.
- SAS/SATA firmware is stored in ROM on the SAS/SATA controller on the system board.

Configuring the server

The *ServerGuide* program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features, such as an integrated SAS/SATA controller with RAID capabilities, and to simplify the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 320.

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:

- **Setup utility**

  The Setup utility (formerly called the Configuration/Setup Utility program) is part of the IBM System x Server Firmware. Use it to change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see "Using the Setup utility" on page 321.

- **Boot Manager program**

  The Boot Manager program is part of the server firmware. Use it to override the startup sequence that is set in the Setup utility and temporarily assign a device to be first in the startup sequence. For more information about using this program, see "Using the Boot Manager" on page 327.

- **IBM *ServerGuide Setup and Installation* CD**

  The ServerGuide program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features, such as an integrated SAS adapter with RAID capabilities, and to simplify the installation of your operating system. For information about obtaining and using this CD, see "Using the ServerGuide Setup and Installation CD" on page 320.

- **Integrated management module 2**

  Use the Integrated management module II (IMM2) for configuration, to update the firmware and sensor data record (SDR) data, and to remotely manage a network. For information about using the IMM2, see "Using the Integrated Management Module II" on page 328.

- **Remote presence capability and blue-screen capture**

  The remote presence and blue-screen capture feature are integrated into the Integrated Management Module II (IMM2). The Integrated Management Module Advanced Upgrade is required to enable the remote presence functions. When the optional Integrated Management Module Advanced Upgrade is installed in the server, it activates the remote presence functions. Without the Integrated Management Module Advanced Upgrade, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you will still be able to access the web interface without the Integrated Management Module Advanced Upgrade. You can order the optional IBM Integrated Management Module Advanced Upgrade, if one did not come with your server. For more information about how to enable the remote presence function, see "Using the remote presence capability and blue-screen capture" on page 331.

- **VMware ESXi embedded hypervisor**

The VMware ESXi embedded hypervisor is available on the server models that come with an installed USB embedded hypervisor flash device. The USB flash device is installed in the USB connector on the system board. Hypervisor is virtualization software that enables multiple operating systems to run on a host system at the same time. For more information about using the embedded hypervisor, see "Using the embedded hypervisor" on page 331.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see "Configuring the Ethernet controller" on page 332.

- **IBM Advanced Settings Utility (ASU) program**

  Use this program as an alternative to the Setup utility for modifying UEFI settings and IMM2 settings. Use the ASU program online or out-of-band to modify UEFI settings from the command line without the need to restart the server to access the Setup utility. For more information about using this program, see "IBM Advanced Settings Utility" on page 333.

- **LSI Configuration Utility**

  Use the LSI Configuration Utility program to configure the integrated SAS/SATA controller with RAID capabilities and the devices that are attached to it. For information about using this program, see "Configuring RAID arrays" on page 333.

  The following table lists the server configurations and the applications that are available for configuring and managing RAID arrays.

Table 15. Server configuration and applications for configuring and managing RAID arrays

Server configuration	RAID array configuration (before operating system is installed)	RAID array management (after operating system is installed)
ServeRAID-M1115 adapter	MegaRAID BIOS Configuration Utility (press Ctrl+H to start), pre-boot CLI (press Ctrl+P to start), ServerGuide, HII	MegaRAID Storage Manager (MSM), MegaCLI (Command Line Interface), and IBM Director
ServeRAID-M5110 adapter	MegaRAID BIOS Configuration Utility (press Ctrl+H to start), pre-boot CLI (press Ctrl+P to start), ServerGuide, HII	MegaRAID Storage Manager (MSM), MegaCLI, and IBM Director
ServeRAID-M5120 adapter	MegaRAID BIOS Configuration Utility (press Ctrl+H to start), pre-boot CLI (press Ctrl+P to start), ServerGuide, HII	MegaRAID Storage Manager (MSM), MegaCLI, and IBM Director

Notes:

1. For more information about the Human Interface Infrastructure (HII) and SAS2IRCU, go to http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5088601.

2. For more information about the MegaRAID, go to http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5073015.

Note: Do not install the ServeRAID M5120 SAS/SATA adapter in slot 4, 7, and 8 for proper cooling.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD contains a setup and installation program that is designed for your server. The ServerGuide program detects the server model and optional hardware devices that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

You can download a free image of the *ServerGuide Setup and Installation* CD or purchase the CD from the ServerGuide fulfillment website at http://www.ibm.com/support/entry/portal/docdisplay?Indocid=SERV-GUIDE. To download the free image, click **IBM Service and Support Site**.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

The ServerGuide program has the following features:
- An easy-to-use interface
- Diskette-free setup, and configuration programs that are based on detected hardware
- ServeRAID Manager program, which configures your ServeRAID adapter or integrated SCSI controller with RAID capabilities
- Device drivers that are provided for the server model and detected hardware
- Operating-system partition size and file-system type that are selectable during setup

ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your operating-system CD to install the operating system.

The ServerGuide program performs the following tasks:
- Sets system date and time
- Detects the RAID adapter or controller and runs the SAS RAID configuration program (with LSI chip sets for ServeRAID adapters only)
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- Detects installed optional hardware devices and provides updated device drivers for most adapters and devices
- Provides diskette-free installation for supported Windows operating systems
- Includes an online readme file with links to tips for hardware and operating-system installation

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up your server model.

On a server with a ServeRAID adapter or SAS/SATA controller with RAID capabilities, you can run the SAS/SATA RAID configuration program to create logical drives.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

Typical operating-system installation

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive adapters, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.
4. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

Installing your operating system without using ServerGuide

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM website.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. From the menu on the left side of the page, click **System x support search**.
4. From the **Task** menu, select **Install**.
5. From the **Product family** menu, select **System x3500 M4**.
6. From the **Operating system** menu, select your operating system, and then click **Search** to display the available installation documents.

Using the Setup utility

Use the Setup utility, formerly called the Configuration/Setup Utility program, to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features

- View, set, and change settings for power-management features
- View and clear error logs
- Resolve configuration conflicts

Starting the Setup utility

To start the Setup utility, complete the following steps:

1. Turn on the server.

   Note: Approximately 20 seconds after the server is connected to AC power, the power-control button becomes active.

2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.

3. Select the settings to view or change.

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Setup utility menu choices

The following choices are on the Setup utility main menu. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  This choice is on the full Setup utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other choices in the Setup utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  – **Product Data**

    Select this choice to view the system board identifier, the revision level or issue date of the firmware, the integrated management module 2 and diagnostics code, and the version and date.

- **System Settings**

  Select this choice to view or change the server component settings.

  – **Processors**

    Select this choice to view or change the processor settings.

  – **Memory**

    Select this choice to view or change the memory settings. To configure memory mirrored, select **System Settings ⟶ Memory**, and then select **Memory Channel Mode ⟶ Mirroring**.

  – **Devices and I/O Ports**

    Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports; configure remote console redirection; enable or disable integrated Ethernet controllers, the SAS/SATA

adapter, SATA optical drive channels, and PCI slots. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

– **Power**

Select this choice to view or change power capping to control consumption, processors, and performance states.

– **Legacy Support**

Select this choice to view or set legacy support.

- **Force Legacy Video on Boot**

Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

- **Rehook INT 19h**

Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

- **Legacy Thunk Support**

Select this choice to enable or disable the UEFI to interact with PCI mass storage devices that are not UEFI-compliant.

– **Integrated Management Module II (IMM2)**

Select this choice to view or change the settings for the Integrated Management Module II (IMM2).

- **POST Watchdog Timer**

Select this choice to view or enable the POST watchdog timer.

- **POST Watchdog Timer Value**

Select this choice to view or set the POST loader watchdog timer value.

- **Reboot System on NMI**

Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Enabled** is the default.

- **Commands on USB Interface Preference**

Select this choice to enable or disable the Ethernet over USB interface on IMM2.

- **Network Configuration**

Select this choice to view the system management network interface port, the IMM2 MAC address, the current IMM2 IP address, and host name; define the static IMM2 IP address, subnet mask, and gateway address; specify whether to use the static IP address or have DHCP assign the IMM2 IP address; and save the network changes.

- **Reset IMM2 to Defaults**

Select this choice to view or reset IMM2 to the default settings.

– **Adapters and UEFI Drivers**

Select this choice to view information about the adapters and drivers in the server that are compliant with EFI 1.10 and UEFI 2.0.

• **Network**

Select this choice to view or configure the network options, such as the iSCSI, PXE, and network devices. There might be additional configuration choices for optional network devices that are compliant with UEFI 2.1 and later.

• **Date and Time**

Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

This choice is on the full Setup utility menu only.

- **Start Options**

Select this choice to view the startup sequence or boot to devices. The server starts from the first boot record that it finds.

This choice is on the full Setup utility menu only.

- **Boot Manager**

Select this choice to view, add, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

- **System Event Logs**

Select this choice to view the system-event log and the POST event log. For more information about these logs, see "Event logs" on page 23.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the system-event log. Also, after you complete a repair or correct an error, clear the system-event log to turn off the system-error LED on the front of the server.

   – **POST Event Viewer**

   Select this choice to enter the POST event viewer to view the error messages in the POST event log.

   – **System Event Log**

   Select this choice to view the error messages in the system-event log.

   – **Clear System Event Log**

   Select this choice to clear the system-event log.

- **User Security**

Select this choice to set, change, or clear passwords. See "Passwords" on page 326 for more information.

This choice is on the full and limited Setup utility menu.

   – **Set Power-on Password**

   Select this choice to set or change a power-on password. For more information, see "Power-on password" on page 326.

   – **Clear Power-on Password**

   Select this choice to clear a power-on password. For more information, see "Power-on password" on page 326.

   – **Set Administrator Password**

   Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If an administrator password is set, the full Setup utility menu is available only if you type the administrator password at the password prompt. For more information, see "Administrator password" on page 327.

   Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

   – **Clear Administrator Password**

   Select this choice to clear an administrator password. For more information, see "Administrator password" on page 327.

- **Save Settings**

  Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Setup utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **User Security** menu choice, you can set, change, and delete a power-on password and an administrator password. The **User Security** choice is on the full Setup utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Setup utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Setup utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Setup utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Setup utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Power-on password: If a power-on password is set, when you turn on the server, you must type the power-on password to complete the system startup. You can use any combination of 6 - 20 printable ASCII characters for the password.

When a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt. Start the Setup utility and reset the power-on password.

  Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

- Change the position of the power-on password switch (enable switch 3 of the system board switch block (SW4) to bypass the password check (see "System-board switches and jumpers" on page 17for more information).
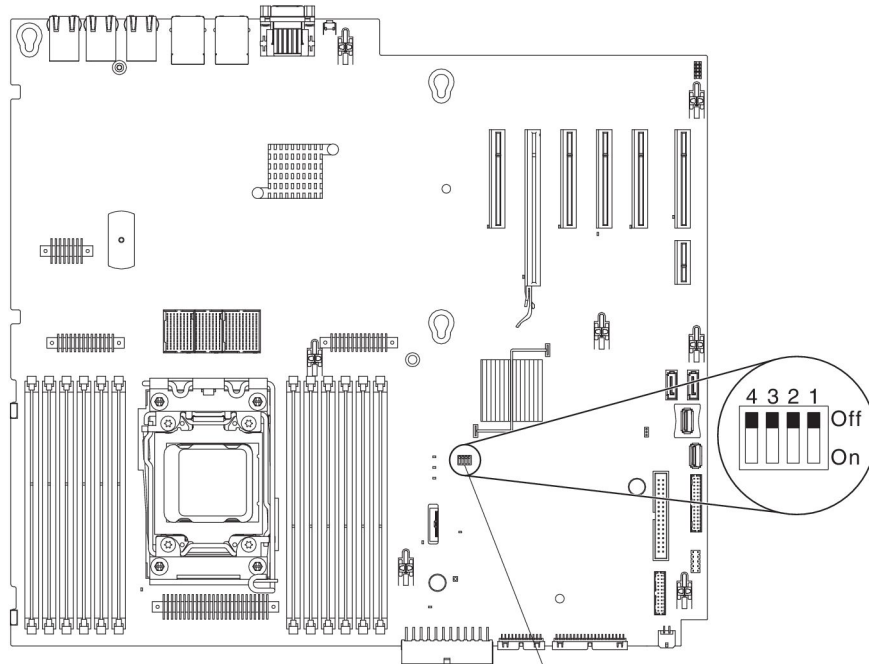
SW4 switch block

Attention: Before you change any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information that begins on page "Safety" on page vii. Do not change settings or move jumpers on any system board switch or jumper blocks that are not shown in this document.

The default for all of the switches on switch block (SW4) is Off.

While the server is turned off, move switch 3 of the switch block (SW4) to the On position to enable the power-on password override. You can then start the Setup utility and reset the power-on password. You do not have to return the switch to the previous position.

The power-on password override switch does not affect the administrator password.

Administrator password: If an administrator password is set, you must type the administrator password for access to the full Setup utility menu. You can use any combination of 6 - 20 printable ASCII characters for the password.

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Using the Boot Manager

The Boot Manager program is used to temporarily redefine the first startup device without changing boot options or settings in the Setup utility.

To use the Boot Manager program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. When the prompt `<F12> Select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.

4. Use the Up arrow and Down arrow keys to select an item from the **Boot Selection Menu** and press Enter.

The next time the server starts, it returns to the startup sequence that is set in the Setup utility.

Starting the backup server firmware

The system board contains a backup copy area for the server firmware. This is a secondary copy of server firmware that you update only during the process of updating server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, change the position of the UEFI boot backup switch (change switch 1 of the SW4 to the on position) to enable the UEFI recovery mode.

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, change back the position of the UEFI boot backup switch (change switch 1 of the SW4 to the off position).

Changing the Power Policy option to the default settings after loading UEFI defaults

The default settings for the Power Policy option are set by the IMM2. To change the Power Policy option to the default settings, complete the following steps:

1. Turn on the server.

   Note: Approximately 20 seconds after the server is connected to AC power, the power-control button becomes active.

2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.

3. Select **System Settings → integrated management module 2 → Reset IMM2 to Defaults**.

4. Wait several minutes while IMM2 initializes all of the default values.

5. Go back and check the Power Policy setting to verify that it is set to **Restore** (the default).

   Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Using the Integrated Management Module II

The integrated management module II (IMM2) is the second generation of the IMM. Unlike the first generation of IMM, the IMM2 has three levels of firmware: basic, standard, and premium. The level of IMM2 firmware in your server depends on the server platform. IMM2 basic firmware provides server management through the Intelligent Platform Management Interface (IPMI). IMM2 standard firmware provides basic functionality plus the ability to manage servers through other user interfaces, such as the web, Telnet, Secure Shell (SSH), and Simple Network Management Protocol (SNMP). IMM2 premium firmware provides standard functionality plus remote-presence capability.

Some servers that come with IMM2 basic or standard firmware might have an option to upgrade the IMM2 firmware to a higher level. If you add the service processor upgrade option to IMM2 basic firmware, the result is IMM2 standard functionality. If you add the remote presence upgrade option to IMM2 standard firmware, the result is IMM2 premium functionality.

Note: You cannot upgrade IMM2 basic firmware directly to IMM2 premium firmware by using the remote presence upgrade option. You must use the service processor upgrade option to upgrade to IMM2 standard firmware and then use the remote presence upgrade option to upgrade to IMM2 premium firmware.

For more information about the IMM2, see the Integrated Management Module II User's Guide at http://www-947.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=MIGR-5086346.

The IMM2 supports the following basic systems-management features:
- Environmental monitor with fan speed control for temperature, voltages, fan failure, and power supply failure.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM2 lights the associated system error LED and the failing DIMM error LED.
- System-event log (SEL).
- ROM-based IMM2 firmware flash updates.
- Auto Boot Failure Recovery (ABR).
- Nonmaskable interrupt (NMI) detection and reporting.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating system watchdog timer times-out. The IMM2 might be configured to watch for the operating system watchdog timer and reboot the system after a timeout, if the ASR feature is enabled. Otherwise, the IMM2 allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the system board for an operating-system memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CNFG) LED support.
- Serial over LAN (SOL).
- PECI 2 support.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Operating-system failure blue screen capture.
- Configuration save and restore.
- PCI configuration data.
- Boot sequence manipulation.

The IMM2 also provides the following remote server management capabilities through the OSA SMBridge management utility program:
- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue

commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

Obtaining the IP address for the IMM2

To access the web interface, you need the IP address for IMM2. You can obtain the IMM2 IP address through the Setup utility. The server comes with a default IP address for the IMM2 of 192.168.70.125. To locate the IP address, complete the following steps:

1. Turn on the server.

   Note: Approximately 5 to 10 seconds after the server is connected to power, the power-control button becomes active.

2. When the prompt `<F1> Setup` is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.

3. From the Setup utility main menu, select **System Settings**.

4. On the next screen, select **Integrated Management Module**.

5. On the next screen, select **Network Configuration**.

6. Find the IP address and write it down.

7. Exit from the Setup utility.

Logging on to the web interface

To log onto the web interface to use the remote presence functions, complete the following steps:

1. Open a web browser on a computer that connects to the server and in the **address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   Note: The IMM2 defaults to DHCP. If a DHCP host is not available, the IMM2 assigns a static IP address of 192.168.70.125.

2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

   Note: The IMM2 is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not the letter O). You have read/write access. You must change the default password the first time you log on.

3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM2 will log you off of the web interface if your browser is inactive for the number of minutes that you entered for the timeout value.

4. Click **Continue** to start the session. The System Health page provides a quick view of the system status.

Using the remote presence capability and blue-screen capture

The remote presence and blue-screen capture features are integrated functions of the Integrated Management Module II (IMM2). When the optional IBM Integrated Management Module Advanced Upgrade is installed in the server, it activates the remote presence functions. The Integrated Management Module Advanced Upgrade is required to enable the integrated remote presence and blue-screen capture features. Without the Integrated Management Module Advanced Upgrade, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you can still access the web interface without the upgrade.

After the Integrated Management Module Advanced Upgrade is installed in the server, it is authenticated to determine whether it is valid. If the key is not valid, you receive a message from the web interface (when you attempt to start the remote presence feature) indicating that the Integrated Management Module Advanced Upgrade is required to use the remote presence feature.

The remote presence feature provides the following functions:
- Remotely viewing video with graphics resolutions up to 1600 x 1200 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

Enabling the remote presence feature

To enable the remote presence feature, complete the following steps:
1. Install the Integrated Management Module Advanced Upgrade.
2. Turn on the server.

   Note: Approximately 20 to 40 seconds after the server is connected to power, the power-control button becomes active.

Reactivate any Features on Demand features after replacing the system board. Instructions for automating the activation of features and installing activation keys is in the *IBM Features on Demand User's Guide*. To download the document, go to http://www.ibm.com/systems/x/fod/, log in, and click **Help**.

Using the embedded hypervisor

The VMware ESXi embedded hypervisor software is available on the optional IBM USB flash device with embedded hypervisor. Hypervisor is virtualization software that enables multiple operating systems to run on a host system at the same time. The USB flash device is required to activate the hypervisor functions.

To start using the embedded hypervisor functions, you must add the USB flash device to the startup sequence in the Setup utility.

To add the USB flash device to the startup sequence, complete the following steps:

1. Turn on the server.

   Note: Approximately 5 to 10 seconds after the server is connected to power, the power-control button becomes active.

2. When the prompt `<F1> Setup` is displayed, press F1.

3. From the Setup utility main menu, select **Boot Manager**.

4. Select **Add Boot Option**; then, select **Generic Boot Option** and **Embedded Hypervisor**. Press Enter, and then select Esc.

5. Select **Change Boot Order** and then select **Change the order**. Use the Up arrow and Down Arrow keys to select Embedded Hypervisor and use the plus (+) and minus (-) keys to move Embedded Hypervisor in the boot order. When **Embedded Hypervisor** is in the correct location in the boot order, press Enter. Select **Commit Changes** and press Enter.

6. Select **Save Settings** and then select **Exit Setup**.

If the embedded hypervisor flash device image becomes corrupt, you can download the image from http://www-03.ibm.com/systems/x/os/vmware/esxi/.

For additional information and instructions, see VMware vSphere 4.1 Documentation at http://www.vmware.com/support/pubs/vs_pages/vsp_pubs_esxi41_e_vc41.html or the *VMware vSphere Installation and Setup Guide* at http://pubs.vmware.com/vsphere-50/topic/com.vmware.ICbase/PDF/vsphere-esxi-vcenter-server-50-installation-setup-guide.pdf.

Configuring the Ethernet controller

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers.

To find device drivers and information about configuring the Ethernet controllers, go to http://www.ibm.com/supportportal/.

Enabling Features on Demand Ethernet software

You can activate the Features on Demand (FoD) software upgrade key for Fibre Channel over Ethernet (FCoE) and iSCSI storage protocols that is integrated in the integrated management module. For more information and instructions for activating the Features on Demand Ethernet software key, see the *IBM Features on Demand User's Guide*. To download the document, go to http://www.ibm.com/systems/x/fod/, log in, and click **Help**.

Enabling Features on Demand RAID software

Integrated into the integrated management module is a Features on Demand RAID software upgrade key that you can activate to get support for RAID levels 5 and 50 or 6 and 60 (depending on the Features on Demand key). For more information and instructions for activating the Features on Demand RAID software key, see the *IBM*

Features on Demand User's Guide. To download the document, go to
http://www.ibm.com/systems/x/fod/, log in, and click **Help**.

Configuring RAID arrays

Through the Setup utility, you can access utilities to configure RAID arrays. The
specific procedure for configuring arrays depends on the RAID controller that you
are using. For details, see the documentation for your RAID controller. To access
the utility for your RAID controller, complete the following steps:

1. Turn on the server.

   Note: Approximately 10 seconds after the server is connected to power, the
   power-control button becomes active.

2. When prompted, `<F1 Setup>` is displayed, press F1. If you have set an
   administrator password, you must type the administrator password to access the
   full Setup utility menu. If you do not type the administrator password, a limited
   Setup utility menu is available.

3. Select **System Settings → Storage**.

4. Press Enter to refresh the list of device drivers.

5. Select the device driver for your RAID controller and press Enter.

6. Follow the instructions in the documentation for your RAID controller.

The Update*Xpress* System Pack Installer

The Update*Xpress* System Pack Installer detects supported and installed device
drivers and firmware in the server and installs available updates. For additional
information and to download the Update*Xpress* System Pack Installer, go to the
System x and BladeCenter Tools Center at http://publib.boulder.ibm.com/infocenter/
toolsctr/v1r0/index.jsp and click **UpdateXpress System Pack Installer**.

IBM Advanced Settings Utility

The IBM Advanced Settings Utility (ASU) program is an alternative to the Setup
utility for modifying UEFI settings. Use the ASU program online or out of band to
modify UEFI settings from the command line without the need to restart the system
to access the Setup utility.

You can also use the ASU program to configure the optional remote presence
features or other IMM2 settings. The remote presence features provide enhanced
systems-management capabilities.

In addition, the ASU program provides IMM LAN over USB interface configuration
through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the
settings as a file and run the file as a script. The ASU program supports scripting
environments through a batch-processing mode.

For more information and to download the ASU program, go to
http://www.ibm.com/support/entry/portal/docdisplay?lndocid=TOOL-ASU.

Updating IBM Systems Director

If you plan to use IBM Systems Director to manage the server, you must check for
the latest applicable IBM Systems Director updates and interim fixes.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

To locate and install a newer version of IBM Systems Director, complete the following steps:

1. Check for the latest version of IBM Systems Director:

    a. Go to http://www.ibm.com/systems/software/director/downloads/index.html.

    b. If a newer version of IBM Systems Director than what comes with the server is shown in the drop-down list, follow the instructions on the web page to download the latest version.

2. Install the IBM Systems Director program.

If your management server is connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

1. Make sure that you have run the Discovery and Inventory collection tasks.

2. On the Welcome page of the IBM Systems Director web interface, click **View updates**.

3. Click **Check for updates**. The available updates are displayed in a table.

4. Select the updates that you want to install, and click **Install** to start the installation wizard.

If your management server is not connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

1. Make sure that you have run the Discovery and Inventory collection tasks.

2. On a system that is connected to the Internet, go to http://www.ibm.com/support/fixcentral/.

3. From the **Product family** list, select **IBM Systems Director**.

4. From the **Product** list, select **IBM Systems Director**.

5. From the **Installed version** list, select the latest version, and click **Continue**.

6. Download the available updates.

7. Copy the downloaded files to the management server.

8. On the management server, on the Welcome page of the IBM Systems Director web interface, click the **Manage** tab, and click **Update Manager**.

9. Click **Import updates** and specify the location of the downloaded files that you copied to the management server.

10. Return to the Welcome page of the web interface, and click **View updates**.

11. Select the updates that you want to install, and click **Install** to start the installation wizard.

Updating the Universal Unique Identifier (UUID)

The Universal Unique Identifier (UUID) must be updated when the system board is replaced. Use the Advanced Settings Utility to update the UUID in the UEFI-based server. The ASU is an online tool that supports several operating systems. Make sure that you download the version for your operating system. You can download the ASU from the IBM website. To download the ASU and update the UUID, complete the following steps.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

1. Download the Advanced Settings Utility (ASU):

a. Go to http://www.ibm.com/supportportal/.

b. Click on the **Downloads** tab at the top of the panel.

c. Under **ToolsCenter**, select **View ToolsCenter downloads**.

d. Select **Advanced Settings Utility (ASU)**.

e. Scroll down and click on the link and download the ASU version for your operating system.

2. ASU sets the UUID in the integrated management module (IMM). Select one of the following methods to access the integrated management module (IMM) to set the UUID:

   • Online from the target system (LAN or keyboard console style (KCS) access)

   • Remote access to the target system (LAN based)

   • Bootable media containing ASU (LAN or KCS, depending upon the bootable media)

3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:

   • For Windows based operating systems:

     – ibm_rndis_server_os.inf

     – device.cat

   • For Linux based operating systems:

     – cdc_interface.sh

4. After you install ASU, use the following command syntax to set the UUID:

   `asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]`

   Where:

   <uuid_value>
   Up to 16-byte hexadecimal value assigned by you.

   [access_method]
   The access method that you selected to use from the following methods:

   • Online authenticated LAN access, type the command:

   `[host <imm_internal_ip>] [user <imm_user_id>][password <imm_password>]`

   Where:

   imm_internal_ip
   The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

   imm_user_id
   The IMM `account` (1 of 12 accounts). The default value is USERID.

   imm_password
   The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

   Note: If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the unauthenticated KCS access method.

The following commands are examples of using the userid and password default values and not using the default values:

Example that does not use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --user <user_id>
--password <password>
```

Example that does use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
```
- Online KCS access (unauthenticated and user restricted):

  You do not need to specify a value for *access_method* when you use this access method.

  Example:
  ```
  asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
  ```
  The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer. See the *Advanced Settings Utility Users Guide* for more details. You can access the *ASU Users Guide* from the IBM website.

  Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

  a. Go to http://www.ibm.com/supportportal/.
  b. Click on the **Downloads** tab at the top of the panel.
  c. Under **ToolsCenter**, select **View ToolsCenter downloads**.
  d. Select **Advanced Settings Utility (ASU)**.
  e. Scroll down and click on the link and download the ASU version for your operating system. Scroll down and look under **Online Help** to download the *Advanced Settings Utility Users Guide*.

- Remote LAN access, type the command:

  Note: When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.
  ```
  host <imm_external_ip> [user <imm_user_id>][password <imm_password>]
  ```
  Where:

  imm_external_ip
  > The external IMM LAN IP address. There is no default value. This parameter is required.

  imm_user_id
  > The IMM `account` (1 of 12 accounts). The default value is USERID.

  imm_password
  > The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

  The following commands are examples of using the userid and password default values and not using the default values:

  Example that does not use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --host <imm_ip>
  --user <user_id> --password <password>
  ```

Example that does use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --host <imm_ip>
```

- Bootable media:

  You can also build a bootable media using the applications available through the ToolsCenter website at http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=TOOL-CENTER. From the **IBM ToolsCenter** page, scroll down for the available tools.

5. Restart the server.

Updating the DMI/SMBIOS data

The Desktop Management Interface (DMI) must be updated when the system board is replaced. Use the Advanced Settings Utility to update the DMI in the UEFI-based server. The ASU is an online tool that supports several operating systems. Make sure that you download the version for your operating system. You can download the ASU from the IBM website. To download the ASU and update the DMI, complete the following steps.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

1. Download the Advanced Settings Utility (ASU):
   a. Go to http://www.ibm.com/supportportal/.
   b. Click on the **Downloads** tab at the top of the panel.
   c. Under **ToolsCenter**, select **View ToolsCenter downloads**.
   d. Select **Advanced Settings Utility (ASU)**.
   e. Scroll down and click on the link and download the ASU version for your operating system.

2. ASU sets the DMI in the integrated management module (IMM). Select one of the following methods to access the integrated management module (IMM) to set the DMI:
   - Online from the target system (LAN or keyboard console style (KCS) access)
   - Remote access to the target system (LAN based)
   - Bootable media containing ASU (LAN or KCS, depending upon the bootable media)

3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:
   - For Windows based operating systems:
     – ibm_rndis_server_os.inf
     – device.cat
   - For Linux based operating systems:
     – cdc_interface.sh

4. After you install ASU, Type the following commands to set the DMI:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```
Where:

<m/t_model>
>   The server machine type and model number. Type `mtm xxxxyyy`, where *xxxx* is the machine type and *yyy* is the server model number.

<s/n>   The serial number on the server. Type `sn zzzzzzz`, where *zzzzzzz* is the serial number.

<asset_method>
>   The server asset tag number. Type `asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* is the asset tag number.

[access_method]
>   The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

  `[host <imm_internal_ip>] [user <imm_user_id>][password <imm_password>]`

  Where:

  imm_internal_ip
  >   The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

  imm_user_id
  >   The IMM account (1 of 12 accounts). The default value is USERID.

  imm_password
  >   The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

  Note: If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the following unauthenticated KCS access method.

  The following commands are examples of using the userid and password default values and not using the default values:

  Examples that do not use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SYsInfoProdName <m/t_model>
  --user <imm_user_id> --password <imm_password>
  asu set SYSTEM_PROD_DATA.SYsInfoSerialNum <s/n> --user <imm_user_id>
  --password <imm_password>
  asu set SYSTEM_PROD_DATA.SYsEncloseAssetTag <asset_tag>
  --user <imm_user_id> --password <imm_password>
  ```

  Examples that do use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
  asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
  asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
  ```

- Online KCS access (unauthenticated and user restricted):

  You do not need to specify a value for *access_method* when you use this access method.

  The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer.

  You can download the ASU from the IBM website. To download the *Advanced Settings Utility Users Guide*, complete the following steps.

Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.

a. Go to http://www.ibm.com/supportportal/.

b. Click on the **Downloads** tab at the top of the panel.

c. Under **ToolsCenter**, select **View ToolsCenter downloads**.

d. Select **Advanced Settings Utility (ASU)**.

e. Scroll down and click on the link and download the ASU version for your operating system. Scroll down and look under **Online Help** to download the *Advanced Settings Utility Users Guide*.

The following commands are examples of using the userid and password default values and not using the default values:

Examples that do not use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SYsInfoProdName <m/t_model>
asu set SYSTEM_PROD_DATA.SYsInfoSerialNum <s/n>
asu set SYSTEM_PROD_DATA.SYsEncloseAssetTag <asset_tag>
```

- Remote LAN access, type the command:

Note: When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.
```
host <imm_external_ip> [user <imm_user_id>][password <imm_password>]
```
Where:

imm_external_ip
> The external IMM LAN IP address. There is no default value. This parameter is required.

imm_user_id
> The IMM account (1 of 12 accounts). The default value is USERID.

imm_password
> The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

The following commands are examples of using the userid and password default values and not using the default values:

Examples that do not use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SYsInfoProdName <m/t_model> --host <imm_ip>
--user <imm_user_id> --password <imm_password>
asu set SYSTEM_PROD_DATA.SYsInfoSerialNum <s/n> --host <imm_ip>
--user <imm_user_id> --password <imm_password>
asu set SYSTEM_PROD_DATA.SYsEncloseAssetTag <asset_tag>
--host <imm_ip> --user <imm_user_id> --password <imm_password>
```

Examples that do use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --host <imm_ip>
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --host <imm_ip>
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
--host <imm_ip>
```

- Bootable media:

You can also build a bootable media using the applications available through the ToolsCenter website at http://www.ibm.com/support/entry/portal/

docdisplay?brand=5000008&lndocid=TOOL-CENTER. From the **IBM ToolsCenter** page, scroll down for the available tools.

5. Restart the server.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your IBM product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that

contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. The address for IBM System x® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/systems/intellistation/.

How to send Dynamic System Analysis data to IBM

Use the IBM Enhanced Customer Data Repository to send diagnostic data to IBM. Before you send diagnostic data to IBM, read the terms of use at http://www.ibm.com/de/support/ecurep/terms.html.

You can use any of the following methods to send diagnostic data to IBM:
- **Standard upload:** http://www.ibm.com/de/support/ecurep/send_http.html
- **Standard upload with the system serial number:** http://www.ecurep.ibm.com/app/upload_hw
- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

Creating a personalized support web page

At http://www.ibm.com/support/mynotifications/, you can create a personalized support web page by identifying IBM products that are of interest to you. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/supline/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
    IBM Taiwan Corporation
    3F, No 7, Song Ren Rd.
    Taipei, Taiwan
    Telephone: 0800-016-888

Appendix B. Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

> IBM Director of Licensing
> IBM Corporation
> North Castle Drive
> Armonk, NY 10504-1785
> U.S.A.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product, and use of those websites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at "Copyright and trademark information" at http://www.ibm.com/legal/copytrade.shtml.

Adobe and PostScript are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc., in the United States, other countries, or both and is used under license therefrom.

Intel, Intel Xeon, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven®, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the server , IBM may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 16. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days
[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.* Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. [2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction. [3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants.* Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

Information Development
IBM Corporation
205/A015
3039 E. Cornwallis Road
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195

U.S.A.

In the request, be sure to include the publication part number and title.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。　　　　　　　　　VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А. В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Index

Numerics

IBM ®

Part Number: 00V9728

Printed in USA