IBM

System x3550 M4
Type 7914

Installation and Service Guide

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Type 7914

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> **Note**
>
> Before using this information and the product it supports, read the general information in
> Appendix D, "Getting help and technical assistance," on page 411, "Notices" on page 415, the
> *Warranty Information* document, and the *Safety Information* and *Environmental Notices and User Guide*
> documents on the IBM *Documentation* CD.

Contents

Chapter 4. Troubleshooting 117

Chapter 5. Parts listing, System x3550 M4 Type 7914 173

Chapter 6. Removing and replacing server components 185

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.

ᠡᠨᠡ ᠵᠦᠢᠯ ᠢ ᠤᠭᠰᠠᠷᠠᠬᠤ ᠠᠴᠠ ᠡᠮᠦᠨᠡ ᠠᠶᠤᠯᠭᠦᠢ ᠠᠵᠢᠯᠯᠠᠭᠠᠨ ᠤ ᠮᠡᠳᠡᠭᠡᠯᠡᠯ ᠢ ᠤᠩᠰᠢᠭᠠᠷᠠᠢ᠃
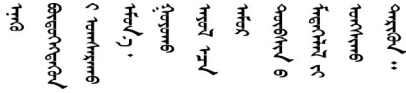
Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

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.

ཐོན་ཟེས་འདི་བདེ་སྐྱོད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྐེར་བསྡུ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۈر 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 service technicians

This section contains information for trained service technicians.

Inspecting for unsafe conditions

Use this information 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 optional devices 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 cords are disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe
   any sharp edges.
3. Check the power cords:
   * 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 cords are the correct type.
   * 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 system 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 these guidelines when you service electrical equipment.

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, 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 current.
- 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 work 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

These statements provide the caution and danger information that is used in this documentation.

Important:

Each caution and danger statement in this documentation 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 documentation before you perform the procedures. Read any additional safety information that comes with your system or optional device before you install the device.

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.
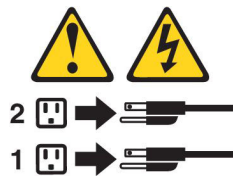
Statement 6

CAUTION:
If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible 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.

Statement 12

CAUTION:
The following label indicates a hot surface nearby.

Statement 26

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

Statement 27

CAUTION:
Hazardous moving parts are nearby.

Rack Safety Information, Statement 2

DANGER

- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Always install the heaviest devices in the bottom of the rack cabinet.**

Chapter 1. The System x3550 M4 Type 7914 server

This *Installation and Service Guide* contains information and instructions for setting up your System x3550 M4 Type 7914 server, instructions for installing some optional devices, cabling and configuring the server, removing and replacing devices, and diagnostics and troubleshooting information.

In addition to the instructions in Chapter 2, "Installing optional devices," on page 25 for installing optional hardware devices, updating firmware and device drivers, and completing the installation, IBM Business Partners must also complete the steps in "Instructions for IBM Business Partners" on page 26.

The IBM System x3550 M4 Type 7914 server is a 1-U-high[1] rack model server for high-volume network transaction processing. This high-performance, multi-core server is ideally suited for networking environments that require superior microprocessor performance, input/output (I/O) flexibility, and high manageability.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

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

The server contains IBM X-Architecture® technologies, which help increase performance and reliability. For more information, see "What your server offers" on page 10 and "Reliability, availability, and serviceability" on page 13.

You can obtain up-to-date information about the server and other IBM server products at http://www.ibm.com/systems/x/. At http://www.ibm.com/support/mysupport/, you can create a personalized support 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.

If you participate in the IBM client reference program, you can share information about your use of technology, best practices, and innovative solutions; build a professional network; and gain visibility for your business. For more information about the IBM client reference program, see http://www.ibm.com/ibm/clientreference/.

The hot-swap server models support up to eight 2.5-inch hot-swap hard disk drives or three 3.5-inch hot-swap hard disk drives. The simple-swap server models support up to three 3.5-inch simple-swap hard disk drives. It supports 2.5-inch hot-swap Serial Attached SCSI (SAS) or SATA hard disk drives, 3.5-inch hot-swap Serial Attached SCSI (SAS) or SATA hard disk drives, or 3.5-inch simple-swap SATA hard disk drives.

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1. Racks are marked in vertical increments of 1.75 inches each. Each increment is referred to as a unit, or a "U". A 1-U-high device is approximately 1.75 inches tall.

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

The following illustration shows the 2.5-inch hot-swap server models with an optional optical drive bay.
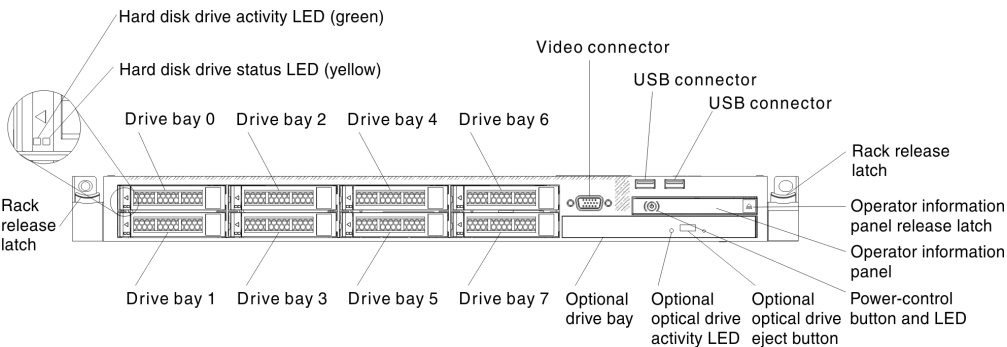
Figure 1. 2.5-inch model front view

The following illustration shows the 3.5-inch hot-swap or simple-swap server models. The servers support up to three 3.5-inch hot-swap SAS/SATA or simple-swap SATA hard disk drives.
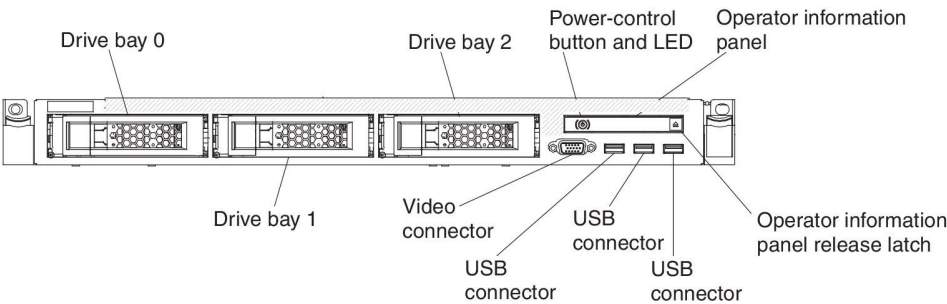
Figure 2. 3.5-inch model front view

If firmware and documentation updates are available, you can download them from the IBM website. The server might have features that are not described in the documentation that comes with the server, and 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. To check for updates, go to http://www.ibm.com/supportportal/.

Record information about the server in the following table.

Product name	IBM System x3550 M4 server
Machine type	7914
Model number	_____
Serial number	_____

The model number and serial number are on the ID label on the front of the server, as shown in the following illustration.

Note: The illustrations in this document might differ slightly from your hardware.
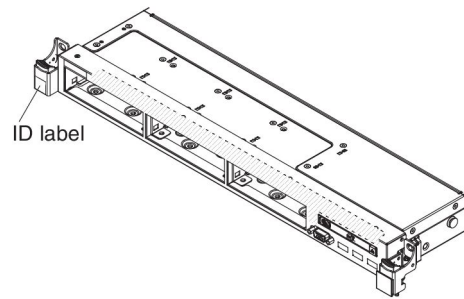
Figure 3. ID label

You can download an IBM *ServerGuide Setup and Installation* CD to help you configure the hardware, install device drivers, and install the operating system.

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

See the *Rack Installation Instructions* document on the IBM *System x Documentation* CD for complete rack installation and removal instructions.

The IBM Documentation CD

The IBM *Documentation* CD contains documentation for the server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *Documentation* CD requires the following minimum hardware and software:
- Microsoft Windows XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

The IBM Documentation CD

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your server and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:
- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  – If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start** > **Run**. In the **Open** field, type

    `e:\win32.bat`

    where *e* is the drive letter of the CD or DVD drive, and click **OK**.
  – If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

    `sh runlinux.sh`

Select the server from the **Product** menu. The **Available Topics** list displays all the documents for the server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the `Ctrl` key while you select the documents. Click **View** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press `Crtl+F` to use the Acrobat search function, or press `Alt+F` to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Related documentation

This *Installation and Service Guide* contains general information about the server including how to set up and cable the server, how to install supported optional devices, how to configure the server, and information to help you solve problems yourself and information for service technicians. The following documentation also comes with the server:

- *Environmental Notices and User Guide*

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

- *IBM License Agreement for Machine Code*

  This document is in PDF format on the IBM *Documentation* CD. It provides translated versions of the *IBM License Agreement for Machine Code* for your product.

- *Important Notices*

  This document is in printed format and comes with the server. It contains information about the safety, environmental, and electronic emission notices for your IBM product.

- *Licenses and Attributions Documents*

  This document is in PDF format on the IBM *Documentation* CD. It provides the open source notices.

- *Rack Installation Instructions*

  This printed document contains instructions for installing the server in a rack and comes with the rack kit.

- *Safety Information*

  This document is in PDF format on the IBM *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.

- *Safety Information Labels*

  This document provides the Simplified Chinese, Mongolian, Tibetan, Uygur, and Zhuang translated versions of the product safety labels.

- *Warranty Information*

  This document is in printed format and comes with the server. It contains warranty terms and a pointer to the IBM Statement of Limited Warranty on the IBM website.

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

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

The server might have features that are not described in the documentation that you received 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 updates, go to http://www.ibm.com/supportportal/.

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 your language 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.

Server features and specifications

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

Table 1. Server features and specifications

Microprocessor (depending on the model):	Memory (depending on the model):	SATA optical drives (optional for 2.5-inch models):

• Supports up to two Intel Xeon™ E5-2600 series multi-core microprocessors (one installed)
• Level-3 cache
• Two QuickPath Interconnect (QPI) links speed up to 8.0 GT per second
Notes:
• Use the Setup utility program to determine the type and speed of the microprocessors.
• For a list of supported microprocessors, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
	• Minimum: 2 GB
	• Maximum: 768 GB
	  – 64 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)
	• Slots: 24 dual inline
	• Supports (depending on the model):
	  – 4 GB unbuffered DIMM
	  – 2 GB, 4 GB, 8 GB, and 16 GB registered DIMMs
	  – 32 GB load reduction DIMM
		• DVD-ROM
		• Multi-burner
		
		Hard disk drive expansion bays (depending on the model):
		• 2.5-inch models: Up to eight 2.5-inch hot-swap SAS/SATA hard disk drive bays (with an optional optical drive bay)
		• 3.5-inch models: Up to three 3.5-inch hot-swap SAS/SATA or simple-swap SATA hard disk drive bays
		
		PCI expansion slots:
		
		Supports two PCI riser slots:
		• Slot 1 supports low-profile cards.
		  – PCI Express 3.0 x16
		• Slot 2 supports half-length, full-height cards.
		  – PCI Express 3.0 x8
		  – PCI Express 3.0 x16 (two microprocessors installed)
		  – PCI-X 64-bit/133 MHz

Table 1. Server features and specifications (continued)

Video controller (integrated into IMM2):	Integrated functions:	RAID controllers (depending on the model):

• 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)
 	
Hot-swap fans:
• One microprocessor: 4 dual-motor hot-swap fans.
• Two microprocessors: 6 dual-motor hot-swap fans.
 	
Power supply:
• Up to two hot-swap power supplies for redundancy support
  – 550-watt ac
  – 750-watt ac
  – 750-watt dc
 	
Note: Power supplies in the server must be with the same power rating or wattage.
	• 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
	• Eight Universal Serial Bus (USB) ports for 3.5-inch models. Seven Universal Serial Bus (USB) ports for 2.5-inch models. One port is for optional USB flash device with embedded hypervisor software is installed.
	• Six network ports (four 1 Gb Ethernet ports on the system board and two additional ports when the optional IBM Dual-Port 10 Gb Network Adapter is installed)
	• One System Management 1 Gb Ethernet port on the rear connected to a systems management network. This system management connector is dedicated to the IMM2 functions.
	• One serial port
		• A ServeRAID H1110 SAS/SATA adapter that provides RAID 0, 1, and 10.
		• 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)
		• A ServeRAID M5120 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)

Table 1. Server features and specifications (continued)

Environment: compliant with ASHRAE class A3 specifications. **Server on**: • Temperature: – 5°C to 40°C (41°F to 104°F) – Altitude: 0 to 950 m (3,117 ft); decrease the maximum system temperature by 1°C for every 175-m increase in altitude. • Maximum altitude: 3,050 m (10,000 ft), 5°C to 28°C (41°F to 82.4°F) • Humidity: – Non-condensing: -12°C dew point (10.4°F) – Relative humidity: 8% to 85% • Maximum dew point: 24°C (75.2°F) • Maximum rate of temperature change: – Tape drives: 5°C/hr (41°F/hr) – Hard disk drives: 20°C/hr (68°F/hr) **Server off**: • Temperature: 5°C to 45°C (41°F to 113°F) • Relative humidity: 8% to 85% • Maximum dew point: 27°C (80.6°F) **Storage** (non-operating): • Temperature: 1°C to 60°C (33.8°F to 140°F) • Maximum altitude: 3,050 m (10,000 ft) • Relative humidity: 5% to 80% • Maximum dew point: 29°C (84.2°F) **Shipment** (non-operating): • Temperature: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 10,700 m (35,105 ft) • Relative humidity: 5% to 100% • Maximum dew point: 29°C (84.2°F)	Particulate contamination: 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 417. **Attention:** • Design to ASHRAE Class A3, ambient of 40°C, with relaxed support: – Support cloud like workload with no performance degradation acceptable (Turbo-Off) – Under no circumstance, can any combination of worst case workload and configuration result in system shutdown or design exposure at 40°C • Specific microprocessors supported environment: – Microprocessor Intel Xeon E5-2690, 135W: - Temperature: 10°C to 27°C (50°F to 80.6°F) - Altitude: 0 to 304.8 m (1,000 ft) – Microprocessor models with 115W and 130W: - Temperature: 10°C to 35°C (50°F to 95°F) - Altitude: 0 to 914.4 m (3,000 ft) **Size:** • 1U • Height: 43 mm (1.7 inches) • Depth: 734 mm (28.9 inches) • Width: 429 mm (16.9 inches) • Weight: approximately 16.4 kg (36.16 lb) when fully configured **Acoustical noise emissions:** • Sound power, idling: 6.2 bels maximum • Sound power, operating: 6.5 bels maximum	**Heat output:** Approximate heat output: • Minimum configuration: 461 Btu per hour (AC 135 watts) • Maximum configuration: 2900 Btu per hour (AC 850 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: 0.14 kVA – Maximum: 0.90 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. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The noise emission level stated in the declared (upper limit) sound-power level, in bels, for a random sample of system.

What your server offers

This section introduces features and technologies the server uses and provides.

- **Active Energy Manager**

  The IBM Active Energy Manager solution is an IBM Systems Director plug-in that measures and reports server power consumption as it occurs. This enables you to monitor power consumption in correlation to specific software application programs and hardware configurations. You can obtain the measurement values through the systems-management interface and view them, using IBM Systems Director. For more information, including the required levels of IBM Systems Director and Active Energy Manager, see the IBM Systems Director Information Center at http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html or see http://www.ibm.com/servers/systems/management/director/resources/.

- **Dynamic System Analysis (DSA)**

  The server comes with the IBM Dynamic System Analysis (DSA) Preboot diagnostic program. DSA collects and analyzes system information to aid in diagnosing server problems, as well as offering a rich set of diagnostic tests of the major components of the server. DSA creates a DSA log, which is a chronologically ordered merge of the system-event log (as the IPMI event log), the integrated management module (IMM) event log (as the ASM event log), and the operating-system event logs. You can send the DSA log as a file to IBM Support or view the information as a text file or HTML file.

  Two editions of Dynamic System Analysis are available: DSA Portable and DSA Preboot. For more information about both editions, see "DSA editions" on page 140.

- **Features on Demand**

  If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see http://www.ibm.com/systems/x/fod/.

- **IBM *ServerGuide Setup and Installation* CD**

  The *ServerGuide Setup and Installation* CD, which you can download from the web, provides programs to help you set up the server and install a Windows operating system. The ServerGuide program detects installed optional hardware devices and provides the correct configuration programs and device drivers. For more information about the *ServerGuide Setup and Installation* CD, see "Using the ServerGuide Setup and Installation CD" on page 94.

- **IBM Systems Director**

  IBM Systems Director is a platform-management foundation that streamlines the way you manage physical and virtual systems in a heterogeneous environment. By using industry standards, IBM Systems Director supports multiple operating systems and virtualization technologies. For more information, see the IBM Systems Director Information Center at http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html and "IBM Systems Director" on page 14.

- **Integrated Management Module II (IMM2)**

  The integrated management module II (IMM2) combines service processor functions, video controller, and remote presence and blue-screen capture features in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the IMM event log, and alerts you to

the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through the following industry-standard interfaces:

– Intelligent Platform Management Interface (IPMI) version 2.0

– Simple Network Management Protocol (SNMP) version 3.0

– Common Information Model (CIM)

– Web browser

Some of the features that are unique to the IMM are enhanced performance, higher-resolution remote video, expanded security options, and Feature on Demand enablement for hardware and firmware options.

For additional information, see "Using the integrated management module" on page 104 and the Integrated Management Module II User's Guide at www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5089484 &brandind=5000008.

- **Integrated network support**

  The server comes with an integrated dual-port Intel Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. For more information, see "Configuring the Ethernet controller" on page 108.

- **Integrated Trusted Platform Module (TPM)**

  This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification, when the software is available. You can enable TPM support through the Setup utility under the **System Security** menu option.

- **Large data-storage capacity and hot-swap capability**

  The hot-swap server models support a maximum of eight 2.5-inch or three 3.5-inch hot-swap Serial Attached SCSI (SAS) hard disk drives or hot-swap Serial ATA (SATA) hard disk drives. The simple-swap server models support a maximum of three 3.5-inch simple-swap SATA hard disk drives.

  With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Large system-memory capacity**

  The server can support up to 768 GB of system memory. The server provides 24 dual inline memory module (DIMM) connectors. The server memory controller supports error correcting code (ECC) for PC3-8500 (DDR3-1066), PC3-10600 (DDR3-1333), or PC3-12800 (DDR3-1600), DDR3 (third-generation double-data-rate), synchronous dynamic random access memory (SDRAM) DIMMs.

- **Light path diagnostics**

  Light path diagnostics provides LEDs to help you diagnose problems. For more information about light path diagnostics and the LEDs, see "Light path diagnostics" on page 123 and "Light path diagnostics LEDs" on page 126.

- **Multi-core processing**

  The server supports up to two Intel Xeon™ E5-2600 series multi-core microprocessors. The server comes with a minimum of one microprocessor.

- **PCI adapter capabilities**

  The server has two PCI interface slots (one supports low-profile cards, and one supports half-length, full-height cards). Slot 2 can support PCI Express or PCI-X adapters through an optional PCI riser card. See "Replacing an adapter" on page 231 for detailed information.

- **Redundant connection**

  The addition of the optional Ethernet adapter provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection and the optional Ethernet adapter is installed on the server, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet adapter connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling and optional power capabilities**

  The server supports a maximum of two 550-watt or 750-watt hot-swap power supplies and six dual-motor hot-swap fans, which provide redundancy and hot-swap capability for a typical configuration. The redundant cooling by the fans in the server enables continued operation if one of the fans fails. The server comes with the minimum of one 550-watt or 750-watt hot-swap power supply and four fans.

  You must install the fourth and sixth fans when you install the second microprocessor in the server. You can order the second optional power supply for power redundancy.

  Note: You cannot mix 550-watt and 750-watt power supplies in the server.

- **ServeRAID support**

  The ServeRAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The standard RAID adapter provides RAID levels 0, 1, and 10. An optional RAID adapter is available for purchase.

- **Systems-management capabilities**

  The server comes with an integrated management module II (IMM2). When the IMM is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The IMM also provides system monitoring, event recording, and network alert capability. The systems-management connector on the rear of the server is dedicated to the IMM. The dedicated systems-management connector 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.

- **UEFI-compliant server firmware**

  IBM System x Server Firmware (server firmware) offers several features, including Unified Extensible Firmware Interface (UEFI) 2.1 compliance; Active Energy Manager technology; enhanced reliability, availability, and serviceability (RAS) capabilities; and basic input/output system (BIOS) compatibility support. UEFI replaces the BIOS and defines a standard interface between the operating system, platform firmware, and external devices. UEFI-compliant System x servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

  Note: The server does not support DOS (Disk Operating System).

- **VMware ESXi embedded hypervisor**

  An optional USB flash device with VMware ESXi embedded hypervisor software is available for purchase. Hypervisor is virtualization software that enables multiple operating systems to run on a host system at the same time. The USB embedded hypervisor flash device can be installed in USB connectors 3 and 4 on the system board. For more information about using the embedded hypervisor, see "Using the embedded hypervisor" on page 107.

Reliability, availability, and serviceability

Three important computer design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in the server, the availability of the server when you need it, and the ease with which you can diagnose and correct problems.

Your server has the following RAS features:
- 3-year parts and 3-year labor limited warranty (Machine Type 7914)
- 24-hour support center
- Automatic error retry and recovery
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic restart after a power failure
- Backup basic input/output system switching under the control of the integrated management module (IMM)
- Built-in monitoring for fan, power, temperature, voltage, and power-supply redundancy
- Cable-presence detection on most connectors
- Chipkill memory protection
- Double-device data correction (DDDC) for x4 DRAM technology DIMMs (available on 16 GB DIMMs only). Ensures that data is available on a single x4 DRAM DIMM after a hard failure of up to two DRAM DIMMs. One x4 DRAM DIMM in each rank is reserved as a space device.
- Diagnostic support for ServeRAID and Ethernet adapters
- Error codes and messages
- Error correcting code (ECC) L3 cache and system memory
- Full Array Memory Mirroring (FAMM) redundancy
- Hot-swap cooling fans with speed-sensing capability
- Hot-swap hard disk drives
- Information and light path diagnostics LED panels
- Integrated Management Module (IMM)
- Light path diagnostics LEDs for memory DIMMs, microprocessors, hard disk drives, solid state drives, power supplies, and fans
- Memory mirroring and memory sparing support
- Memory error correcting code and parity test
- Memory down sizing (non-mirrored memory). After a restart of the server after the memory controller detected a non-mirrored uncorrectable error and the memory controller cannot recover operationally, the IMM logs the uncorrectable error and informs POST. POST logically maps out the memory with the uncorrectable error, and the server restarts with the remaining installed memory.
- Menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration programs
- Microprocessor built-in self-test (BIST), internal error signal monitoring, internal thermal trip signal monitoring, configuration checking, and microprocessor and voltage regulator module failure identification through light path diagnostics
- Nonmaskable interrupt (NMI) button
- Parity checking on the small computer system interface (SCSI) bus and PCI-E and PCI/PCI-X buses
- Power management: Compliance with Advanced Configuration and Power Interface (ACPI)
- Power-on self-test (POST)
- Predictive Failure Analysis (PFA) alerts on memory, microprocessors, SAS/SATA hard disk drives or solid state drives, fans, power supplies, and VRM
- Redundant Ethernet capabilities with failover support
- Redundant hot-swap power supplies and redundant hot-swap fans

- Redundant network interface card (NIC) support
- Remind button to temporarily turn off the system-error LED
- Remote system problem-determination support
- ROM-based diagnostics
- ROM checksums
- Serial Presence Detection (SPD) on memory, VPD on system board, power supply, and hard disk drive or solid state drive backplanes, microprocessor and memory expansion tray, and Ethernet cards
- Single-DIMM isolation of excessive correctable error or multi-bit error by the Unified Extensible Firmware Interface (UEFI)
- Solid state drives
- Standby voltage for system-management features and monitoring
- Startup (boot) from LAN through remote initial program load (RIPL) or dynamic host configuration protocol/boot protocol (DHCP/BOOTP)
- System auto-configuring from the configuration menu
- System-error logging (POST and IMM)
- Systems-management monitoring through the Inter-Integrated Circuit (IC) protocol bus
- Uncorrectable error (UE) detection
- Upgradeable POST, Unified Extensible Firmware Interface (UEFI), diagnostics, IMM firmware, and read-only memory (ROM) resident code, locally or over the LAN
- Vital product data (VPD) on microprocessors, system board, power supplies, and SAS/SATA (hot-swap hard disk drive or solid state drive) backplane
- Wake on LAN capability

IBM Systems Director

IBM Systems Director is a platform-management foundation that streamlines the way you manage physical and virtual systems supports multiple operating systems and virtualization technologies in IBM and non-IBM x86 platforms.

Through a single user interface, IBM Systems Director provides consistent views for viewing managed systems, determining how these systems relate to one other, and identifying their statuses, helping to correlate technical resources with business needs. A set of common tasks that are included with IBM Systems Director provides many of the core capabilities that are required for basic management, which means instant out-of-the-box business value. The common tasks include the following:

- Discovery
- Inventory
- Configuration
- System health
- Monitoring
- Updates
- Event notification
- Automation for managed systems

The IBM Systems Director Web and command-line interfaces provide a consistent interface that is focused on driving these common tasks and capabilities:

- Discovering, navigating, and visualizing systems on the network with the detailed inventory and relationships to the other network resources

- Notifying users of problems that occur on systems and the ability to isolate the sources of the problems
- Notifying users when systems need updates and distributing and installing updates on a schedule
- Analyzing real-time data for systems and setting critical thresholds that notify the administrator of emerging problems
- Configuring settings of a single system and creating a configuration plan that can apply those settings to multiple systems
- Updating installed plug-ins to add new features and functions to the base capabilities
- Managing the life cycles of virtual resources

For more information about IBM Systems Director, see the documentation on the *IBM Systems Director* DVD that comes with the server, the IBM Systems Director Information Center at http://pic.dhe.ibm.com/infocenter/director/pubs/index.jsp?topic=%2Fcom.ibm.director.main.helps.doc%2Ffqm0_main.html, and the Systems Management website at http://www.ibm.com/systems/management/, which presents an overview of IBM Systems Management and IBM Systems Director.

Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off. For the locations of other LEDs on the system board, see "System-board LEDs" on page 32.

Front view

The following illustrations show the controls, LEDs, and connectors on the front of your server model.

2.5-inch hard disk drive server model.
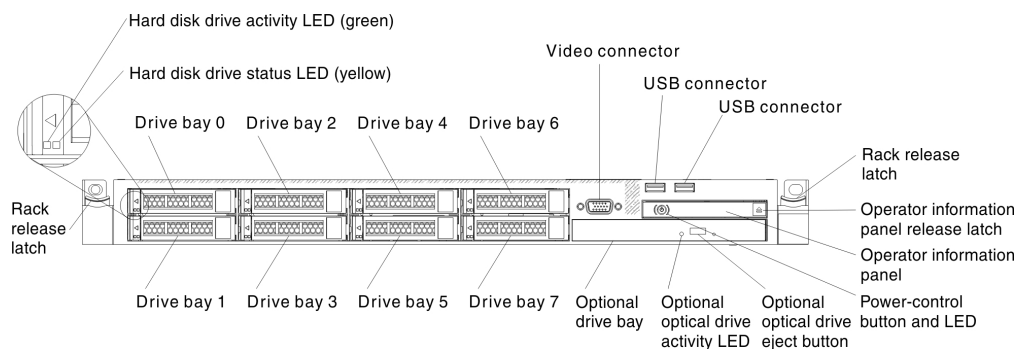
Figure 4. 2.5-inch front view

3.5-inch hard disk drive server model.

Drive bay 0   Drive bay 2   Power-control button and LED   Operator information panel

Drive bay 1   Video connector   USB connector   Operator information panel release latch

USB connector   USB connector
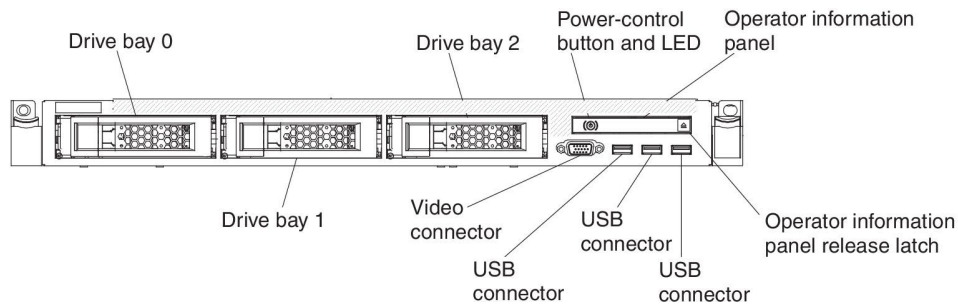
Figure 5. 3.5-inch front view

- **Rack release latches:** Press the latches on each front side of the server to remove the server from the rack.
- **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.
- **Optional DVD eject button:** Press this button to release a DVD or CD from the optional DVD drive.
- **Optional DVD drive activity LED:** When this LED is lit, it indicates that the optional DVD drive is in use.
- **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" on page 17.
- **Operator information panel release latch:** Press the blue release latch to pull out the light path diagnostics panel and view the light path diagnostics LEDs and buttons. See "Light path diagnostics panel" on page 18 for more information about the light path diagnostics.
- **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

   Note: The maximum video resolution is 1600 x 1200 at 75 Hz.
- **USB connectors:** Connect a USB device, such as a USB mouse or keyboard to any of these connectors.

Operator information panel

The following illustrations show the controls and LEDs on the advanced operator information panel and the operator information panel depending on your server model.

Power-control button/
power-on LED

Ethernet activity   Locator button/   System-error
LEDs   locator LED   LED

Ethernet icon   Check log LED   Release latch
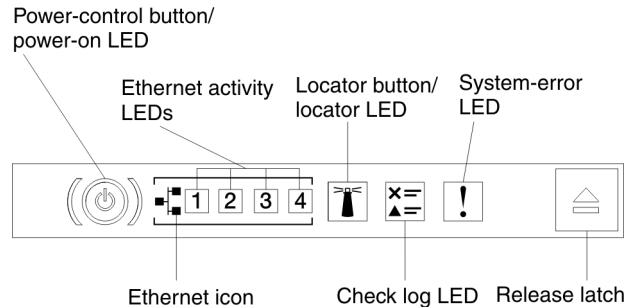
Figure 6. Advanced operator information panel

Power-control button/
power-on LED

Ethernet activity   Locator button/   System-error
LEDs   locator LED   LED

Ethernet icon   Check log LED   Reset button
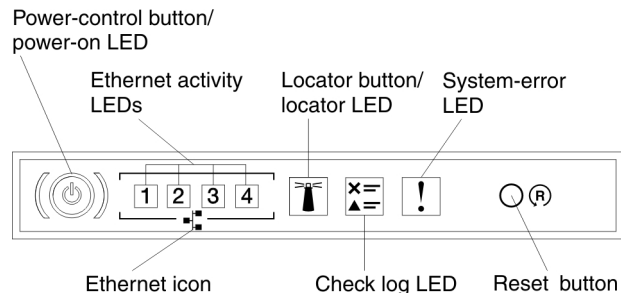
Figure 7. Operator information panel

- **Power-control button and power-on LED:** Press this button to turn the server on and off manually. 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 lit, 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 button/LED:** Use this blue LED to visually locate the server among other servers. A system-locator LED is also on the rear of the server. This LED is used as a presence detection button as well. You can use IBM Systems Director or IMM web interface to light this LED remotely. This LED is controlled by the IMM. The locator button is pressed to visually locate the server among the others servers.

- **Check log LED:** When this yellow LED is lit, it indicates that a system error has occurred. Check the event log for additional information. See "Event logs" on page 136 for more information about event logs.

- **System-error LED:** When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the light path diagnostics panel on the operator information panel or on the system board is also lit to help isolate the error. This LED is controlled by the IMM.

Notes:

1. Depending on the type of operator information panel installed in your server, the **Reset button** is on the operator information panel or the light path diagnostics panel.

2. You don't have to pull out the operator information panel to obtain more information if there's no release latch existed in your server model.

Light path diagnostics panel

The light path diagnostics panel is located on the top of the operator information panel.

For additional information about the LEDs on the light path diagnostics panel, see "Light path diagnostics LEDs" on page 126.

Note: The system service label inside the server cover also provides information about the location of the light path diagnostics LEDs.

To access the light path diagnostics panel, press the blue release latch on the operator information panel. Pull forward on the panel until the hinge of the operator information panel is free of the server chassis. Then pull down on the panel, so that you can view the light path diagnostics panel information.
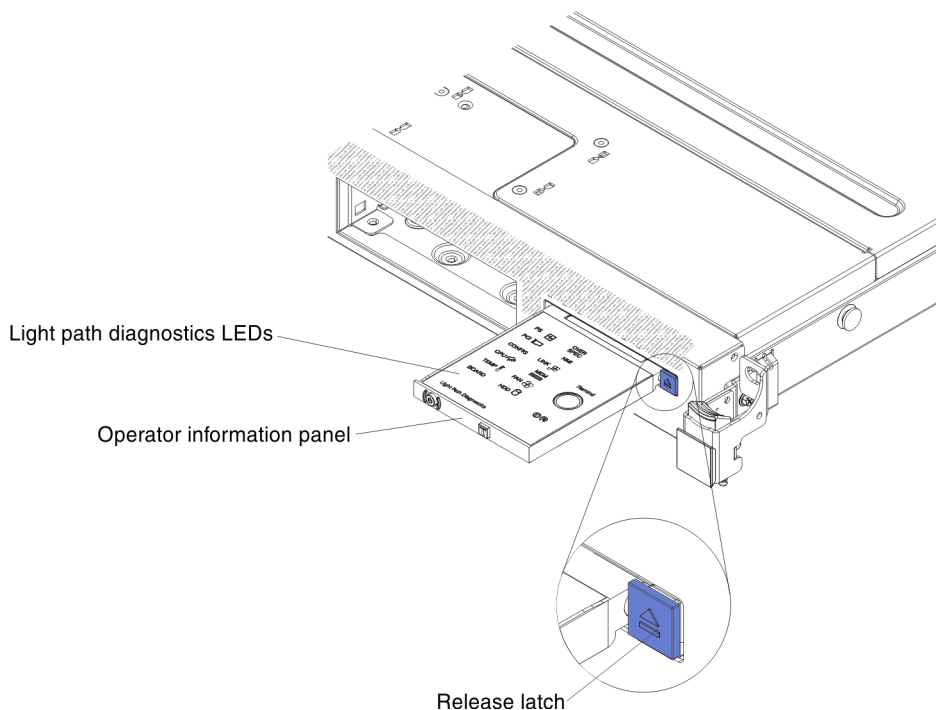
Figure 8. Light path diagnostics panel exposure

The following illustration shows the LEDs and controls on the light path diagnostics panel.
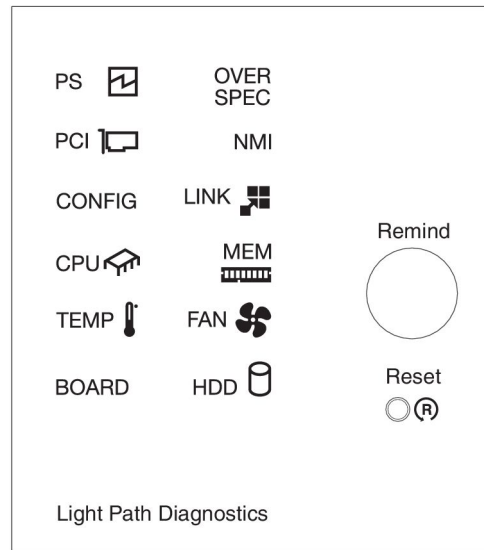
Figure 9. Light path diagnostics panel

- **Remind button:** This button places the system-error 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.

- **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.

Rear view

The following illustration shows the connectors on the rear of the server.
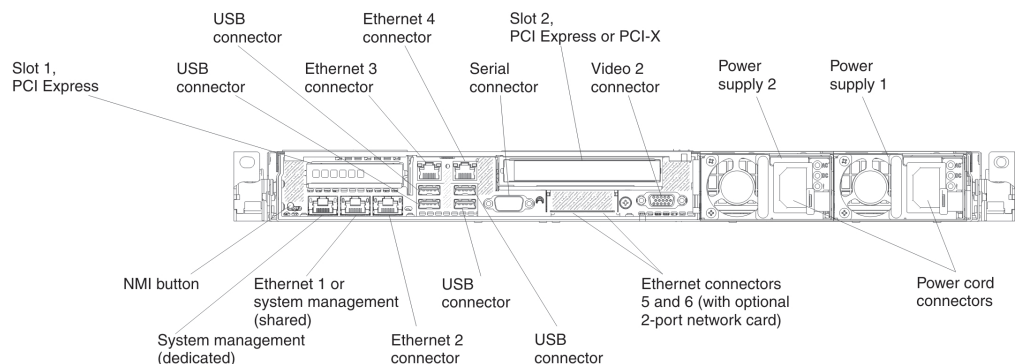
Figure 10. Rear view connectors

- **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. The NMI button is in the lower left-hand corner on the rear of the server.

- **PCI slot 1:** Insert a low-profile PCI Express adapter into this slot.
- **PCI slot 2:** Insert a half-length, full-height PCI Express or PCI-X 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. The video connectors on the front and rear of the server can be used simultaneously.

  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 (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 (default) connector.

The following illustration shows the LEDs on the rear of the server.
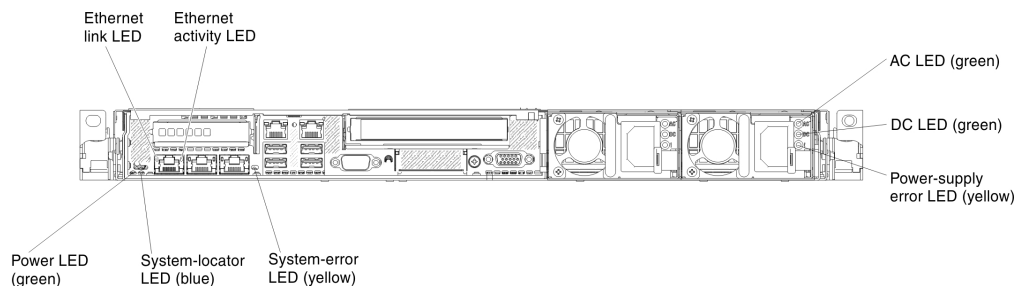
Figure 11. Rear view LEDs

The following illustration shows the LEDs on a dc power supply.
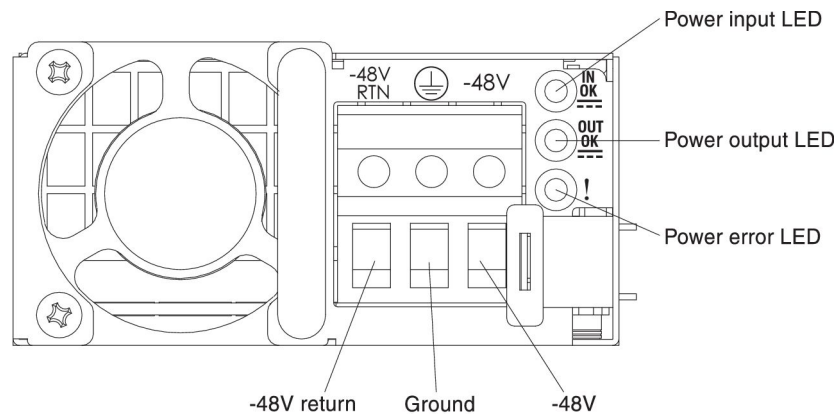
Figure 12. DC power supply LEDs

- **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 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.
- **AC power LED:** Each hot-swap ac 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. For any other combination of LEDs, see "AC power-supply LEDs" on page 132.
- **DC power LED:** Each hot-swap ac power supply has a dc 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. For any other combination of LEDs, see "AC power-supply LEDs" on page 132.
- **IN OK power LED:** Each hot-swap dc power supply has an IN OK power LED. When the IN OK power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, both the IN OK and OUT OK power LEDs are lit. For any other combination of LEDs, see "DC power-supply LEDs" on page 133.
- **OUT OK power LED:** Each hot-swap dc power supply has an OUT OK power LED. When the OUT OK power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During typical operation, both the IN OK and OUT OK power LEDs are lit. For any other combination of LEDs, see "DC power-supply LEDs" on page 133.
- **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.
- **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.

- **System-locator LED:** Use this LED to visually locate the server among other servers. You can use IBM Systems Director or IMM2 web interface to light this LED remotely.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

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. Ethernet 1 connector supports Wake on LAN feature.
3. When you turn on the server with the graphical adapters installed, the IBM logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.

Turning off the server

When you turn off the server and leave it connected to power, the server can respond to requests to the service processor, such as a remote request to turn on the server. While the server remains connected to 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.
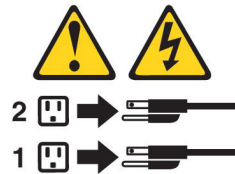
The server can be turned off in any of the following ways:

- 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 riser-card assembly and the PCI-X riser-card 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.

Chapter 2. Installing optional devices

This section provides detailed instructions for installing optional hardware devices in the server.

In addition to the instructions in this chapter for installing optional hardware devices, updating the firmware and device drivers, and completing the installation, IBM Business Partners must also complete the steps in "Instructions for IBM Business Partners" on page 26.

Important: To help ensure that the devices that you install work correctly and do not introduce problems, observe the following precautions:

1. Make sure that the server and the installed firmware levels support the devices that you are installing. If necessary, update the UEFI and IMM firmware and any other firmware that is stored on the system board. For information about where firmware is stored in the server, see "Updating the firmware" on page 91. For a list of supported optional devices for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

2. Use the best practices to apply current firmware and device-driver updates for the server and optional devices. To download the "IBM System x Firmware Update Best Practices" document, go to www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5082923&brandind=5000008. Additional hints and tips are available from the following sites:

   - IBM support: http://www.ibm.com/supportportal/
   - System x configuration tools: http://www.ibm.com/systems/x/hardware/configtools.html

3. Before you install optional hardware devices, 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. If the server is not working correctly, see "Running the DSA Preboot diagnostic programs" on page 141 for information about how to run diagnostics.

4. Follow the installation procedures in this chapter and use the correct tools. Incorrectly installed devices can cause system failure because of damaged pins in sockets or connectors, loose cabling, or loose components.

Instructions for IBM Business Partners

In addition to the instructions in this chapter for installing optional hardware devices, updating firmware and device drivers, and completing the installation, IBM Business Partners must also complete the following steps:

1. After you have confirmed that the server starts correctly and recognizes the newly installed devices and that no error LEDs are lit, run the Dynamic System Analysis (DSA) stress test. For information about using DSA, see "IBM Dynamic System Analysis" on page 139.

2. Shut down and restart the server multiple times to ensure that the server is correctly configured and functions correctly with the newly installed devices.

3. Save the DSA log as a file and send it to IBM. For information about transferring data and logs, see "How to send DSA data to IBM."

4. To ship the server, repackage it in the original undamaged packing material and observe IBM procedures for shipping.

Support information for IBM Business Partners is available at http://www.ibm.com/partnerworld/.

How to send DSA 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/
- **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/

Server components

The following illustration shows the major components in the server.

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

Figure 13. Server components

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.

System-board internal connectors

The following illustration shows the internal connectors on the system board.
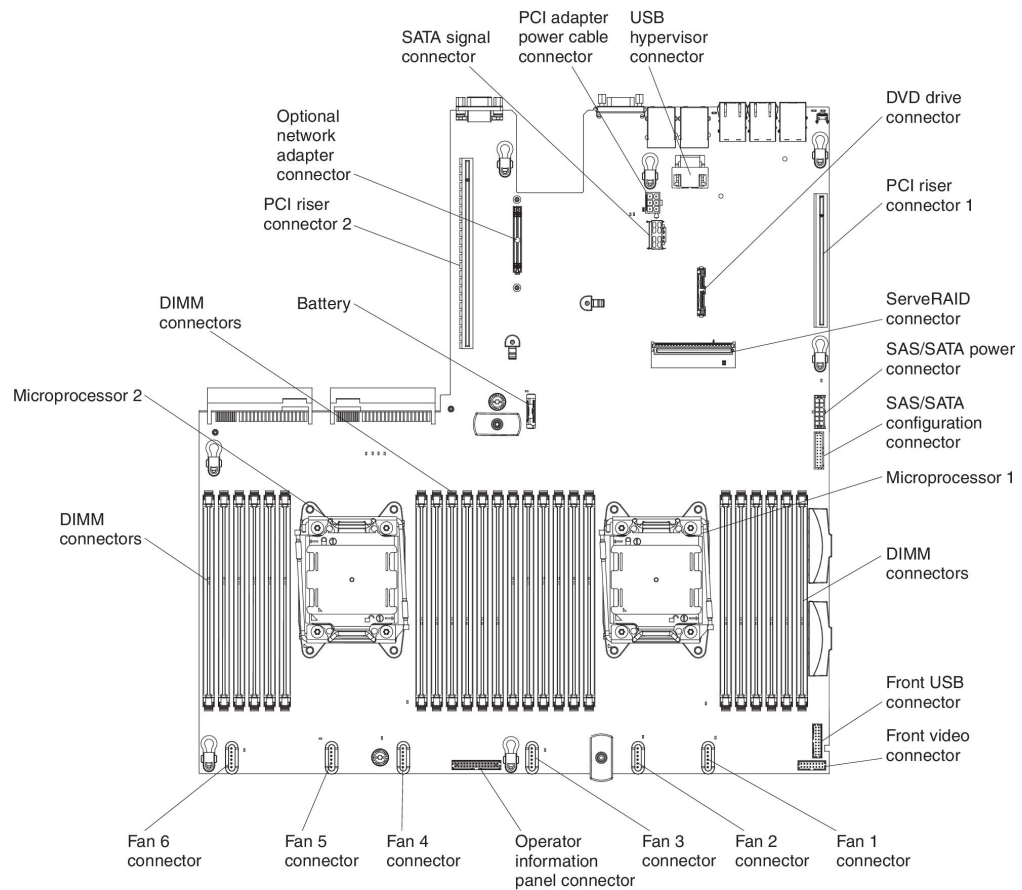
Figure 14. System-board internal connectors

System-board external connectors

The following illustration shows the external connectors on the system board.
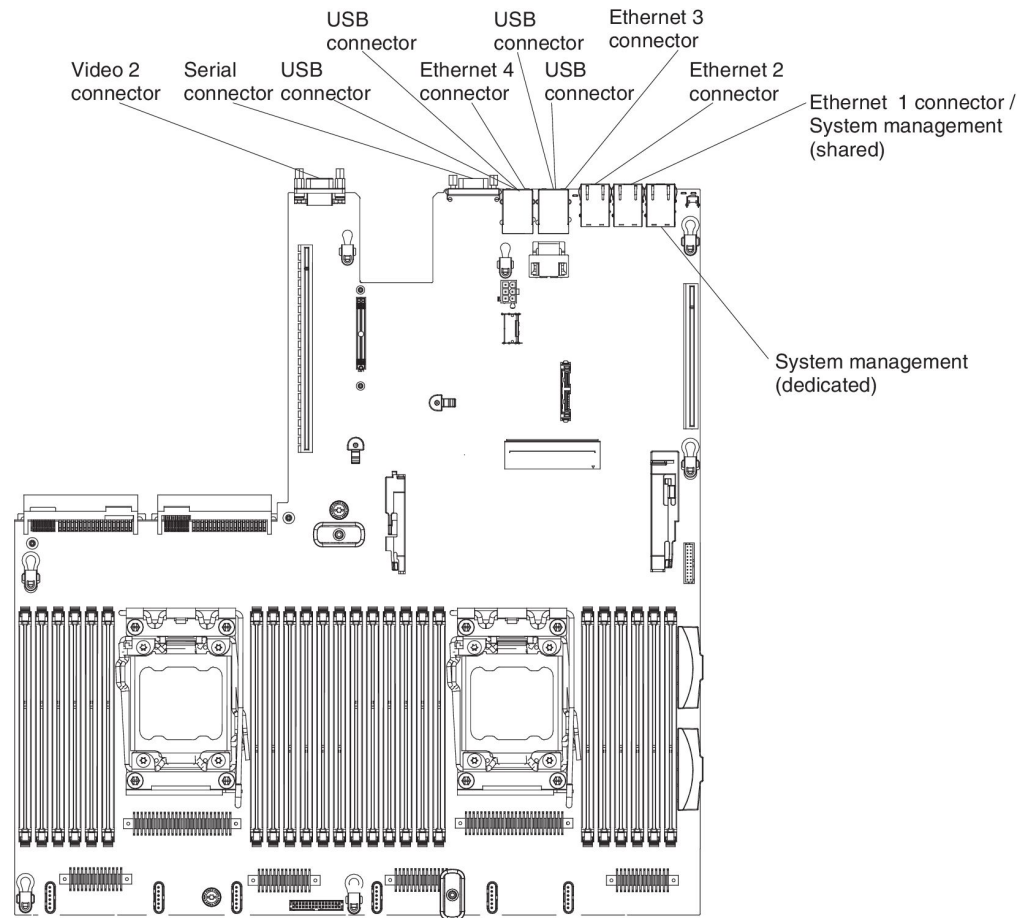
Figure 15. System-board external connectors

System-board switches, jumpers, and buttons

The following illustration shows the location of the switches, jumpers, and buttons on the server.

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.
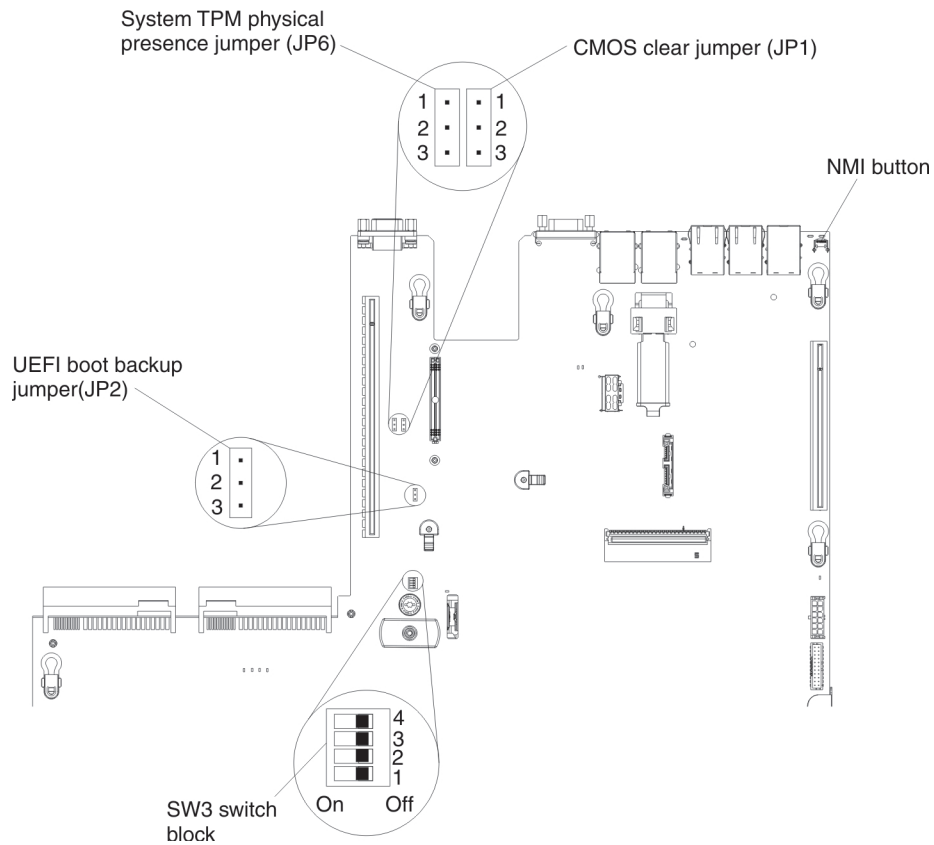
Figure 16. System-board switches, jumpers, and buttons

The following table describes the jumpers on the system board.

Table 2. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	CMOS clear jumper	• Pins 1 and 2: Normal (default). • Pins 2 and 3: Clears the real-time clock (RTC) registry.
JP2	UEFI boot backup jumper	• Pins 1 and 2: Normal (default). Loads the primary server firmware ROM page. • Pins 2 and 3: Loads the secondary (backup) server firmware ROM page.
JP6	System TPM physical presence jumper	• Pins 1 and 2: Normal (default). • Pins 2 and 3: Indicates a physical presence to the system TPM.
Notes:		
1. If no jumper is present, the server responds as if the pins are set to the default.		
2. Changing the position of the UEFI boot backup jumper (JP2) from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem.		

The following table describes the functions of the SW3 switch block on the system board.

Table 3. System board SW3 switch block definition

Switch number	Default position	Description
1	Off	Reserved.
2	Off	Reserved.
3	Off	Reserved.
4	Off	Power-on password override. Changing the position of this switch 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. You do not have to move the switch back to the default position after the power-on password in overridden. Changing the position of this switch does not affect the administrator password check if an administrator password is set. See "Passwords" on page 101 for additional information about passwords.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in "Safety" on page vii, "Installation guidelines" on page 33, "Handling static-sensitive devices" on page 36, and "Turning off the server" on page 23.
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

The following table describes the functions of the button on the system board.

Table 4. Button on the server

Button name	Function
Force NMI button	This button is on the rear of the server. Press this button to force a nonmaskable interrupt to the microprocessor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump (use this button only when you are directed to do so by IBM Support).

System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.
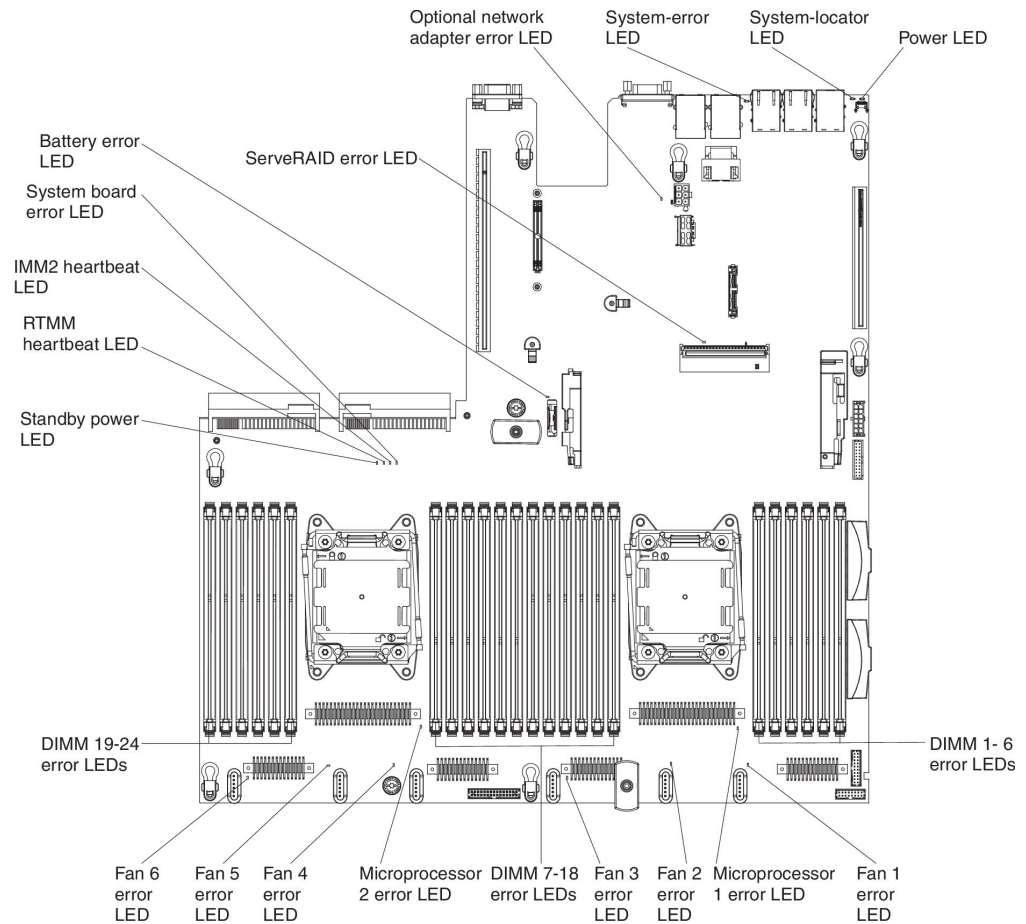
Figure 17. System-board LEDs

System-board optional-device connectors

The following illustration shows the connectors on the system board for the optional devices.
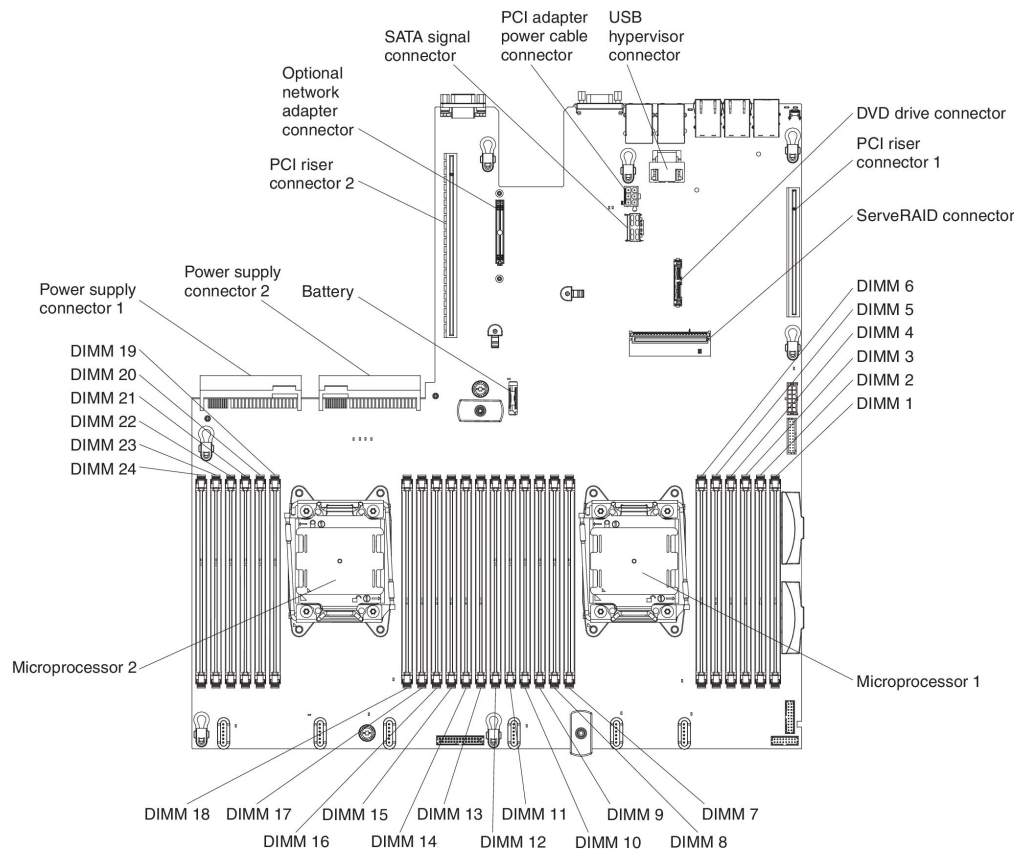
Figure 18. System-board optional-device connectors

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:

- Read the safety information in "Safety" on page vii, the guidelines in "Working inside the server with the power on" on page 35, and "Handling static-sensitive devices" on page 36. This information will help you work safely.

- 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/.

- 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/.

- 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. If the server is not working correctly, see "Running the DSA Preboot diagnostic programs" on page 141 for information about how to run diagnostics.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- 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, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the server connected to power.
- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, 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.
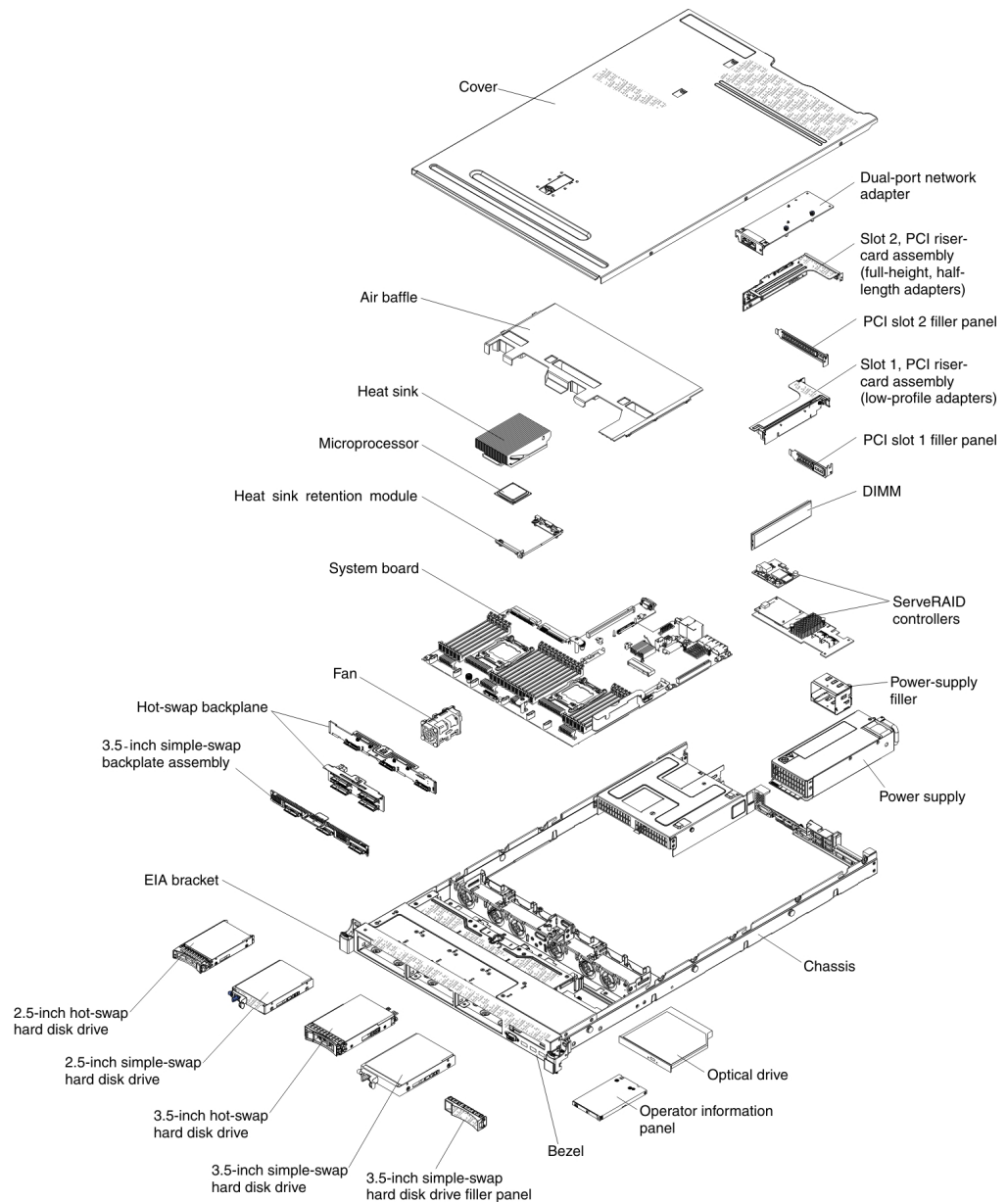- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server 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.

System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- Each of the power-supply bays has a power supply or a filler 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 fan within 30 seconds of removal.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You have replaced a failed hot-swap power supply within 2 minutes of removal.
- You do not operate the server without the air baffle installed. Operating the server without the air baffle might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a socket cover or a microprocessor and heat sink.
- You have installed the fourth and sixth fans when you installed the second microprocessor option.

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.

You might have to have the server turned on while the cover is off, to look at light path diagnostics LEDs or replace hot swap components. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working 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 could 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 working 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 surface 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 handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the cover

To remove the server cover, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. If the server has been installed in a rack, slide the server out from the rack enclosure.
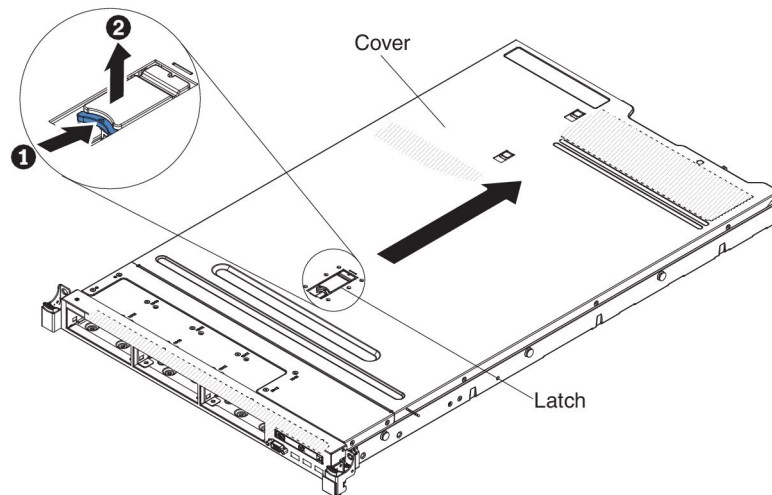
Figure 19. Cover removal

4. Pull up firmly on the blue latch on the top (in the center of the front of the server) of the cover and slide the cover toward the rear of the server until the cover has disengaged from the chassis.

5. Lift the server cover off the server and set it aside.

   Attention: For proper cooling and airflow, replace the server cover before you turn on the server.

Removing the air baffle

To remove the air baffle, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Turning off the server" on page 23).

3. Remove the cover (see "Removing the cover" on page 36).

4. Grasp the air baffle, disengage pins from pin holes; then, lift the air baffle up.
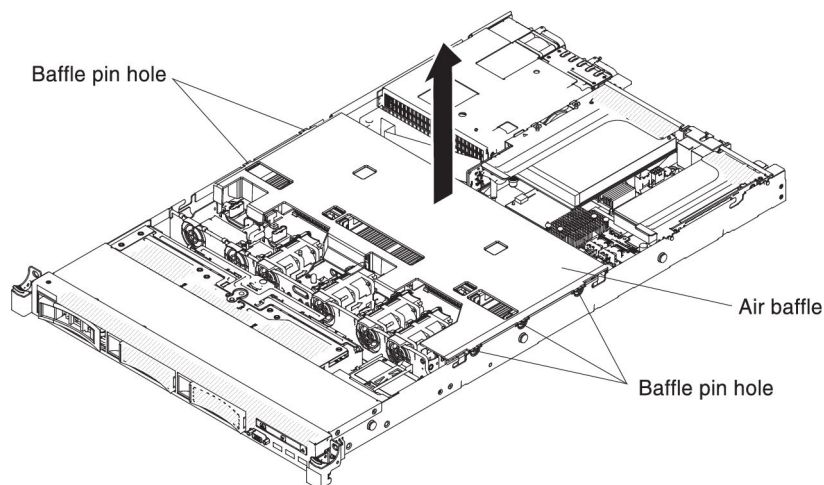
Figure 20. Air baffle removal

5. Remove the air baffle from the server and set it aside.

> **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.

Installing drives

The following notes describe the type of hard disk drives that the server supports and other information that you must consider when you install a hard disk drive. For a list of supported hard disk drives, see http://www.ibm.com/systems/info/ x86servers/serverproven/compat/us/.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA hard disk drive, be sure to set the SAS or SATA ID for that device.
- The hot-swap server models support up to eight 2.5-inch or three 3.5-inch hot-swap SAS or SATA hard disk drives.
- The simple-swap server models support up to three 3.5-inch simple-swap SATA hard disk drives.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI adapter or PCI Express adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

Drive IDs

The drive ID that is assigned to each drive is printed on the front of the server. The following illustrations show the locations of the IDs of the drives. The ID numbers and the drive bay numbers are the same.

2.5-inch hot-swap hard disk drive IDs

The hot-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.

Hard disk drive
activity LED (green)

Hard disk drive
status LED (yellow)

Drive bay 0   Drive bay 2   Drive bay 4   Drive bay 6

Drive bay 1   Drive bay 3   Drive bay 5   Drive bay 7

Figure 21. 2.5-inch hot-swap hard disk drive IDs

3.5-inch hot-swap hard disk drive IDs

The hot-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.

Hard disk drive
activity LED (green)

Hard disk drive
status LED (yellow)

Drive bay 0   Drive bay 2

Drive bay 1
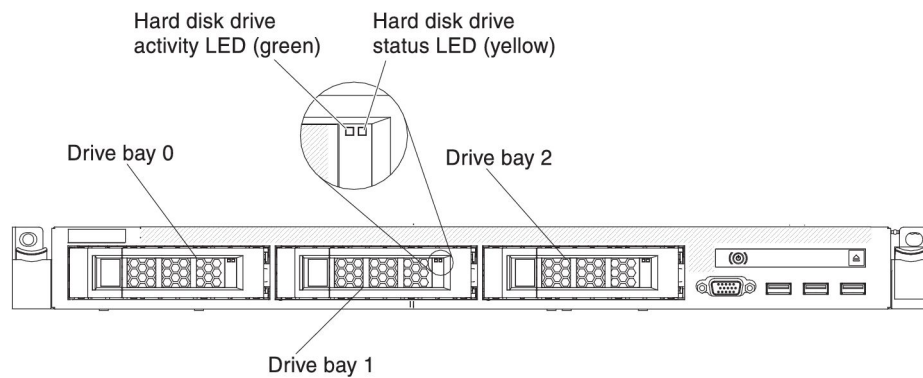
Figure 22. 3.5-inch hot-swap hard disk drive IDs

2.5-inch simple-swap hard disk drive IDs

The simple-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.

Drive bay 0
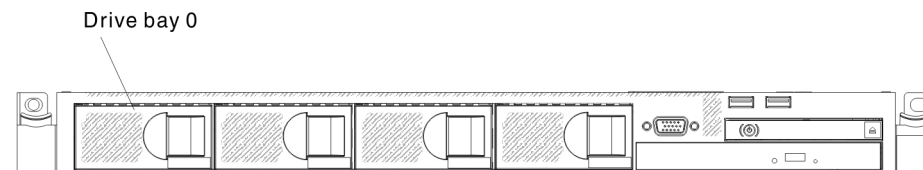
Figure 23. 2.5-inch simple-swap hard disk drive IDs

3.5-inch simple-swap hard disk drive IDs

The simple-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.

Drive bay 0   Drive bay 2

Drive bay 1
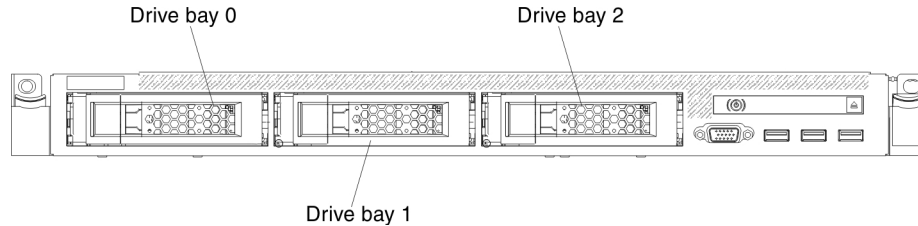
Figure 24. 3.5-inch simple-swap hard disk drive IDs

Installing hot-swap hard disk drives

To install a hot-swap SAS or SATA hard disk drive, complete the following steps.

Note: If you have only one hard disk drive, you must install it in the bay 0 (upper-left).

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Remove the filler panel from the empty drive bay. Keep the filler panel in a safe place.
3. 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.
4. Install the hard disk drive in the drive bay:

    a. Make sure that the tray handle is in the open (unlocked) position.

    b. Align the drive with the guide rails in the bay.

2.5-inch hot-swap hard disk drive

Drive handle

3.5-inch hot-swap hard disk drive

Drive handle

Figure 25. Hot-swap hard disk drives installation

  c. Gently push the drive into the bay until the drive stops.

  d. Rotate the tray handle to the closed (locked) position.

  e. Check the hard disk drive status LED to verify that the hard disk drive is operating correctly. If the yellow hard disk drive status LED of a drive 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.

    Note: If the server is configured for RAID operation using a ServeRAID adapter, you might have to reconfigure your disk arrays after you install

hard disk drives. See the ServeRAID adapter documentation for additional information about RAID operation and complete instructions for using the ServeRAID adapter.

5. If you are installing additional hot-swap hard disk drives, do so now.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing simple-swap hard disk drives

You must turn off the server before installing simple-swap drives in the server. Before you install a simple-swap SATA hard disk drive, read the following information. For a list of supported hard disk drives, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

- Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SATA device, be sure to set the SATA ID for that device.
- You can install up to three 3.5-inch simple-swap SATA hard disk drives in the server. Do not install hot-swap drives into a simple-swap server model, it is not supported.
- You can install one 2.5-inch simple-swap SATA hard disk drives in bay 0 in the server. Do not install hot-swap drives into a simple-swap server model, it is not supported.
- The simple-swap server models are available only in non-RAID configurations.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.

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

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the filler panel from the empty drive bay.
4. 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.
5. Install the hard disk drive in the drive bay:
   a. 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.

Figure 26. 2.5-inch simple-swap hard disk drive installation
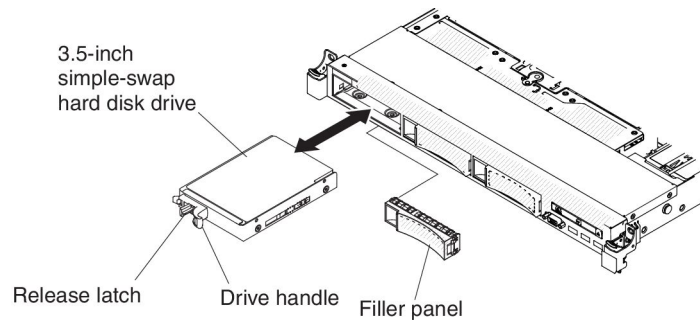
Figure 27. 3.5-inch simple-swap hard disk drive installation

    b. Gently push the drive into the bay until the drive stops.

6. Reinstall the drive bay filler panel that you removed earlier.

7. If you are installing additional simple-swap hard disk drives, do so now.

Installing an optional DVD drive

To install an optional DVD drive, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

    Note: When you disconnect the power source from the server, you lose the ability to view the LEDs because the LEDs are not lit when the power source is removed. Before you disconnect the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, on the light path diagnostics panel, and LEDs inside the server on the system board.

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the DVD drive filler panel if it is installed. Locate the blue release tab on the rear of the DVD drive filler panel; then, while you press the tab, push the DVD drive filler panel out of the drive bay.

Release tab

DVD drive filler panel

Figure 28. DVD drive filler panel removal

5. Remove the retention clip from the side of the DVD drive filler panel. Save the DVD drive filler panel for future use.

Note: If you are installing an optical 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

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

7. Follow the instructions that come with the DVD drive to set any jumpers or switches.

8. Attach the drive retention clip that you removed from the DVD drive filler panel to the side of the new DVD drive.
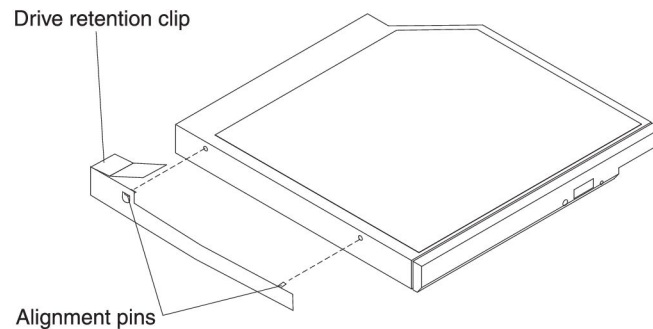
Figure 29. DVD drive retention clip installation

9. Align the DVD drive in the drive bay and slide the DVD drive into the optical drive bay until the DVD drive clicks into place.
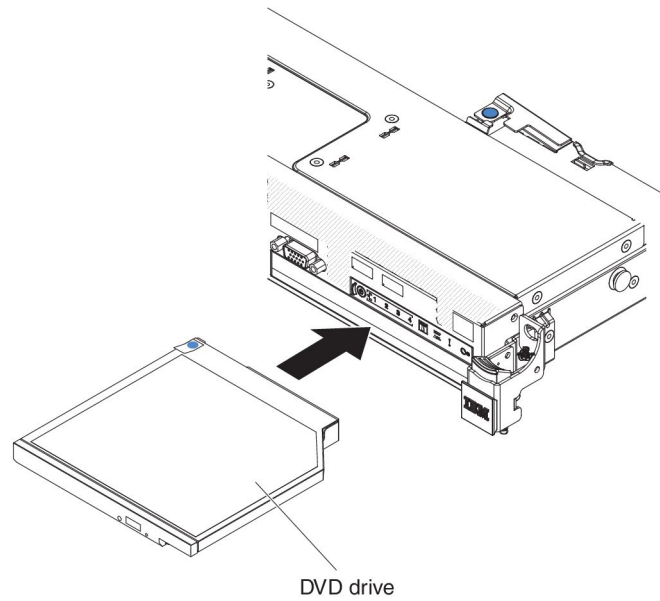
DVD drive

Figure 30. DVD drive installation

10. Connect the DVD drive cable (see "Replacing the DVD drive cable" on page 217). The following illustration shows the cable routing for the DVD drive:
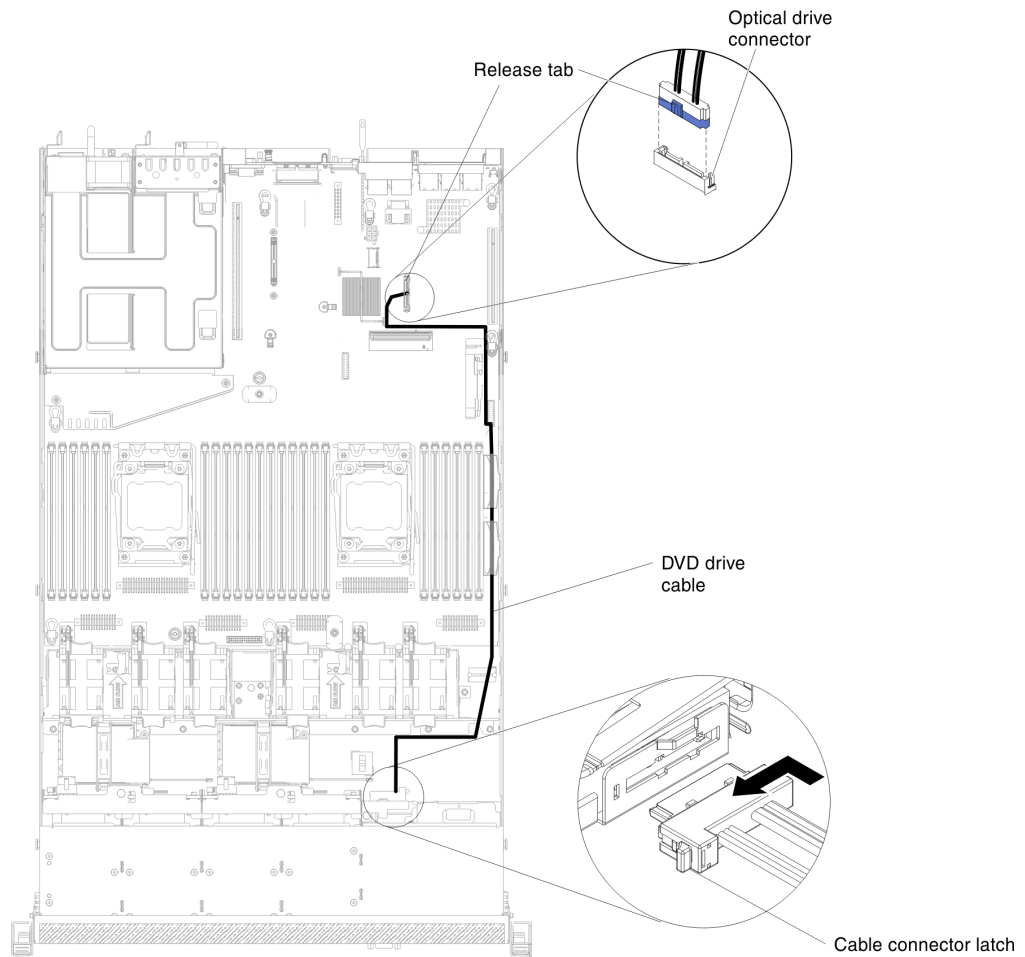
Figure 31. DVD drive cable routing

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing an optional DVD drive cable

To install the DVD drive cable, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Align the cable connector with the connector on the rear of the DVD drive cage. Press the cable connector into the optical drive cage connector and slide it to the left until it is firmly seated.

Cable
connector
latch
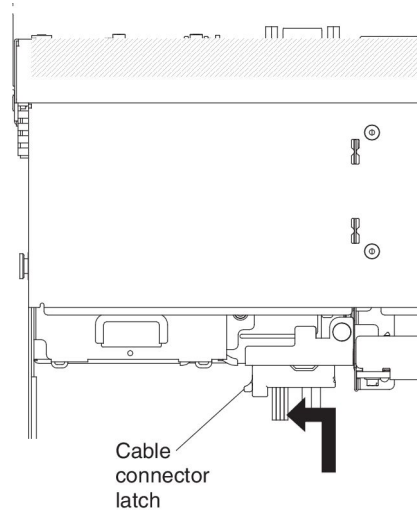
Figure 32. DVD drive cable latch

The following illustration shows cable routing for the DVD cable:

Attention: Follow the optical drive cable routing as the illustration shows. Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.
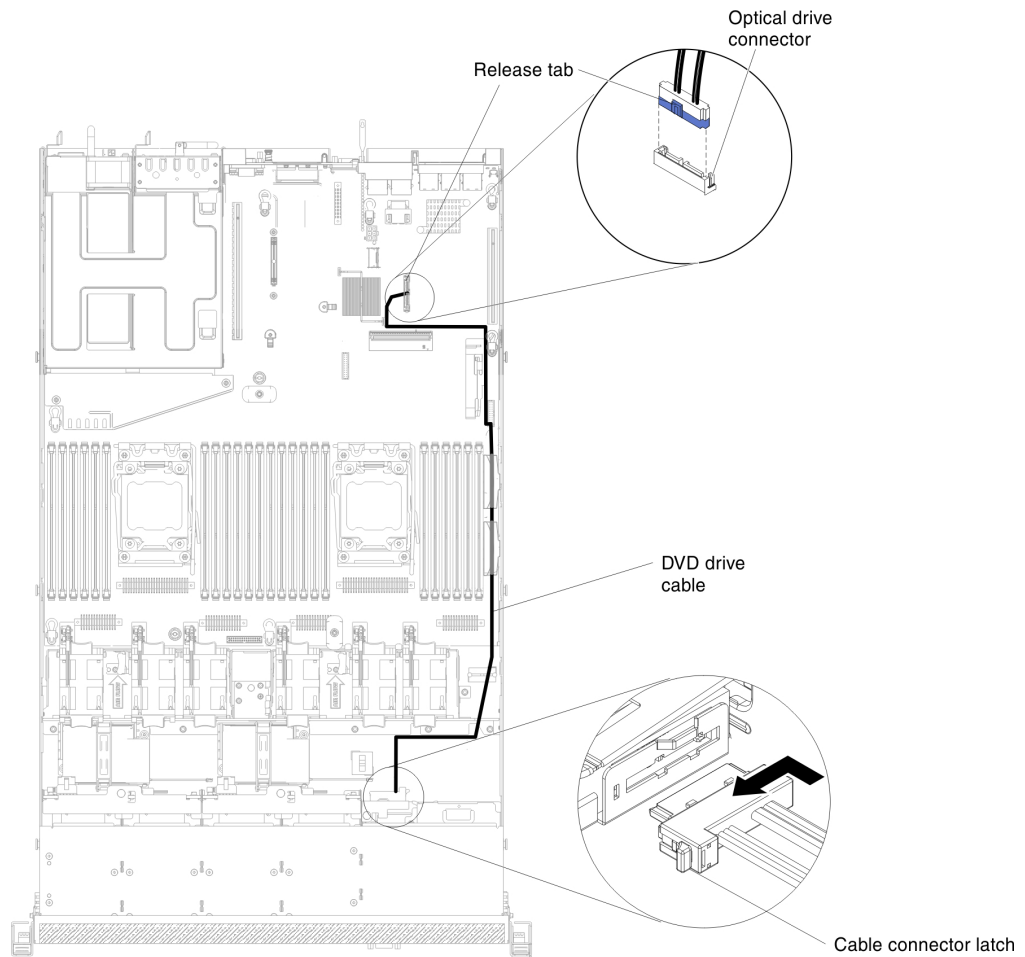
Figure 33. DVD drive cable routing

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

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/systems/info/x86servers/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 5. Maximum memory installation using ranked DIMMs

Number of DIMMs	DIMM type	DIMM size	Total memory
16	Dual-rank UDIMMs	4 GB	64 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 4 GB. The server supports a minimum of 4 GB and a maximum of 64 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 92.
- 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.

Notes:

1. 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.
2. DIMM slots 13-24 are reserved for microprocessor 2; thus, DIMM slots 13-24 are enabled when microprocessor 2 is installed.

The following illustration shows the location of the DIMM connectors on the system board.

Figure 34. DIMM connectors location

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 genaral, all three channels on the memory interface for each microprocessor can be populated in any order and have no matching requirements.

Table 6. Normal mode DIMM installation sequence

Number of installed microprocessor	DIMM connector population sequence
One microprocessor installed	1, 4, 9, 12, 2, 5, 8, 11, 3, 6, 7, 10
Two microprocessors installed	1, 13, 4, 16, 9, 21, 12, 24, 2, 14, 5, 17, 8, 20, 11, 23, 3, 15, 6, 18, 7, 19, 10, 22

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. To enable memory mirrored channel through the Setup utility, select **System Settings** > **Memory**. For more information, see "Using the Setup utility" on page 96. 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 channel 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 channel.
- 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 in memory mirrored channel mode.

The following diagram lists the DIMM connectors on each memory channel.

Figure 35. Connectors on each memory channel

The following table shows the installation sequence for memory mirrored channel mode:

Table 7. 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	3, 6
Sixth pair of DIMMs	1	7, 10
Seventh pair of DIMMs	2	13, 16
Eighth pair of DIMMs	2	21, 24
Ninth pair of DIMMs	2	14, 17
Tenth pair of DIMMs	2	20, 23
Eleventh pair of DIMMs	2	15, 18
Twelfth pair of DIMMs	2	19, 22

Table 7. Memory mirrored channel mode DIMM population sequence (continued)

Number of DIMMs	Number of installed microprocessor	DIMM connector
Note: DIMM connectors 3, 6, 7, 10, 15, 18, 19, and 22 are not used in memory mirrored channel mode when UDIMMs are installed in the server.		

Memory rank sparing

The memory rank sparing feature disables the failed memory from the system configuration and activates a rank sparing DIMM to replace the failed active DIMM.

You can enable rank sparing memory in the Setup utility, select **System Settings** > **Memory**. For more information, see "Using the Setup utility" on page 96. When you use the memory rank sparing feature, consider the following information:

- The memory rank sparing feature is supported on server models with an Intel Xeon™ E5-2600 series microprocessor.
- The maximum available memory is reduced when memory rank sparing mode is enabled.

The following diagram lists the DIMM connectors on each memory channel.

Figure 36. Connectors on each memory channel

Follow the installation sequence for rank sparing mode:

- Install at least one quad-rank DIMM in a channel.
- Install at least two single-rank or dual-rank DIMMs in a channel.

Table 8. 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
Twelfth pair of DIMMs	2	15, 18

Table 8. Memory rank sparing mode DIMM population sequence (continued)

Number of DIMMs	Number of installed microprocessor	DIMM connector
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 memory module

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
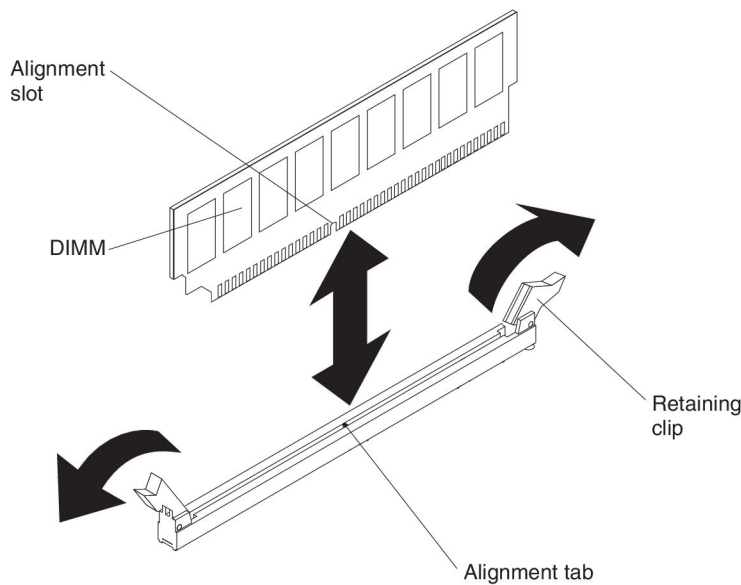
Figure 37. DIMM removal

6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
7. Turn the DIMM so that the alignment slot align correctly with the alignment tab.
8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector (see "System-board optional-device connectors" on page 32 for the locations of the DIMM connectors).
9. 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.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

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:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section.
- The server provides one internal SAS/SATA RAID connector and two PCI slots on the system board. See "System-board optional-device connectors" on page 32 for the location of the internal SAS/SATA RAID connector and riser-card slots. You can replace the IBM ServeRAID SAS/SATA adapter with an optional IBM ServeRAID SAS/SATA adapter in the slot. For configuration information, see the ServeRAID documentation at http://www.ibm.com/supportportal/.
- 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.
- Read the following table before installing memory modules when any Quadro adapters is installed.

Table 9. NVIDIA Quadro video adapter configurations

Description	Supported maximum total memory size
Quadro 600 adapter	128 GB
Quadro 2000 adapter	512 GB

- Read the following table before installing NAND flash adapters.

Table 10. NAND flash configurations

Description	Option part number	PCI riser 1	PCI riser 2
IBM 365 GB High IOPS MLC mono adapter	46C9078	Two microprocessors installed	Two microprocessors installed
IBM 785 GB High IOPS MLC mono adapter	46C9081	Two microprocessors installed	Two microprocessors installed
IBM 1.2 TB high IOPS MLC mono adapter	90Y4377	Two microprocessors installed	Two microprocessors installed
IBM 2.4 TB high IOPS MLC duo adapter	90Y4397	Not supported	Two microprocessors installed

- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported

- The server does not support full-length, full-height PCI adapters or legacy 5V PCI adapters.
- When you install any PCI adapter, the power cords must be disconnected from the power source before you remove the PCI Express riser-card assembly and the PCI-X riser-card assembly. Otherwise, the active power management event signal will be disabled by the system-board logic, and the Wake on LAN feature might not work. However, after the server is powered-on locally, the active power manager active power management event signal will be enabled by the system-board logic.
- The server provides two PCI riser-card slots on the system board. The following information describes the PCI riser-card slots and the type of adapters that the riser cards support:
  - If you want to install a PCI Express or PCI-X adapter, you must order the PCI riser-card option.
  - PCI riser slot 1. This slot supports only low-profile adapters.
  - PCI riser slot 2. This slot supports full-height, half-length adapters.

  The following table lists the supported configurations for the PCI riser-card slots.

Table 11. PCI riser slots supported configurations

PCI riser-card slot number	Configuration 1	Configuration 2 (Two microprocessors installed)	Configuration 3
Slot 1	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket
Slot 2	PCI Express 3.0 (x8) card with a PCI Express riser card with a standard bracket	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket	PCI-X 64-bit/133 MHz card with a PCI-X riser card with a standard bracket

Notes:
1. The instructions in this section apply to any PCI adapter (for example, video graphics adapters or network adapters).
2. 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.
3. Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported.

To install an adapter, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the server cover (see "Removing the cover" on page 36).
4. Follow the cabling instructions, if any come with the adapter. Route the adapter cables before you install the adapter.
5. Insert the adapter into the PCI riser-card assembly, aligning the edge connector on the adapter with the connector on the PCI riser-card assembly. Press the edge of the connector *firmly* into the PCI riser-card assembly. Make sure that

the adapter snaps into the PCI riser-card assembly securely.

Figure 38. Adapter installation

> **Attention:** When you install an adapter, make sure that the adapter is correctly seated in the riser-card assembly and that the riser-card assembly is securely seated in the riser-card connector on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.

6. Install the riser-card assembly in the server (see "Replacing a PCI riser-card assembly" on page 227).

7. Connect the cable to the newly-installed adapter.

   Note: You might need to remove the blue latch from PCI riser-card assembly 2 to easily connect the cables.
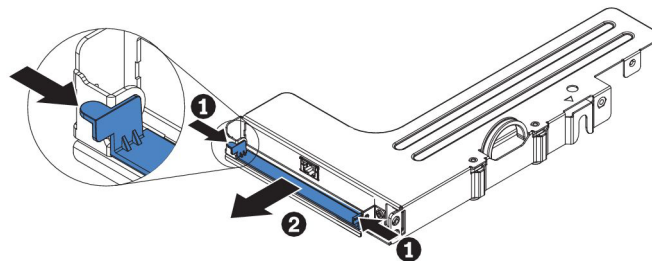
Figure 39. Latch removal

8. Perform any configuration tasks that are required for the adapter.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing a ServeRAID SAS/SATA controller

The ServeRAID SAS/SATA controller can be installed in the dedicated connector on the system board or PCI riser-card slots (see "System-board internal connectors" on page 28 for the location of the connectors). To install a SAS/SATA adapter, complete the following steps:

Depending on the server model, the server comes with a ServeRAID H1110, a ServeRAID M1115, a ServeRAID M5110, or a ServeRAID 5210 SAS/SATA adapter installed.

Note: Remove the PCI bracket that come with ServeRAID H1110, ServeRAID M1115, ServeRAID M5110 SAS/SATA, or a ServeRAID 5210 adapter before installing a SAS/SATA adapter in the dedicated connector on the system board.

Attention:
- You can not install ServeRAID H1110 when microprocessor Intel Xeon E5-2637 (FRU part number 49Y8124) is installed.
- You can not install ServeRAID M1115 or IBM 6Gb performance optimized HBA when Quadro 2000 is installed.

You can replace the ServeRAID controller with another supported ServeRAID controller. For a list of supported ServeRAID controllers, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

Note: For brevity, in this documentation the ServeRAID SAS/SATA controller is often referred to as the *SAS/SATA adapter* or the *ServeRAID adapter*.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove PCI riser-card assembly 1 if necessary (see "Removing a PCI riser-card assembly" on page 226).
5. If you are installing a new or replacement SAS/SATA adapter, touch the static-protective package that contains the new SAS/SATA adapter to any unpainted metal surface on the server. Then, remove the new SAS/SATA adapter from the package.
6. Align the SAS/SATA adapter so that the keys align correctly with the connector on the system board.
7. Insert the SAS/SATA adapter in the dedicated connector on the system board or PCI riser-card slots.

   Attention: Incomplete insertion might cause damage to the server or the adapter.

   a. Insert the SAS/SATA adapter into the RAID connector on the system board until it is firmly seated. The retention brackets secure the SAS/SATA adapter in place when the adapter is firmly seated into the connector.

   Note: Remove the PCI bracket that come with ServeRAID H1110, ServeRAID M1115, or ServeRAID M5110 SAS/SATA adapter before installing a SAS/SATA adapter in the dedicated connector on the system board.

Figure 40. ServeRAID adapter installation

    b. Insert the SAS/SATA adapter into the PCI riser cards (see "Replacing an adapter" on page 231).
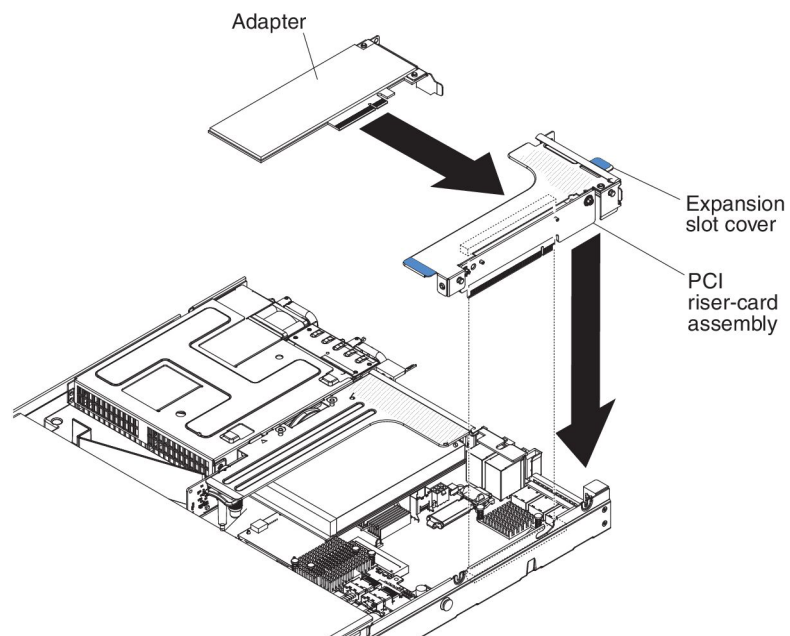
Figure 41. Adapter installation

8. Route the backplane signal cables (see "Cabling backplane" on page 186).
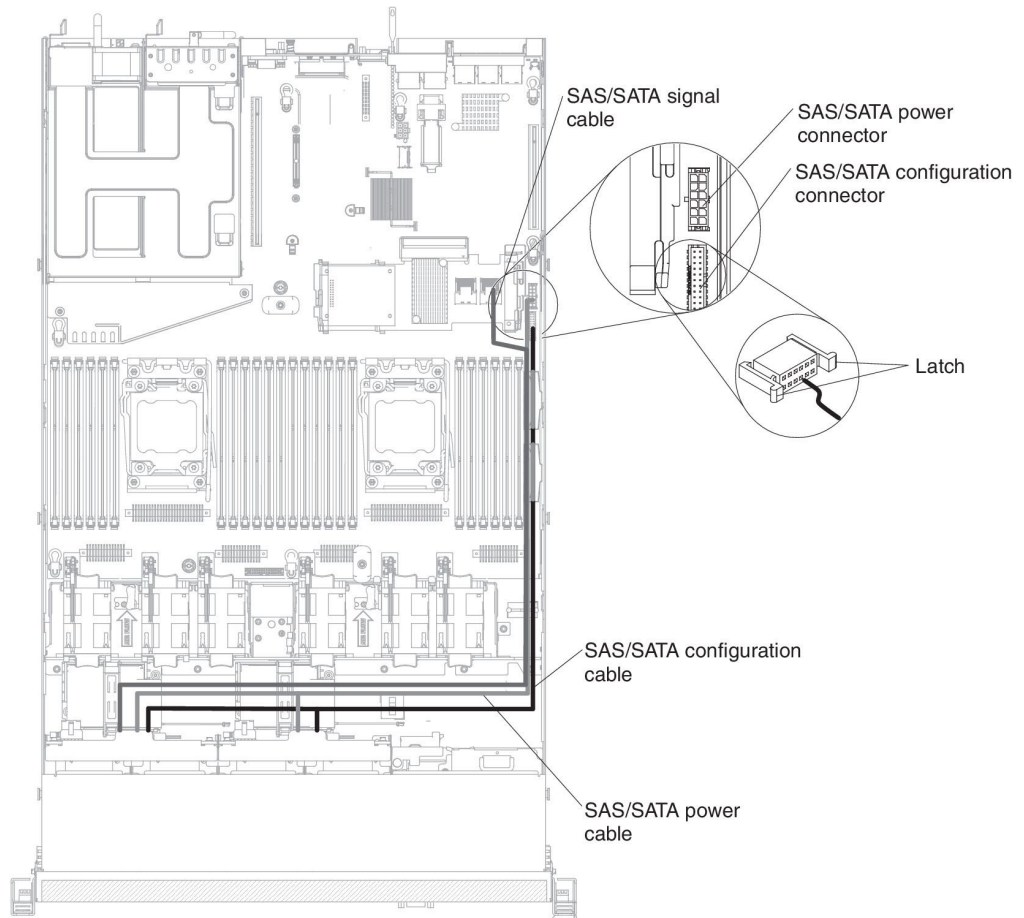
Figure 42. ServeRAID adapter cable routing

9. Connect the signal cables to the SAS/SATA adapter:

   a. **ServeRAID H1110 adapter**: Take the signal cable that is attached to the
      drive backplane for drive bays 0 through 3 and connect it to the SAS/SATA
      connector on the ServeRAID adapter.
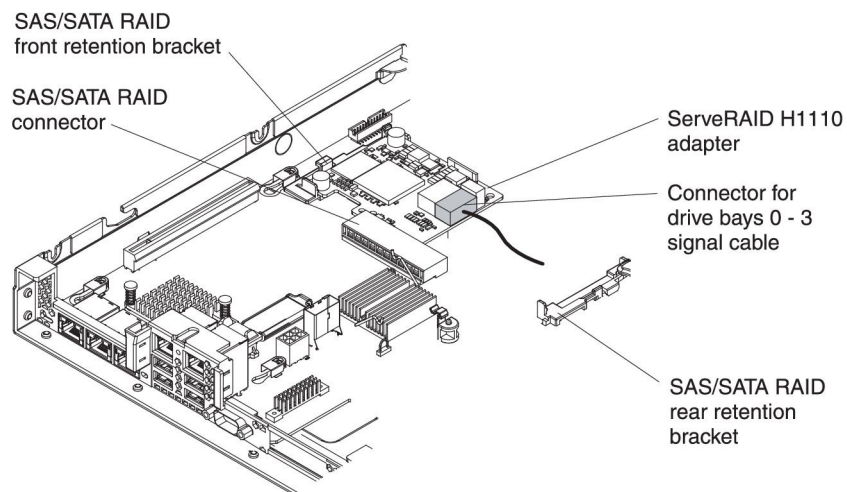
Figure 43. ServeRAID H1110 adapter cable routing

b. **ServeRAID M1115 adapter**: Take the signal cable that is attached to the drive backplane for drive bays 4 through 7 and connect it to the ServeRAID adapter connector for drive bays 4 through 7 (port 1). Connect the other signal cable that is attached to the drive backplane for drive bays 0 through 3 and connect it to the other connector (port 0) on the adapter.
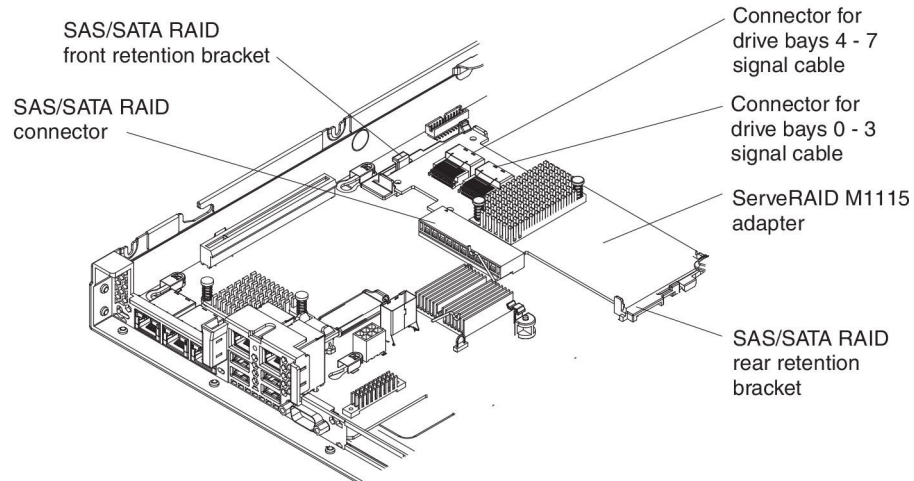
Figure 44. ServeRAID M1115 adapter cable routing

c. **ServeRAID M5110 adapter**: Take the signal cable that is attached to the drive backplane for drive bays 4 through 7 and connect it to the ServeRAID adapter connector for drive bays 4 through 7 (port 1). Connect the other signal cable that is attached to the drive backplane for drive bays 0 through 3 and connect it to the other connector (port 0) on the adapter.
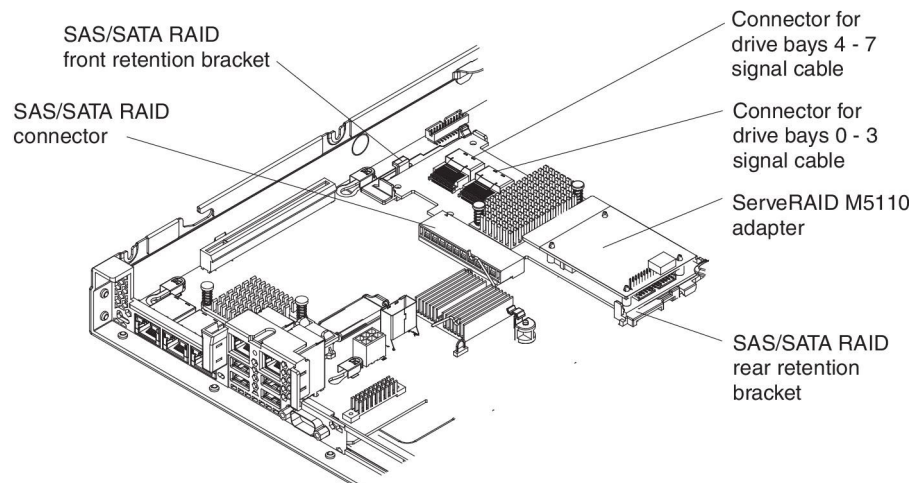
Figure 45. ServeRAID M5110 adapter cable routing

Note: When you restart the server, you are prompted to import the existing RAID configuration to the new ServeRAID adapter.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing the ServeRAID adapter memory module

To install the ServeRAID adapter memory module, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the ServeRAID SAS/SATA controller (see "Removing a ServeRAID SAS/SATA controller" on page 234).

5. Align the memory module with the connector on the ServeRAID adapter and push it into the connector until it is firmly seated.

Figure 46. ServeRAID memory module installation

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing a RAID adapter battery remotely in the server

When you install any RAID adapter that comes with batteries, it is sometimes necessary to install the batteries in another location in the server to prevent the batteries from overheating. Depending on your server model, a battery must be installed remotely near the optical drive cage or the backplane. The 2.5-inch server models support up to two batteries.

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

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Install the ServeRAID adapter on the system board (see "Installing a ServeRAID SAS/SATA controller" on page 58) or install the ServeRAID adapter on the riser card and install the riser-card assembly in the server (see "Replacing an adapter" on page 231).

5. Connect one end of the battery cable to the RAID adapter battery connector.

6. Route the remote battery cable along the chassis.

RAID adapter battery cable
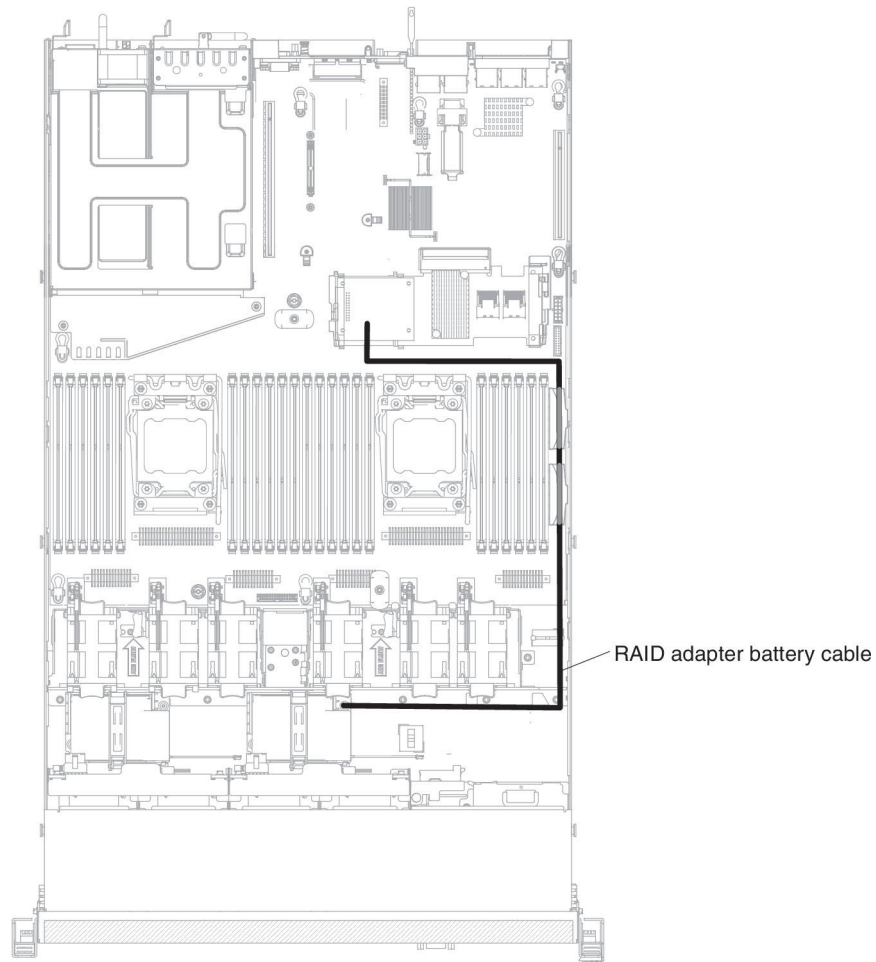
Figure 47. RAID adapter battery cabling

> **Attention:** Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

7. Remove any cable covering or obstructing the battery holder before opening the battery holder.
8. Install the battery:
   a. Release the retention clip in the open position.
   b. 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.
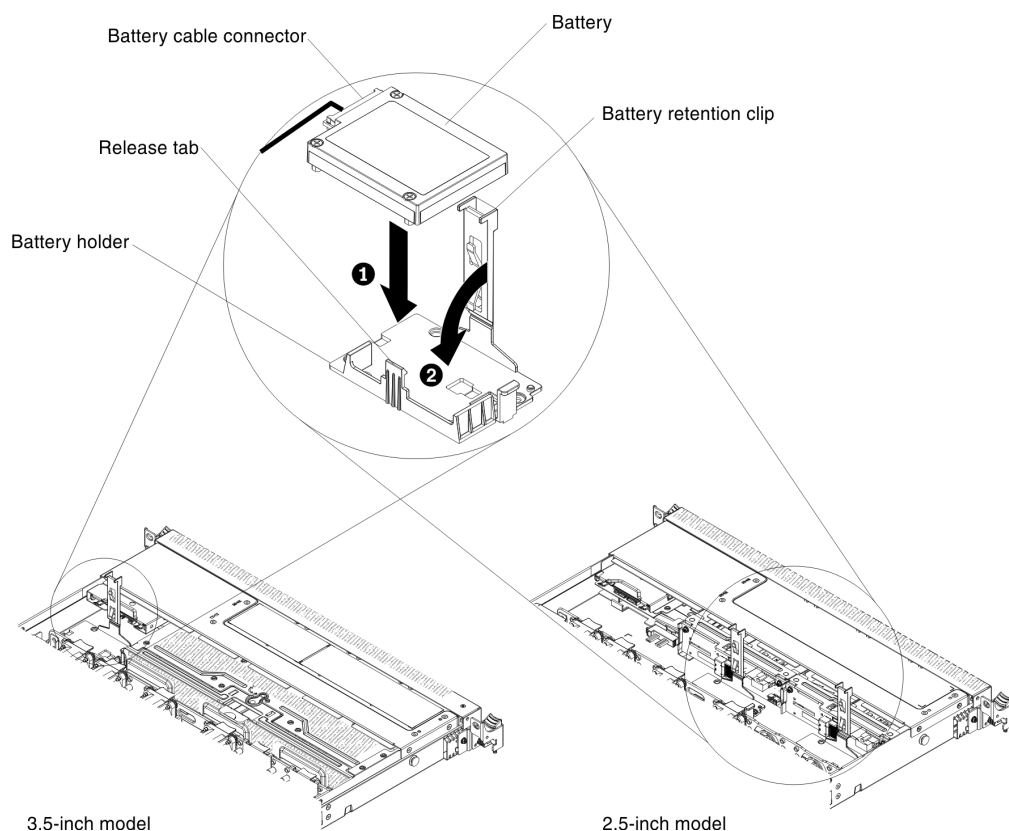
Figure 48. RAID adapter battery installation

> **Note:** The positioning of the remote battery depends on the type of the remote batteries that you install.

> c. Connect the other end of the battery cable to the battery cable connector on the battery.

> d. Lower and press down on the retention clip until it snaps in place to hold the battery firmly in place.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing the dual-port network adapter

You can purchase one of the following dual-port network adapters to add two additional network ports in the server. To order a dual-port network adapter option, contact your IBM marketing representative or authorized reseller.

Table 12. Supported dual-port network adapters on the network connector

Dual-port network adapter	Option part number	FRU part number	Remark
Mellanox ConnectX-3 dual-port QDR/FDR10 mezz card	90Y6338	90Y4956	
Qlogic dual-port 10GbE SFP+ Embedded VFA	90Y6454	90Y5099	Two microprocessors installed required.
Emulex dual-port 10GbE SFP+ Embedded VFA III	90Y6456	90Y5100	

Table 12. Supported dual-port network adapters on the network connector (continued)

Dual-port network adapter	Option part number	FRU part number	Remark
Dual-port FDR embedded adapter	00D4143	90Y6606	

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 configure network adapters, complete the following steps:
  1. From the Setup utility main menu (see "Using the Setup utility" on page 96), select **System Settings** > **Network**.
  2. From the **Network Device List**, select one network adapter.

     Note: You might need to enter each item (displaying MAC address) to see detailed information.
  3. Press Enter to configure the network adapter settings.
- To convert the NIC/iSCSI/FCoE for Emulex Dual Port 10GbE SFP+ Embedded VFA III, complete the following steps:
  1. From the Setup utility main menu (see "Using the Setup utility" on page 96), select **System Settings** > **Network** and press Enter.
  2. From the **Network Device List**, select Emulex network adapter.

     Note: You might need to enter each item (displaying MAC address) to see detailed information.
  3. Press Enter to configure Emulex network adapter, select **Personality** and press Enter to change the settings.
     - NIC
     - iSCSI (enabled after FoD installed)
     - FCoE (enabled after FoD installed)
- To download the latest version of drivers for iSCSI and FCoE from the IBM website, complete the following steps:
  1. Go to http://www.ibm.com/support/fixcentral/.
  2. Click **Product support** > **System x** > **Product family** > **System x3550 M4** > **7914**.
  3. From the **Operating system** menu, select your operating system, and then click **Search** to display the available drivers.
  4. Download the latest version of drivers.
     - Emulex iSCSI Device Driver for Windows 2008
     - Emulex FCoE Device Driver for Windows 2008

  Note: Changes are made periodically to the IBM website. The actual procedure might vary slightly from what is described in this document.
- Port 0 on the Emulex Dual Port 10GbE SFP+ Embedded VFA III can be configured as shared system management.
- When the server is in standby mode, both ports on the Emulex Dual Port 10GbE SFP+ Embedded VFA III function at 100M connection speed with Wake on LAN feature.

The Emulex Dual Port 10GbE SFP+ Embedded VFA III is automatically disabled if one of the following errors occurs:

- An error log indicates a temperature warning for the Ethernet adapter.
- All power supplies are removed or the server is disconnected from the power source.

To install the dual-port network adapter, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the PCI riser-card assembly (if installed) from PCI riser connector 2 (see "Removing a PCI riser-card assembly" on page 226).
5. Remove the adapter filler panel on the rear of the chassis (if it has not been removed already).

Network adapter
filler panel

Figure 49. Adapter filler panel removal

6. Touch the static-protective package that contains the new adapter to any unpainted metal surface on the server. Then, remove the adapter from the package.
7. Align the adapter so that the port connectors on the adapter line up with the pin and thumbscrew on the chassis; then, align the connector of the adapter with the adapter connector on the system board.
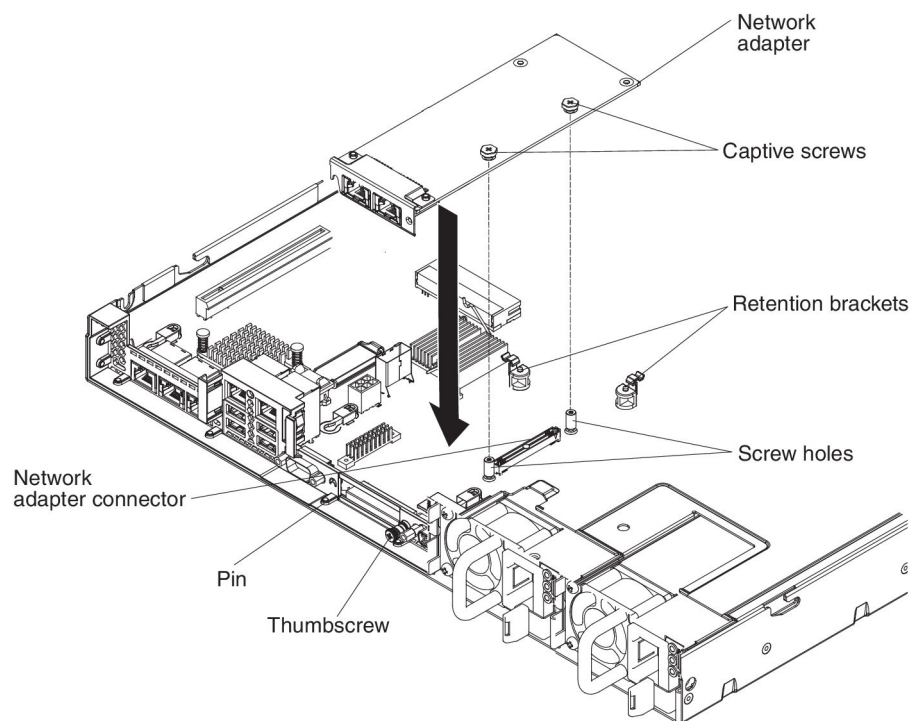
Figure 50. Network adapter installation

8. Press the adapter firmly until the pin, and retention brackets engage the adapter. Make sure the adapter is securely seated on the connector on the system board.

   Attention: Make sure the port connectors on the adapter are aligned properly with the chassis on the rear of the server. An incorrectly seated adapter might cause damage to the system board or the adapter.

9. Fasten the thumbscrew on the rear side of the chassis.
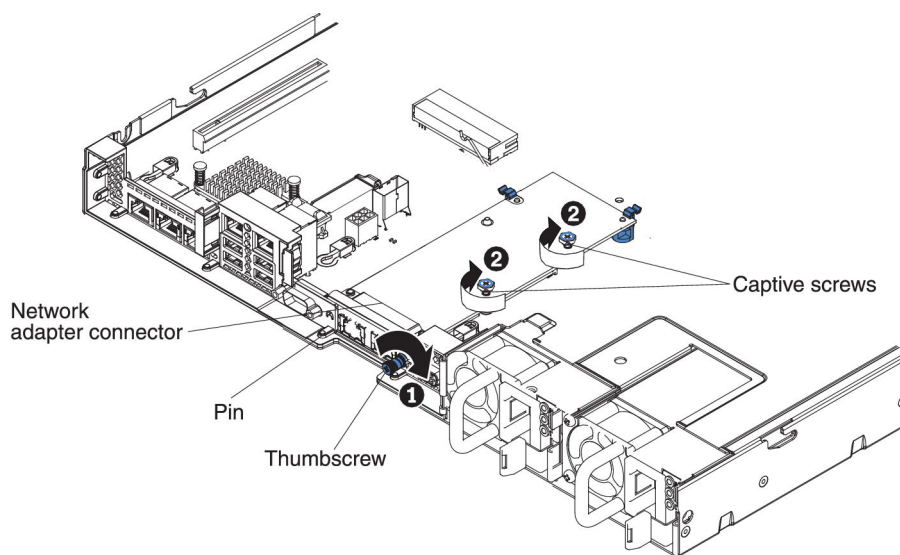
Figure 51. Screws engagement

10. Fasten the two captive screws on the network adapter.

11. Reinstall the PCI riser-card assembly in PCI riser connector 2 if you have removed it previously (see "Replacing a PCI riser-card assembly" on page 227).

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing a hot-swap ac power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- 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 100-127 V ac or 200-240 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. For example, you cannot mix 550-watt and 750-watt power supplies in the server.

- 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 ac power supply, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
3. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler from the power-supply bay.

Figure 52. Power supply installation

4. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply connector.

   Attention: Do not mix 550-watt and 750-watt power supplies 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 the power cord for the new power supply to the power-cord connector on the power supply.

7. Connect the other end of the power cord to a properly grounded electrical outlet.
8. 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.
9. If you are replacing a power supply with one of a different wattage in the server, apply the new power information label provided over the existing power information label on the server. Power supplies in the server must be with the same power rating or wattage to ensure that the server will operate correctly.

Figure 53. Power information label

10. 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.
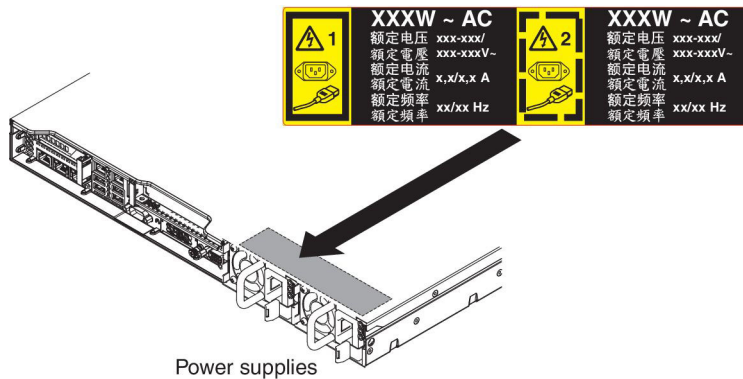
Figure 54. Redundant power information label

Installing a hot-swap dc power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- 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.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 -48 V dc or -60 V dc auto-sensing.
- Before you install a dc power supply in the server, you must remove all ac power supplies. Do not use both ac and dc power supplies in the same server. Install up to two dc power supplies or up to two ac power supplies, but not a combination.
- 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.
- It is the customer's responsibility to supply the necessary power cable.

  To reduce the risk of electric shock or energy hazards:
  - **Use a circuit breaker that is rated at 25 amps.**
  - **Use 2.5 mm^2 (12 AWG) at 90° C copper wire.**
  - **Torque the wiring-terminal screws to 0.50 ~ 0.60 newton-meters (4.43 ~ 5.31 inch-pounds).**

  For more information, see Statement 34 on page 73.
- If the power source requires ring terminals, you must use a crimping tool to install the ring terminals to the power cord wires. The ring terminals must be UL approved and must accommodate the wire that is described in the above-mentioned note .

Statement 29:

CAUTION:
This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment.

This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment. If this connection is made, all of the following conditions must be met:

- This equipment shall be connected directly to the dc supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the dc supply system earthing electrode conductor is connected.
- This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the earthed

conductor of the same dc supply circuit and the earthing conductor, and also the point of earthing of the dc system. The dc system shall not be earthed elsewhere.

- The dc supply source shall be located within the same premises as this equipment.
- Switching or disconnecting devices shall not be in the earthed circuit conductor between the dc source and the point of connection of the earthing electrode conductor.

Statement 31

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 power source.**
- **Connect to properly wired power sources 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 ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when you install, move, or open covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn OFF all power sources and equipment that is to be attached to this product.	1. Turn OFF all power sources and equipment that is to be attached to this product.
2. Attach signal cables to the product.	• For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit.
3. Attach power cords to the product.	• For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables.
• For ac systems, use appliance inlets.	
• For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety.	
4. Attach signal cables to other devices.	2. Remove the signal cables from the connectors.
5. Connect power cords to their sources.	3. Remove all cables from the devices.
6. Turn ON all the power sources.	

Statement 33

CAUTION:
This product does not provide a power-control button. Turning off blades or removing power modules and I/O modules does not turn off electrical current to the product. The product also might have more than one power cord. To remove all electrical current from the product, make sure that all power cords are disconnected from the power source.

Statement 34

CAUTION:
To reduce the risk of electric shock or energy hazards:

- **This equipment must be installed by trained service personnel in a restricted-access location, as defined by the NEC and IEC 60950-1, First Edition, The Standard for Safety of Information Technology Equipment.**

- **Connect the equipment to a properly grounded safety extra low voltage (SELV) source. A SELV source is a secondary circuit that is designed so that normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).**

- **Incorporate a readily available approved and rated disconnect device in the field wiring.**

- **See the specifications in the product documentation for the required circuit-breaker rating for branch circuit overcurrent protection.**

- **Use copper wire conductors only. See the specifications in the product documentation for the required wire size.**

- **See the specifications in the product documentation for the required torque values for the wiring-terminal screws.**

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)   > 50 kg (110 lb)

Important: Be sure to read the multilingual safety instructions on the CD that comes with the server before you use the product.

To install a hot-swap dc power supply, complete the following steps:

Attention: Only trained service personnel other than IBM service technicians are authorized to install and remove the -48 volt dc power supply, and make the connections to and disconnections from the -48 volt dc power source. IBM service technicians are not certified or authorized to install or remove the -48 volt power cable. The customer is responsible for ensuring that only trained service personnel install or remove the -48 volt power cable.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
3. Turn off the circuit breaker for the dc power source to which the new power supply will be connected. Disconnect the power cord from the dc power source.
4. Attach the dc power cable to the new power supply.

Figure 55. DC power supply rear view

5. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler from the power-supply bay.
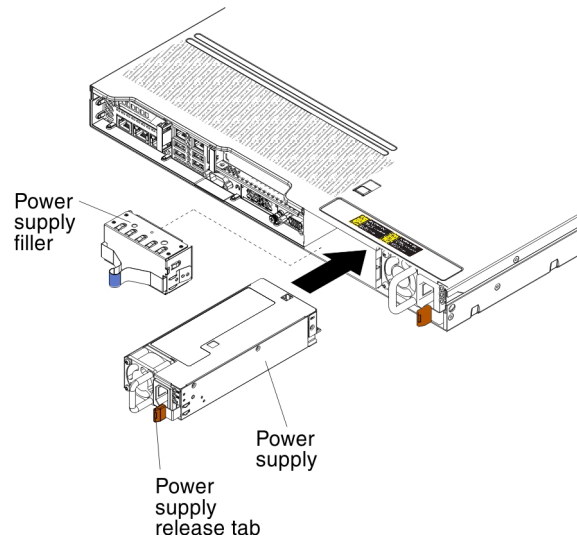
Figure 56. Power supply installation

6. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply connector.

7. Route the power cord through the handle and cable tie if any, so that it does not accidentally become unplugged.

8. Connect the other ends of the dc power cable to the dc power source. Cut the wires to the correct length, but do not cut them shorter than 150 mm (6 inch). If the power source requires ring terminals, you must use a crimping tool to install the ring terminals to the power cord wires. The ring terminals must be UL approved and must accommodate the wires that are described on page 71. The minimum nominal thread diameter of a pillar or stud type of terminal must be 4 mm; for a screw type of terminal the diameter must be 5.0 mm.

9. Turn on the circuit breaker for the dc power source to which the new power supply is connected.

10. Make sure that the green power LEDs on the power supply are lit, indicating that the power supply is operating correctly.

11. If you are replacing a power supply with one of a different wattage in the server, apply the new power information label provided over the existing power information label on the server. Power supplies in the server must be with the same power rating or wattage to ensure that the server will operate correctly.
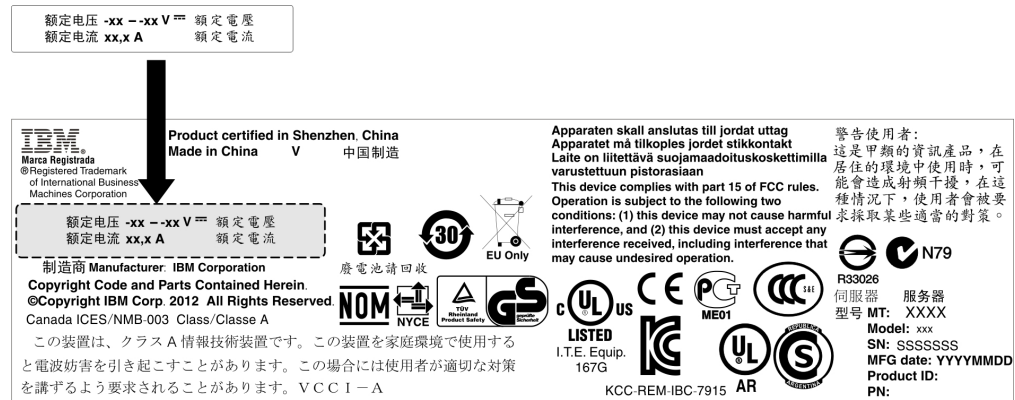
Figure 57. Power information label

12. 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.

Figure 58. Redundant power information label

Installing a hot-swap fan

The server comes standard with four dual-motor hot-swap cooling fans. When there is one microprocessor installed, install fan 1, 2, 3, and 5 for proper cooling.

Attention: To ensure proper operation, replace a failed hot-swap fan within 30 seconds.

To install an additional hot-swap fan, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Remove the cover (see "Removing the cover" on page 36).
3. Remove the fan filler panel (if it has not been removed already). Keep the filler panel in a safe place.
4. Touch the static-protective package that contains the new fan to any unpainted metal surface on the server. Then, remove the new fan from the package.

Fan tabs

Fan connector on
the system board

Fan 6

Fan 5
Fan 4
Fan 3
Fan 2
Fan 1

Fan (side view)
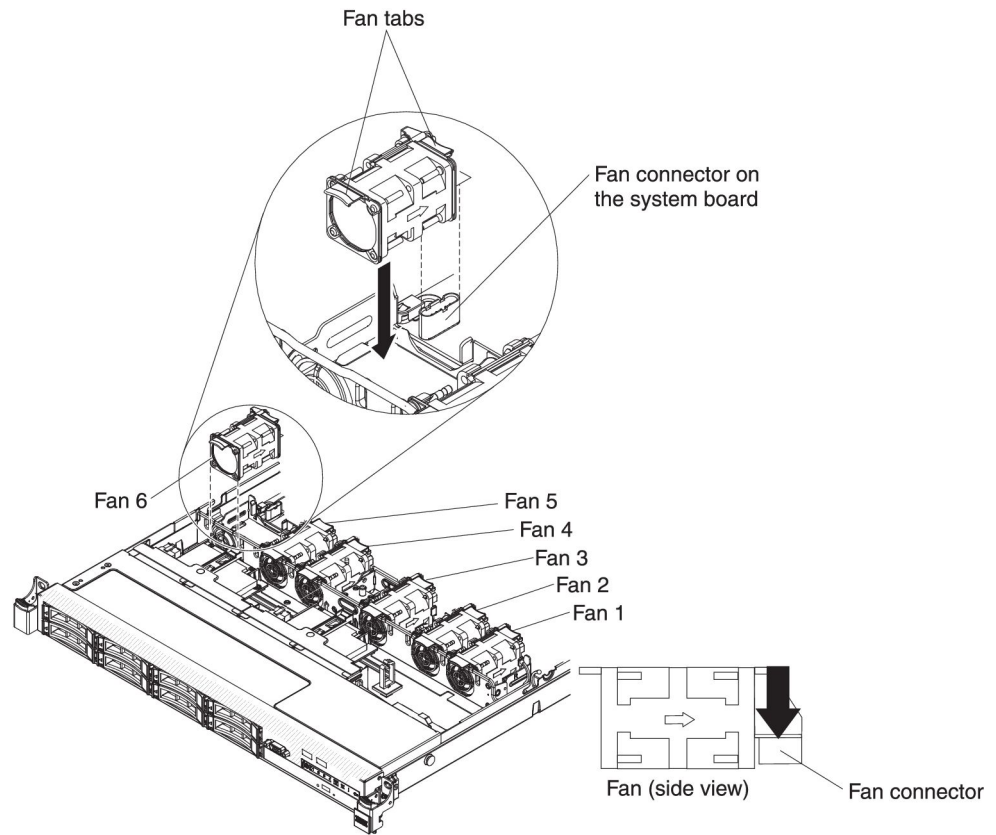
Fan connector

Figure 59. Fan installation

5. Orient the fan over the fan slot in the fan assembly bracket so that the fan
   connector aligns with the connector on the system board.
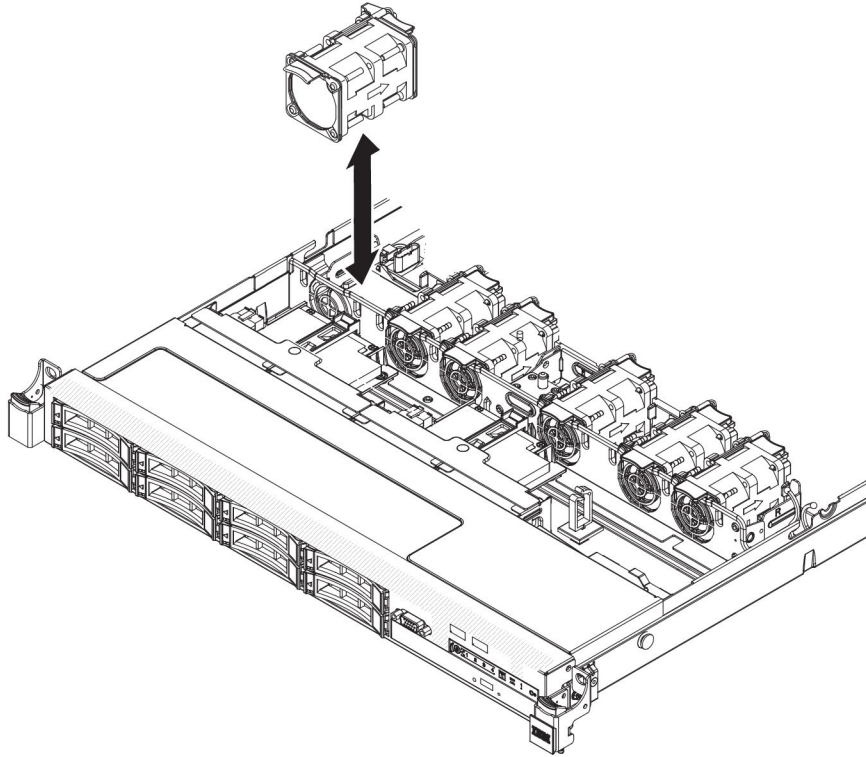
Figure 60. Fan installation

6. Insert the fan into the fan slot in the fan assembly bracket and press it down until it is seated correctly in the slot and the fan connector is seated correctly in the connector on the system board.

   Note: Make sure that the newly-installed fan aligns horizontally with other correctly-seated fans for proper installation.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing a SAS/SATA 4 Pac HDD option

You can install an IBM System x3550 M4 Hot-swap SAS/SATA 4 Pac HDD option to add four 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 4 Pac HDD option, contact your IBM marketing representative or authorized reseller.

The SAS/SATA 4 Pac HDD option kit contains the following components:
• One 2.5-inch hot-swap hard disk drive backplane (with bracket)
• Four drive bay filler panels
• One SAS signal cable

Note: The 4 pac HDD option including structural parts and Tier 1 parts.

To install a SAS/SATA 4 Pac HDD option, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Install the 2.5-inch hot-swap hard disk drive backplane (see "Replacing the hot-swap drive backplane" on page 263).

5. Pull existing filler panels out of the server. Keep them in a safe place.
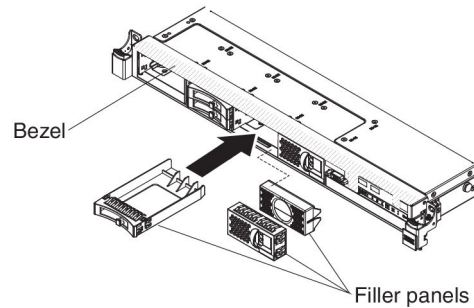
Figure 61. Filler panels

6. Install the 2.5-inch hard disk drives (see "Replacing hot-swap hard disk drives" on page 204).

7. Install the filler panels that come with the SAS/SATA 4 Pac HDD option into empty drive bays.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing a USB embedded hypervisor flash device

To install a USB hypervisor flash device, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect the power cords.

3. Remove the cover (see "Removing the cover" on page 36).

4. Install the flash device:
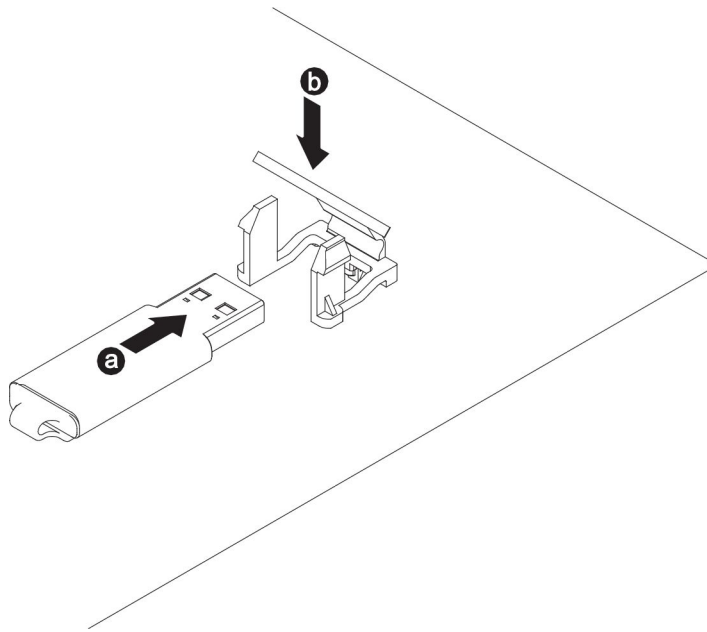
Figure 62. USB hypervisor flash device installation

> a. Align the flash device with the connector on the system board and push it into the USB connector until it is firmly seated.
>
> b. Press down on the retention latch to lock the flash device into the USB connector.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

Installing an additional microprocessor and heat sink

The following notes describe the type of microprocessor that the server supports and other information that you must consider when you install a microprocessor and heat sink:

- 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 up to two Intel Xeon™ E5-2600 series multi-core microprocessors, which are designed for the LGA 2011 socket. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported microprocessors.

- Do not mix microprocessors with different cores in the same server.

- The first microprocessor must always be installed in microprocessor socket 1 on the system board.

- When one microprocessor is installed, the air baffle must be installed to provide proper system cooling.

- Do not remove the first microprocessor from the system board when you install the second microprocessor.

- When you install the second microprocessor, you must also install additional memory, the fourth and sixth fans. See "Installing a memory module" on page 48 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.
- Both microprocessor voltage regulator modules are integrated on the system board.
- 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 your server, go to http://www.ibm.com/supportportal/.
- 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 86.

  Note: Removing the heat sink from the microprocessor destroys the even distribution of the thermal grease and requires replacing the thermal grease.
- To order an additional optional microprocessor, contact your IBM marketing representative or authorized reseller.

To install an additional microprocessor and heat sink, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.

   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 36.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Rotate the heat sink retention module release lever to the open position.

Heat sink
release lever

Lock tab

Retainer bracket

Figure 63. Heat-sink lever rotation

6. Open the microprocessor socket release levers and retainer:

Microprocessor
release lever

Microprocessor
release lever
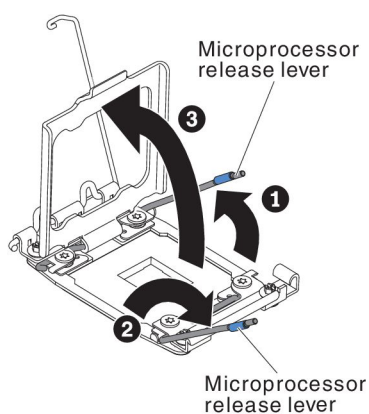
Figure 64. Microprocessor socket levers and retainer disengagement

   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.

7. 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.

Figure 65. Installation tool cover removal

> **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.
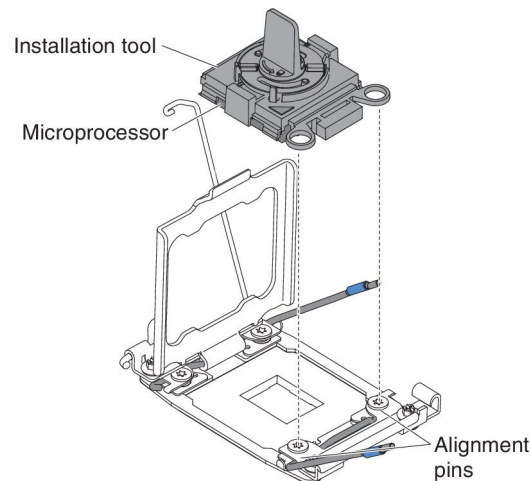
Figure 66. Installation tool alignment

   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.
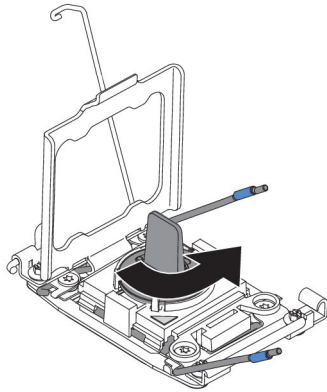
Figure 67. Installation tool handle adjustment

> **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.

8. Remove the microprocessor socket cover, tape, or label from the surface of the microprocessor socket, if one is present. Store the socket cover in a safe place.
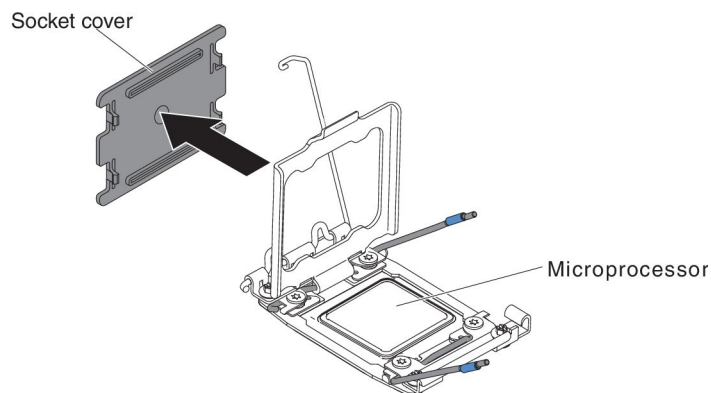
Figure 68. Socket cover removal

> **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 36.

9. Close the microprocessor socket release levers and retainer:
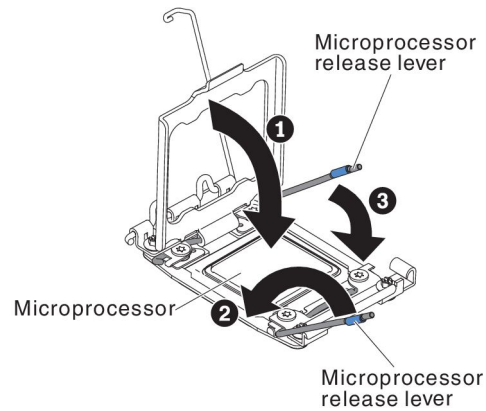
Figure 69. Microprocessor socket levers and retainer engagement

  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.
10. Install the 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 86 for more information.
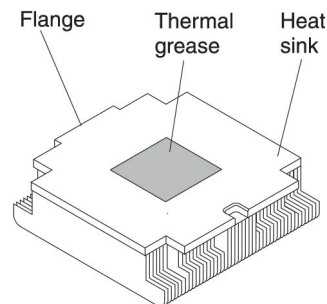
Figure 70. Thermal grease

  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.
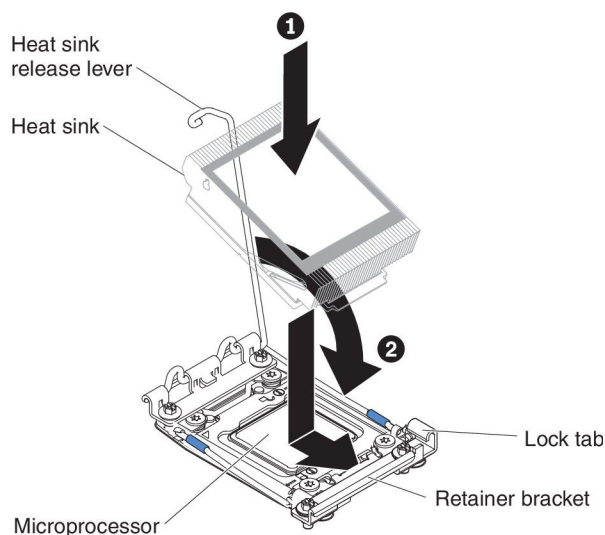
Figure 71. Heat sink installation

     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.

11. If you installed the second microprocessor, install the fourth and sixth fans (see "Replacing a hot-swap fan" on page 260).

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 87.

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 "Safety" on page vii.
- Read the "Installation guidelines" on page 33.
- Read "Handling static-sensitive devices" on page 36.

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 of the microprocessor; this is to ensure uniform distribution of the grease.

Figure 72. Thermal grease distribution

Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.
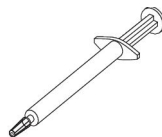
Figure 73. Syringe

6. Install the heat sink onto the microprocessor as described in 10 on page 294.

Completing the installation

To complete the installation, complete the following steps:

1. If you removed the air baffle, reinstall it (see "Replacing the air baffle" on page 88).

2. If you removed the server cover, replace it (see "Replacing the cover" on page 89).

3. Install the server in the rack cabinet (see the *Rack Installation Instructions* that come with the server for instructions).

4. Reconnect the cables and power cords (see "Connecting the cables" on page 89).

5. Update the server configuration (see "Updating the server configuration" on page 90).

6. Slide the server back into the rack, if necessary.

7. Start the server. Confirm that it starts correctly and recognizes the newly installed devices, and make sure that no error LEDs are lit.

8. (IBM Business Partners only) Complete the additional steps in "Instructions for IBM Business Partners" on page 26.

Replacing the air baffle

To replace the air baffle (if it has been removed), complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Turning off the server" on page 23).

3. Align the air baffle pins with the baffle pin holes on both sides of the chassis; then, lower the air baffle into the server. Press the air baffle down until it is securely seated.

   Note: Close the retaining clip on each end of the DIMM connector before installing the air baffle for proper cooling.
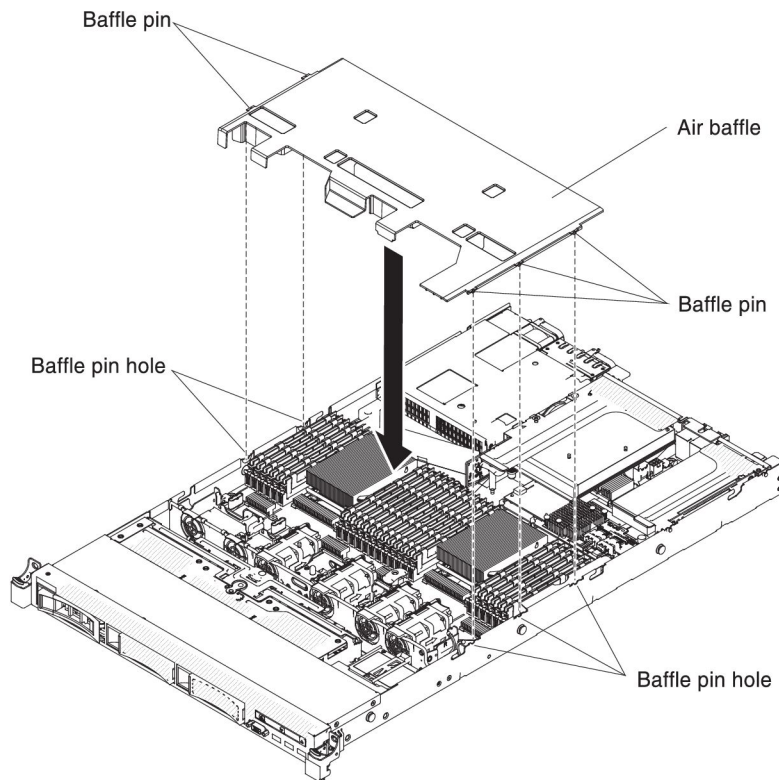
Figure 74. Air baffle installation

Replacing the cover

To replace the server cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.

   Important: Before you slide the cover forward, make sure that all the tabs on the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

2. Position the cover on top of the server.
3. Slide the cover toward the front of the server.
4. Make sure that the cover correctly engages all the inset tabs on the server.
5. Press down the blue latch on the top (in the center of the front of the server) of the cover.

Figure 75. Cover installation

6. Slide the server all the way into the rack until it latches.

Connecting the cables

The following illustrations show the locations of the input and output connectors of the server.
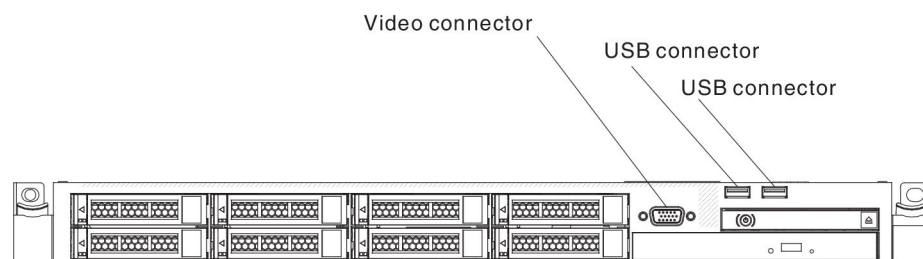
Figure 76. 2.5-inch model front of server
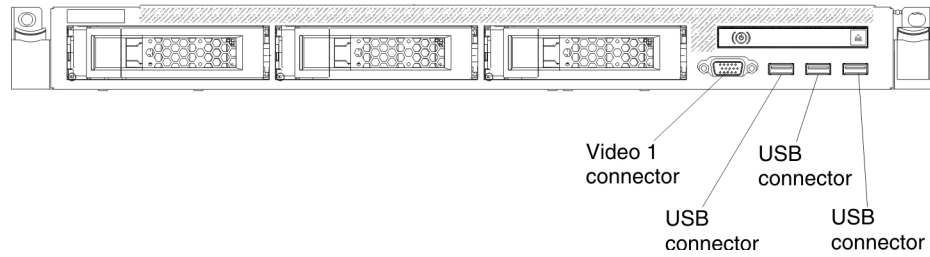
Figure 77. 3.5-inch model front of server
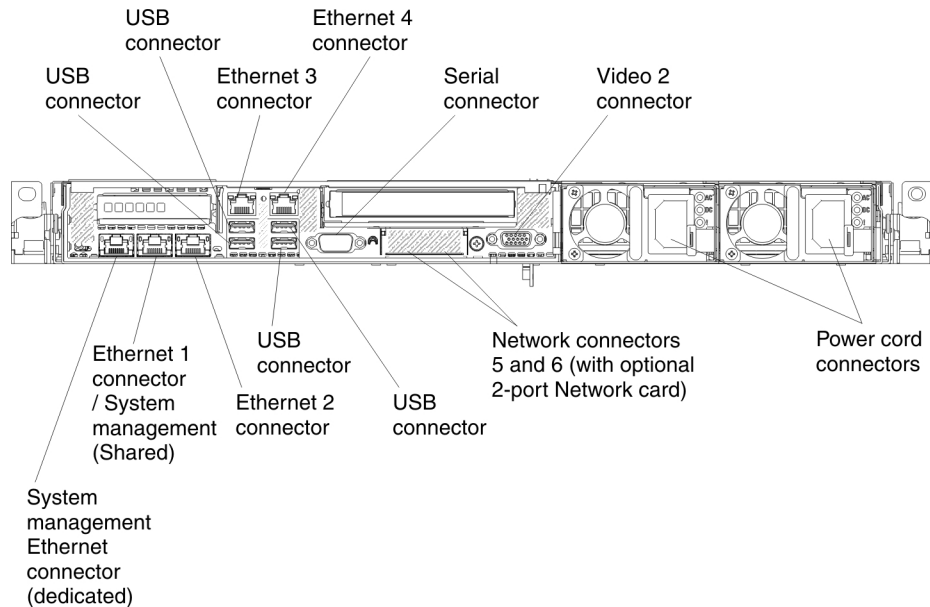
Figure 78. Rear of server

You must turn off the server before you connect or disconnect cables.

See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.

Updating the server configuration

When you start the server for the first time after you add or remove a device, you might receive a message that the configuration has changed. The Setup utility starts automatically so that you can save the new configuration settings.

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

For information about configuring the integrated Gigabit Ethernet controller, see "Configuring the Ethernet controller" on page 108.

Chapter 3. Configuration information and instructions

This chapter provides information about updating the firmware and using the configuration utilities.

Updating the firmware

Important:

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://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=TOOL-CENTER 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 on the IBM website. To check for the latest level of firmware, such as the UEFI firmware, device drivers, and integrated management module (IMM) firmware, go to http://www.ibm.com/support/fixcentral/.

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 update the firmware that is stored in memory on the device or restore the pre-existing firmware from a CD or DVD image.

The following list indicates where the firmware is stored:
- UEFI firmware is stored in ROM on the system board.
- IMM2 firmware is stored in ROM on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller and on the system board.

- ServeRAID firmware is stored in ROM on the system board and the RAID adapter (if one is installed).
- SAS/SATA firmware is stored in ROM on the SAS/SATA controller on the system board.

Configuring the server

The following configuration programs come with the server:

- **Setup utility**

  The Setup utility is part of the UEFI firmware. Use it to perform configuration tasks such as changing interrupt request (IRQ) settings, changing the startup-device sequence, setting the date and time, and setting passwords. For information about using this program, see "Using the Setup utility" on page 96.

- **Boot Manager program**

  The Boot Manager is part of the UEFI 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 103.

- **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/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 94.

- **IBM FastSetup**

  IBM FastSetup is a no-cost software tool that helps simplify the maintenance and deployment of selected IBM BladeCenter chassis, servers, and components. The intuitive graphical interface initializes all phases of server setup, including discovery, update, and configuration. Features include templates that enable replication of settings to many servers and automation that reduces hands-on time and user errors. Wizards and other default settings enable customization capabilities. The low-touch, set-once and walk-away feature reduces the hands-on server setup time from days to minutes, particularly for larger deployments. For information about this tool, see http://www.ibm.com/support/entry/portal/docdisplay?lndocid=TOOL-FASTSET.

- **Integrated management module**

  Use the integrated management module II (IMM2) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using the IMM, see "Using the integrated management module" on page 104 and the *Integrated Management Module II User's Guide* at www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5089484&brandind=5000008.

- **VMware ESXi embedded hypervisor**

  An optional USB flash device with VMware ESXi embedded hypervisor software is available for purchase. Hypervisor is virtualization software that enables multiple operating systems to run on a host system at the same time. The USB embedded hypervisor flash device can be installed in USB connectors 3 and 4 on the system board. For more information about using the embedded hypervisor, see "Using the embedded hypervisor" on page 107.

- **Remote presence capability and blue-screen capture**

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM2). 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 feature to assist in determining the cause of the hang condition. For more information, see "Using the remote presence and blue-screen capture features" on page 105.

- **Ethernet controller configuration**

For information about configuring the Ethernet controller, see "Configuring the Ethernet controller" on page 108.

- **Features on Demand software Ethernet software**

The server provides Features on Demand software Ethernet support. You can purchase a Features on Demand software upgrade key for Fibre Channel over Ethernet (FCoE) and iSCSI storage protocols. For more information, see "Enabling Features on Demand Ethernet software" on page 108.

- **Features on Demand software RAID software**

The server provides Features on Demand software RAID support. You can purchase a Features on Demand software upgrade key for RAID. For more information, see "Enabling Features on Demand RAID software" on page 109.

- **IBM Advanced Settings Utility (ASU) program**

Use this program as an alternative to the Setup utility for modifying UEFI settings and IMM 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 run the Setup utility. For more information about using this program, see "IBM Advanced Settings Utility program" on page 109.

- **Configuring RAID arrays**

For information about configuring RAID arrays, see "Configuring RAID arrays" on page 109.

The following table lists the different server configurations and the applications that are available for configuring and managing RAID arrays.

Table 13. 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-H1110 adapter	LSI Utility (Setup utility, press Ctrl+C), ServerGuide, Human Interface Infrastructure (HII)	MegaRAID Storage Manager (MSM), SAS2IRCU (Command Line) Utility for Storage Management

Table 13. Server configuration and applications for configuring and managing RAID arrays (continued)

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.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5088601.

2. For more information about the MegaRAID, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5073015.

Using the ServerGuide Setup and Installation CD

Use this information as an overview for using the ServerGuide Setup and Installation CD.

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are 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 simplifies the 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* from http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-GUIDE.

In addition to the *ServerGuide Setup and Installation* CD, you must have your operating-system CD to install the operating system.

ServerGuide features

This information provides an overview of the 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 performs the following features:
*   An easy-to-use interface
*   Diskette-free setup, and configuration programs that are based on detected hardware
*   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

The ServerGuide program performs the following tasks:
*   Sets system date and time
*   Detects installed hardware options 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 your hardware and operating-system installation

Setup and configuration overview

ServerGuide 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

ServerGuide 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 controllers, 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

Use this information to install the operating system on the server without using ServerGuide.

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, you can download operating-system installation instructions for the server from http://www.ibm.com/supportportal/.

Using the Setup utility

Use these instructions to start the Setup utility.

Use the Unified Extensible Firmware Interface (UEFI) 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 and change passwords
- 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
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

Starting the Setup utility

To start the Setup utility, 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. 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 settings to view or change.

Setup utility menu choices

Use the Setup utility main menu to view and configure server configuration data and settings.

The following choices are on the Setup utility main menu for the UEFI. 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 options 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 and diagnostics code, and the version and date.

  This choice is on the full Setup utility menu only.

- **System Settings**

  Select this choice to view or change the server component settings.

  – **Adapters and UEFI Drivers**

    Select this choice to view information about the UEFI 1.10 and UEFI 2.0 compliant adapters and drivers installed in the server.

  – **Processors**

    Select this choice to view or change the processor settings.

  – **Memory**

    Select this choice to view or change the memory settings.

  – **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 controllers, SATA optical drive channels, PCI slots, and video controller. 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.

  – **Operating Modes**

    Select this choice to view or change the operating profile (performance and power utilization).

  – **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 UEFI to interact with PCI mass storage devices that are non-UEFI compliant. The default is **Enable**.

- **Infinite Boot Retry**

  Select this choice to enable or disable UEFI to infinitely retry the legacy boot order. The default is **Disable**.

- **BBS Boot**

  Select this choice to enable or disable legacy boot in BBS manner. The default is **Enable**.

– **System Security**

Select this choice to view or configure Trusted Platform Module (TPM) support.

– **Integrated Management Module**

Select this choice to view or change the settings for the integrated management module.

- **Power Restore Policy**

  Select this choice to set the mode of operation after the power lost.

- **Commands on USB Interface**

  Select this choice to enable or disable the Ethernet over USB interface on IMM. The default is **Enable**.

- **Network Configuration**

  Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and host name; define the static IMM IP address, subnet mask, and gateway address, specify whether to use the static IP address or have DHCP assign the IMM2 IP address, save the network changes, and reset the IMM.

- **Reset IMM to Defaults**

  Select this choice to view or reset IMM to the default settings.

- **Reset IMM**

  Select this choice to reset IMM.

– **Recovery**

Select this choice to view or change the system recovery parameters.

- **POST Attempts**

  Select this choice to view or change the number of attempts to POST.

  • **POST Attempts Limit**

    Select this choice to view or change the Nx boot failure parameters.

- **System Recovery**

  Select this choice to view or change system recovery settings.

  • **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**

  Select this choice to enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Enable** is the default.

- **Halt on Severe Error**

  Select this choice to enable or disable the system from booting into OS, displaying the POST event viewer whenever a severe error was detected. **Disable** is the default.

– **Storage**

  Select this choice to view or change the storage device settings.

– **Network**

  Select this choice to view or change the network device options, such as iSCSI.

– **Drive Health**

  Select this choice to view the status of the controllers installed in the blade server.

- **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 or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

  The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. 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.

  This choice is on the full Setup utility menu only.

- **Boot Manager**

  Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

- **System Event Logs**

  Select this choice to enter the System Event Manager, where you can view the POST event log and the system-event log. You can use the arrow keys to move between pages in the error log. This choice is on the full Setup utility menu only.

  The POST event log contains the most recent error codes and messages that were generated during POST.

  The system-event log contains POST and system management interrupt (SMI) events and all events that are generated by the baseboard management controller that is embedded in the integrated management module (IMM).

  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 POST error messages.

– **System Event Log**

Select this choice to view 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 101 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. See "Power-on password:" on page 101 for more information.

– **Clear Power-on Password**

Select this choice to clear a power-on password. See "Power-on password:" on page 101 for more information.

– **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. See "Administrator password:" on page 103 for more information.

– **Clear Administrator Password**

Select this choice to clear an administrator password. See "Administrator password:" on page 103 for more information.

- **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.

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.
- Remove the battery from the server, wait 30 seconds, and then reinstall it.
- Change the position of the power-on password switch (switch 4) on the system board switch block (SW3) to bypass the power-on password check (see Table 3 on page 31 for more information).
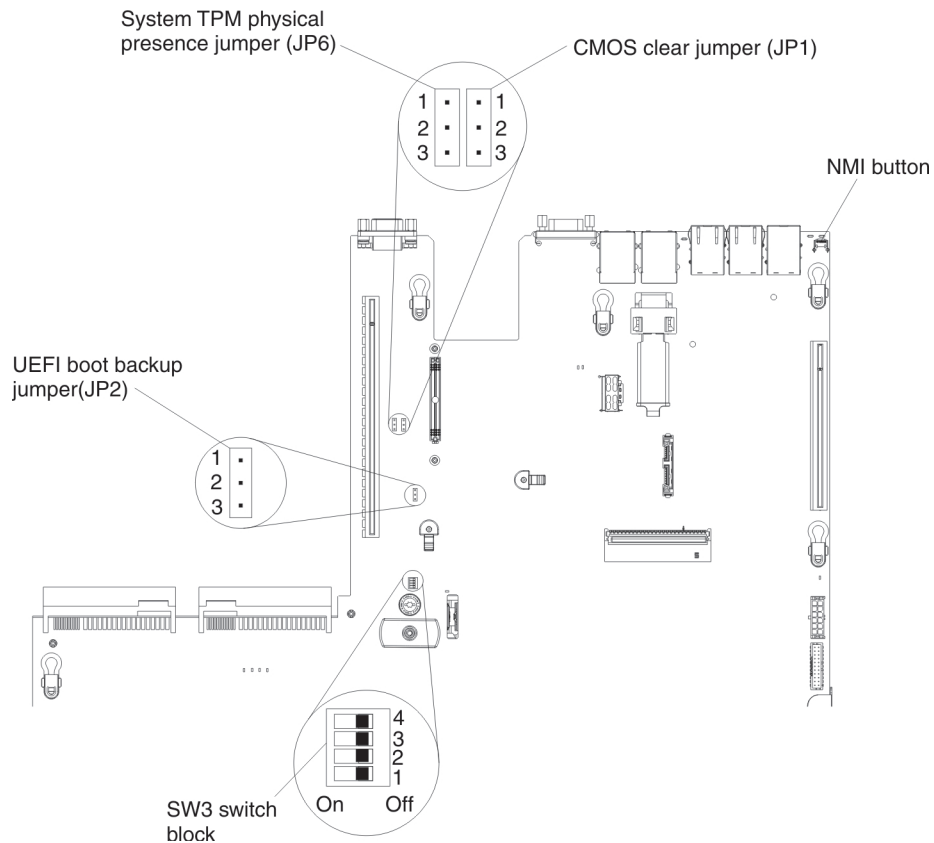
Figure 79. System-board switches, jumpers, and buttons

Attention: Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information that begins "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 SW3 is Off.

While the server is turned off, move power-on password switch (switch 4) on the system board switch block (SW3) 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 to 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 a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing 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.
4. Use the Up arrow and Down arrow keys to select an item from the 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 the server firmware that you update only during the process of updating the 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, place the UEFI boot backup jumper (JP2) in the backup position (pins 2 and 3). See "System-board switches, jumpers, and buttons" on page 29 for the location of the UEFI boot backup jumper (JP2).

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, move the UEFI boot backup jumper (JP2) back to the primary position (pins 1 and 2).

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 ToolsCenter for System x and BladeCenter at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/ and click **UpdateXpress System Pack Installer**.

Using the integrated management module

The integrated management module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and remote presence function in a single chip.

The IMM supports the following basic systems-management features:
- Active Energy Manager.
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Auto Boot Failure Recovery (ABR).
- Automatic microprocessor disable on failure and restart in a two-microprocessor configuration when one microprocessor signals an internal error. When one of the microprocessors fail, the server will disable the failing microprocessor and restart with the other microprocessor.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating system watchdog timer times-out. The IMM 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 IMM allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the light path diagnostics panel for an operating-system memory dump. ASR is supported by IPMI.
- A virtual media key, which enables remote presence support (remote video, remote keyboard/mouse, and remote storage).
- Boot sequence manipulation.
- Command-line interface.
- Configuration save and restore.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM lights the associated system error LED and the failing DIMM error LED.
- Environmental monitor with fan speed control for temperature, voltages, fan failure, power supply failure, and power backplane failure.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CONFIG) LED support.
- Light path diagnostics LEDs indicators to report errors that occur with fans, power supplies, microprocessor, hard disk drives, and system errors.
- Local firmware code flash update
- Nonmaskable interrupt (NMI) detection and reporting.
- Operating-system failure blue screen capture.
- PCI configuration data.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).

- Query power-supply input power.
- ROM-based IMM firmware flash updates.
- Serial over LAN (SOL).
- Serial port redirection over telnet or ssh.
- SMI handling
- System event log (SEL) - user readable event log.

The IMM 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.

For more information about IMM, see the *Integrated Management Module II User's Guide* at www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5089484 &brandind=5000008.

Using the remote presence and blue-screen capture features

The remote presence and blue-screen capture features are integrated functions of the integrated management module II (IMM2). 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.

Obtaining the IMM host name

If you are logging on to the IMM for the first time after installation, the IMM defaults to DHCP. If a DHCP server is not available, the IMM uses a static IP address of 192.168.70.125. The default IPv4 host name is "IMM-" (plus the last 12 characters on the IMM MAC address). The default host name also comes on the IMM network access tag that comes attached to the power supply on the rear of the server. The IMM network access tag provides the default host name of the IMM and does not require you to start the server.

The IPv6 link-local address (LLA) is derived from the IMM default host name. The IMM LLA is on the IMM network access tag is on the power supply on the rear of the server. To derive the link-local address, complete the following steps:

1. Take the last 12 characters on the IMM MAC address (for example, 5CF3FC5EAAD0).
2. Separate the number into pairs of hexadecimal characters (for example, 5C:F3:FC:5E:AA:D0).
3. Separate the first six and last six hexadecimal characters.
4. Add "FF" and "FE" in the middle of the 12 characters (for example, 5C F3 FC FF FE 5E AA D0).
5. Convert the first pair of hexadecimal characters to binary (for example, 5=0101, C=1100, which results in 01011100 F3 FC FF FE 5E AA D0).
6. Flip the 7th binary character from left (0 to 1 or 1 to 0), which results in 01011110 F3 FF FE 5E AA D0.
7. Convert the binary back to hexadecimal (for example, 5E F3FCFFFE5EAAD0).

Obtaining the IP address for the IMM

To access the web interface to use the remote presence feature, you need the IP address or host name of the IMM. You can obtain the IMM IP address through the Setup utility and you can obtain the IMM host name from the IMM network access tag. The server comes with a default IP address for the IMM of 192.168.70.125.

To obtain the IP address, complete the following steps:

1. Turn off 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 on to the IMM web interface, complete the following steps:

1. On a system that is connected to the server, open a web browser. In the **Address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   Note: If you are logging on to the IMM for the first time after installation, the IMM defaults to DHCP. If a DHCP host is not available, the IMM assigns a static IP address of 192.168.70.125. The IMM network access tag provides the default host name of the IMM and does not require you to start the server.

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 system-event log.

   Note: The IMM is set initially with a user name of USERID and password of PASSW0RD (with a zero, not a the letter O). You have read/write access. You must change the default password the first time you log on.

3. Click **Log in** to start the session. The System Status and Health page provides a quick view of the system status.

Note: If you boot to the operating system while in the IMM GUI and the message "Booting OS or in unsupported OS" is displayed under **System Status** > **System State**, disable Windows 2008 firewall or type the following command in the Windows 2008 console. This might also affect blue-screen capture features.

```
netsh firewall set icmpsetting type=8 mode=ENABLE
```

By default, the icmp packet is blocked by Windows firewall. The IMM GUI will then change to "OS booted" status after you change the setting as indicated above in both the Web and CLI interfaces.

Using the embedded hypervisor

The VMware ESXi embedded hypervisor software is available on the optional IBM USB flash device with embedded hypervisor.

The USB flash device can be installed in USB connectors on the system board (see "System-board internal connectors" on page 28 for the location of the connectors). 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** > **Embedded Hypervisor**. Press Enter, and then select Esc.

5. Select **Change Boot Order** > **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

You can activate the Features on Demand (FoD) software upgrade key for RAID that is integrated in the integrated management module. 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.

IBM Advanced Settings Utility program

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.

Installing a newer version

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/management/director/ downloads.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.

Installing updates with your management server is connected to the Internet

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.

Installing updates with your management server is not connected to the Internet

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 Web site. 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-947.ibm.com/support/entry/portal/docdisplay?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 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. 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-947.ibm.com/support/entry/portal/docdisplay?lndocid=TOOL-CENTER. From the **IBM ToolsCenter** page, scroll down for the available tools.

5. Restart the server.

Chapter 4. Troubleshooting

This chapter describes the diagnostic tools and troubleshooting information 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 D, "Getting help and technical assistance," on page 411 for more information.

Start here

You can solve many problems without outside assistance by following the troubleshooting procedures in this documentation and on the World Wide Web.

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 123 for information about using light path diagnostics LEDs.
   - **Event logs:** See "Event logs" on page 136 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?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 UpdateXpress 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?lndocid=SERV-XPRESS and "Updating the firmware" on page 91. For more information about the Bootable Media Creator, see http://www.ibm.com/support/entry/portal/docdisplay?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 UpdateXpress System Pack or UpdateXpress 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 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 "About the checkout procedure" on page 120. For information about configuring the server, see Chapter 3, "Configuration information and instructions," on page 91.

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 by symptom" on page 143 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 http://www.ibm.com/support/entry/portal/Open_service_request/ . 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.

Service bulletins

IBM continually updates the support website with the latest tips and techniques that you can use to solve problem that you might have with the System x3550 M4 server.

To find service bulletins that are available for the IBM System x3550 M4 server, go to http://www.ibm.com/supportportal/ and search for 7914, and `retain`.

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 "Safety" on page vii.
- IBM Dynamic System Analysis (DSA) provides 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 DSA, 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 DSA.

  Exception: If multiple error codes or light path diagnostics LEDs indicate a microprocessor error, the error might be in the microprocessor or in the microprocessor socket. See "Microprocessor problems" on page 150 for information about diagnosing microprocessor problems.

- Before you run DSA, 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 Appendix C, "UEFI/POST diagnostic codes," on page 397. If the server is halted and no error message is displayed, see "Troubleshooting by symptom" on page 143 and "Solving undetermined problems" on page 166.
- For information about power-supply problems, see "Solving power problems" on page 164, "Power problems" on page 155, and "Power-supply LEDs" on page 131.
- For intermittent problems, check the event log; see "Event logs" on page 136 and Appendix A, "DSA messages," on page 305.

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. Check the power supply LEDs (see "Power-supply LEDs" on page 131).
   b. Turn off the server and all external devices.
   c. Check all internal and external devices for compatibility at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
   d. Check all cables and power cords.
   e. Set all display controls to the middle positions.
   f. Turn on all external devices.
   g. Turn on the server. If the server does not start, see "Troubleshooting by symptom" on page 143.
   h. Check the system-error LED on the operator information panel. If it is lit, check the light path diagnostics LEDs (see "Light path diagnostics" on page 123).
   i. Check for the following results:
      - Successful completion of POST (see "POST" on page 139 for more information)
      - Successful completion of startup, which is indicated by a readable display of the operating-system desktop
3. Is there a readable image on the monitor screen?
   - **No:** Find the failure symptom in "Troubleshooting by symptom" on page 143; if necessary, see "Solving undetermined problems" on page 166.
   - **Yes:** Run DSA (see "Running the DSA Preboot diagnostic programs" on page 141).
      - If DSA reports an error, follow the instructions in Appendix A, "DSA messages," on page 305.
      - If DSA does not report an error but you still suspect a problem, see "Solving undetermined problems" on page 166.

Diagnostic tools

The section introduces available tools to help you diagnose and solve hardware-related problems.

- **Light path diagnostics**

  Use light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 123 for more information.

- **Event logs**

  The event logs list the error codes and messages that are generated when an error is detected for the subsystems IMM2, POST, DSA, and the server baseboard management controller. See "Event logs" on page 136 for more information.

- **Integrated management module II**

  The integrated management module II (IMM2) combines service processor functions, video controller, and remote presence and blue-screen capture features in a single chip. The IMM provides advanced service-processor control,

monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the IMM event log, and alerts you to the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through the following industry-standard interfaces:

– Intelligent Platform Management Protocol (IPMI) version 2.0

– Simple Network Management Protocol (SNMP) version 3

– Common Information Model (CIM)

– Web browser

For more information about the integrated management module II (IMM2), see "Using the integrated management module" on page 104, Appendix B, "Integrated management module II (IMM2) error messages," on page 339, and the *Integrated Management Module II User's Guide* at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5089484..

- **IBM Dynamic System Analysis**

  Two editions of IBM Dynamic System Analysis (DSA) are available for diagnosing problems, DSA Portable and DSA Preboot:

  – DSA Portable

    DSA Portable collects and analyzes system information to aid in diagnosing server problems. DSA Portable runs on the server operating system and collects the following information about the server:

    - Drive health information

    - Event logs for ServeRAID controllers and service processors

    - Installed hardware, including PCI and USB information

    - Installed applications and hot fixes

    - Kernel modules

    - Light path diagnostics status

    - Microprocessor, input/out hub, and UEFI error logs

    - Network interfaces and settings

    - RAID controller configuration

    - Service processor (integrated management module) status and configuration

    - System configuration

    - Vital product data, firmware, and UEFI configuration

    DSA Portable creates a DSA log, which is a chronologically ordered merge of the system-event log (as the IPMI event log), the integrated management module (IMM) event log (as the ASM event log), and the operating-system event logs. You can send the DSA log as a file to IBM Support (when requested by IBM Support) or view the information as a text file or HTML file.

    Note: Use the latest available version of DSA to make sure you are using the most recent configuration data. For documentation and download information for DSA, see http://www.ibm.com/systems/management/.

    For additional information, see "IBM Dynamic System Analysis" on page 139 and Appendix A, "DSA messages," on page 305.

  – DSA Preboot

    DSA Preboot diagnostic program is stored in the integrated USB memory on the server. DSA Preboot collects and analyzes system information to aid in

diagnosing server problems, as well as offering a rich set of diagnostic tests of the major components of the server. DSA Preboot collects the following information about the server:

- Drive health information
- Event logs for ServeRAID controllers and service processors
- Installed hardware, including PCI and USB information
- Light path diagnostics status
- Microprocessor, input/output hub, and UEFI error logs
- Network interfaces and settings
- RAID controller configuration
- Service processor (integrated management module) status and configuration
- System configuration
- Vital product data, firmware, and UEFI configuration

DSA Preboot also provides diagnostics for the following system components (when they are installed):

1. Emulex network adapter
2. IMM I2C bus
3. Light path diagnostics panel
4. Memory modules
5. Microprocessors
6. Optical devices (CD or DVD)
7. SAS or SATA drives

See "Running the DSA Preboot diagnostic programs" on page 141 for more information on running the DSA Preboot program on the server.

- **Troubleshooting by symptom**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting by symptom" on page 143 for more information.

Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server that leads you to the failed component. When an error occurs, LEDs are lit along the path of the front panel, the light path diagnostics panel, then on the failed component. 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 "Safety" on page vii and "Handling static-sensitive devices" on page 36.

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 information about an un-isolated fault condition in the server is available in the IMM event log or in the system-event log.

- 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.
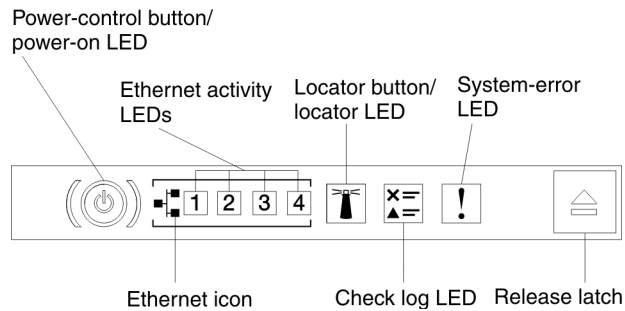
Figure 80. Operator information panel

2. To view the light path diagnostics panel, press the blue release latch on the operator information panel. Pull forward on the panel until the hinge of the operator information panel is free of the server chassis. Then pull down on the panel so that you can view the light path diagnostics panel information. This reveals the light path diagnostics panel. Lit LEDs on this panel indicate the type of error that has occurred.
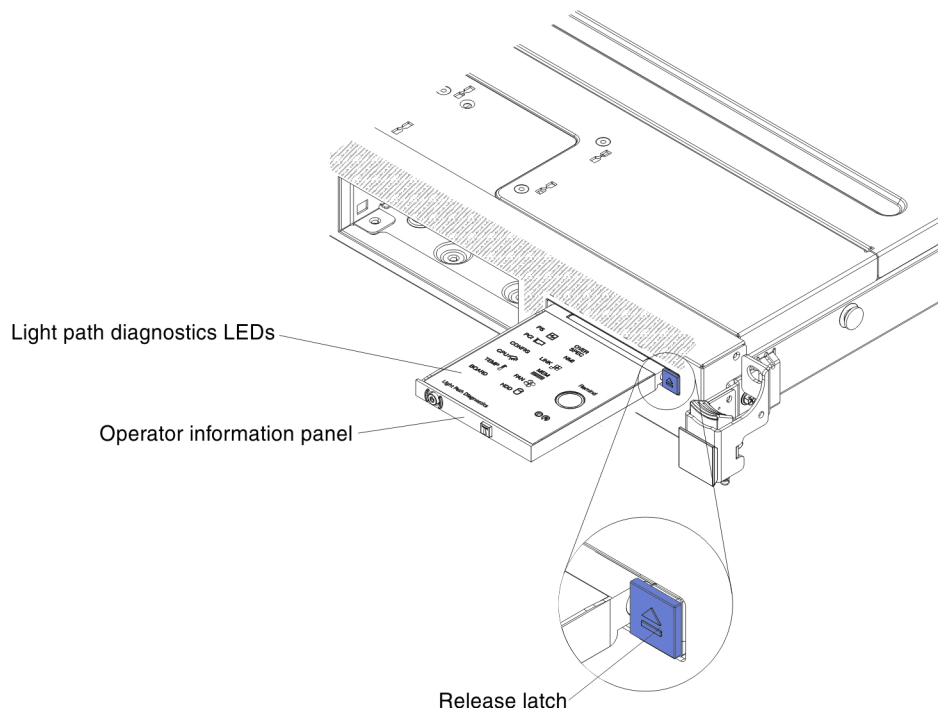
Figure 81. Light path diagnostics panel disengagement

The following illustration shows the light path diagnostics panel.

```
PS  ⊡            OVER
                 SPEC

PCI ▭            NMI

CONFIG      LINK ▦

CPU ⌂            MEM          Remind
                 ▦            ⦿

TEMP ▮      FAN  ✹

BOARD       HDD  ▯           Reset
                              ○ Ⓡ


Light Path Diagnostics
```
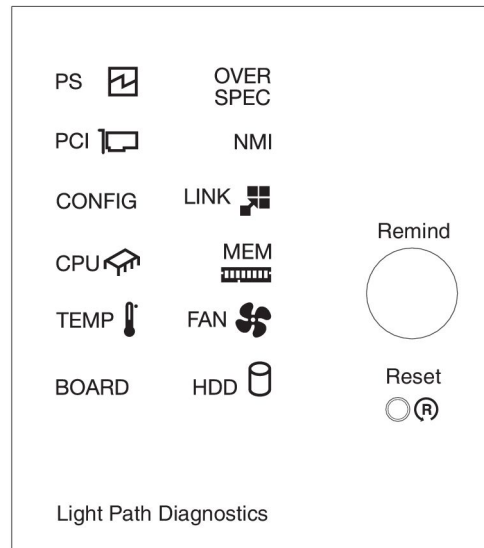
Figure 82. Light path diagnostics panel

Note any LEDs that are lit, and then reinstall the light path diagnostics panel in the server.

- **Remind button:** Press this button to place the system-error LED/check log LED on the front information panel into Remind mode. 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. In Remind mode, the system-error LED flashes every 2 seconds until one of the following conditions occurs:
  - All known errors are corrected.
  - The server is restarted.
  - A new error occurs, causing the system-error LED to be lit again.
- **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.

The system service label inside the server cover provides an overview of internal components that correspond to the LEDs on the light path diagnostics panel. This information and the information in "Light path diagnostics LEDs" on page 126 can often provide enough information to diagnose the error.

3. Remove the server cover and look inside the server for lit LEDs. Certain components inside the server have LEDs that are lit to indicate the location of a problem.

   Note: You do not have to remove the server cover to view the LEDs on hard disk drives and power supplies.

   The following illustration shows the LEDs on the system board.

Optional network adapter error LED System-error LED System-locator LED Power LED

Battery error LED ServeRAID error LED

System board error LED

IMM2 heartbeat LED

RTMM heartbeat LED

Standby power LED

DIMM 19-24 error LEDs

DIMM 1- 6 error LEDs

Fan 6 error LED Fan 5 error LED Fan 4 error LED Microprocessor 2 error LED DIMM 7-18 error LEDs Fan 3 error LED Fan 2 error LED Microprocessor 1 error LED Fan 1 error LED

Figure 83. System board error LEDs

Light path diagnostics LEDs

This section describes the LEDs on the light path diagnostics panel and suggested actions to correct the detected problems.

For additional information, see "Server controls, LEDs, and power" on page 15 and "System-board LEDs" on page 32 for the location of the system board LEDs.

Table 14. Light path diagnostics panel LEDs

• 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
Check log LED	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.
System-error LED	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.

Table 14. Light path diagnostics panel LEDs (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.**

LED	Description	Action
PS	When only the PS LED is lit, a power supply has failed.	The system might detect a power supply error. Complete the following steps to correct the problem: 1. Check the power-supply with a lit yellow LED (see "Power-supply LEDs" on page 131). 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 AC input voltage. 5. Replace the failed power supply.
	PS + CONFIG When both the PS and CONFIG 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	The system consumption reaches the power supply over-current protection point or the power supplies are damaged.	1. If the Pwr Rail (1, 2, 3, 4, 5, or 6) error was not detected, complete the following steps:
		  a. 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.
		  b. Replace the failed power supply.
		2. If the Pwr Rail (1, 2, 3, 4, 5, or 6) error was also detected, follow actions listed in "Power problems" on page 155 and "Solving power problems" on page 164.

PCI	An error has occurred on a PCI card, a PCI bus, or on the system board. An additional LED is lit next to a failing PCI slot.	1. Check the riser-card LEDs, the ServeRAID error LED, and the dual-port network adapter error LED to identify the component that caused the error.
		2. Check the system-error log for information about the error.
		3. If you cannot isolate the failing component by using the LEDs and the information in the system-error log, remove one component at a time; and restart the server after each component is removed.
		4. Replace the following components, in the order shown, restarting the server each time:
		  • PCI riser cards
		  • ServeRAID adapter
		  • Optional network adapter
		  • (Trained technician only) System board
		5. If the failure remains, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 14. Light path diagnostics panel LEDs (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.**	

LED	Description	Action
NMI	A nonmaskable interrupt has occurred, or the NMI button was pressed.	1. Check the system-error log for information about the error. 2. Restart the server.
CONFIG	CONFIG + PS An invalid power configuration error has occurred.	If the CONFIG LED and the PS 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.
	CONFIG + CPU A hardware configuration error has occurred.	If the CONFIG LED and the CPU 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 "Replacing a microprocessor and heat sink" on page 289 for additional information about microprocessor requirements). 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.
	CONFIG + MEM A hardware configuration error has occurred.	If the CONFIG LED and the MEM LED are lit, check the system-event log in the Setup utility or IMM2 error messages. Follow steps indicated in Appendix C, "UEFI/POST diagnostic codes," on page 397 and Appendix B, "Integrated management module II (IMM2) error messages," on page 339.
LINK	Reserved.	

Table 14. Light path diagnostics panel LEDs (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.**	

LED	Description	Action
CPU	When only the CPU LED is lit, a microprocessor has failed.	If the CONFIG 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 "Replacing a microprocessor and heat sink" on page 289 for information about installation and requirements. 2. (Trained technician only) Replace the failing microprocessor (see "Removing a microprocessor and heat sink" on page 286 and "Replacing a microprocessor and heat sink" on page 289). 3. For more information, go to http://www.ibm.com/ systems/support/supportsite.wss/ docdisplay?brandind=5000008&lndocid=SERV-CALL.
	CPU + CONFIG When both the CPU LED and the CONFIG LED are lit, the microprocessor configuration is invalid.	If the CONFIG LED and the CPU 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 "Replacing a microprocessor and heat sink" on page 289 for additional information about microprocessor requirements). 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.

Table 14. Light path diagnostics panel LEDs (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.**	

LED	Description	Action
MEM	When only the MEM 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 CONFIG LED is not lit, the system might detect a memory error. Complete the following steps to correct the problem: 1. Update the server firmware to the latest level (see "Updating the firmware" on page 91). 2. Reseat or swap the DIMMs with lit LED. 3. Check the system-event log in the Setup utility or IMM error messages. Follow steps indicated in Appendix C, "UEFI/POST diagnostic codes," on page 397 and Appendix B, "Integrated management module II (IMM2) error messages," on page 339. 4. Replace the failing DIMM (see "Removing a memory module" on page 219 and "Installing a memory module" on page 48).
	MEM + CONFIG When both the MEM and CONFIG LEDs are lit, the memory configuration is invalid.	If the MEM LED and the CONFIG LED are lit, check the system-event log in the Setup utility or IMM2 error messages. Follow steps indicated in Appendix C, "UEFI/POST diagnostic codes," on page 397 and Appendix B, "Integrated management module II (IMM2) error messages," on page 339.
TEMP	The system or the system component temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit.	1. Make sure that the heat sink is seated correctly. 2. Determine whether a fan has failed. If it has, replace it. 3. Make sure that the room temperature is not too high. See "Server 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 heat sink or the fan on the adapter, or the optional network adapter is seated correctly. If the fan has failed, replace it. 6. For more information, 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. Reseat the failing fan, which is indicated by a lit LED near the fan connector on the system board. 2. Replace the failing fan (see "Removing a hot-swap fan" on page 259 and "Replacing a hot-swap fan" on page 260).

Table 14. Light path diagnostics panel LEDs (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.**	

LED	Description	Action
BOARD	An error has occurred on the system board or the system battery.	1. Check the LEDs on the system board to identify the component that caused the error. The BOARD LED can be lit due to any of the following reasons: • Battery • (Trained technician only) System board 2. Check the system-error log for information about the error. 3. Replace the failing component: • Battery (see "Removing the system battery" on page 271 and "Replacing the system battery" on page 273). • (Trained technician only) System board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301).
HDD	A hard disk drive has failed or is missing.	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. For more information, see "Light path diagnostics LEDs" on page 126. 4. 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. 5. If the problem remains, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Power-supply LEDs

The following minimum configuration is required for the server to start:
• One microprocessor in microprocessor socket 1
• One 2 GB DIMM on the system board
• One power supply
• Power cord
• Four cooling fans (fan 1, 2, 3, and 5)
• One PCI riser-card assembly in PCI connector 1

AC power-supply LEDs:
The following minimum configuration is required for the DC LED on the power
supply to be lit:
* Power supply
* Power cord

Note: You must turn on the server for the DC LED on the power supply to be lit.

The following illustration shows the locations of the power-supply LEDs on the ac
power supply.

Figure 84. AC power-supply LEDs

The following table describes the problems that are indicated by various
combinations of the power-supply LEDs on an ac power supply and suggested
actions to correct the detected problems.

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	The power supply has failed.	Replace the power supply.	
Off	On	Off	The power supply has failed.	Replace the power supply.	
Off	On	On	The power supply has failed.	Replace the power supply.	

AC power-supply LEDs					
AC	DC	Error (!)	Description	Action	Notes
On	Off	Off	Power-supply not fully seated, faulty system board, or the power supply has failed.	1. Reseat the power supply. 2. Follow actions in the "Power problems" on page 155. 3. If the OVER SPEC LED on the light path diagnostics is lit, follow the actions in "Light path diagnostics LEDs" on page 126. 4. If the OVER SPEC LED on the light path diagnostics is not lit, check the error LEDs on the system board and the IMM2 error messages. Follow steps in "Power problems" on page 155 and "Solving power problems" on page 164 until the problem is solved.	Typically indicates a power-supply is not fully seated.
On	Off	On	The power supply has failed.	Replace the power supply.	
On	On	On	The power supply has failed.	Replace the power supply.	

DC power-supply LEDs:
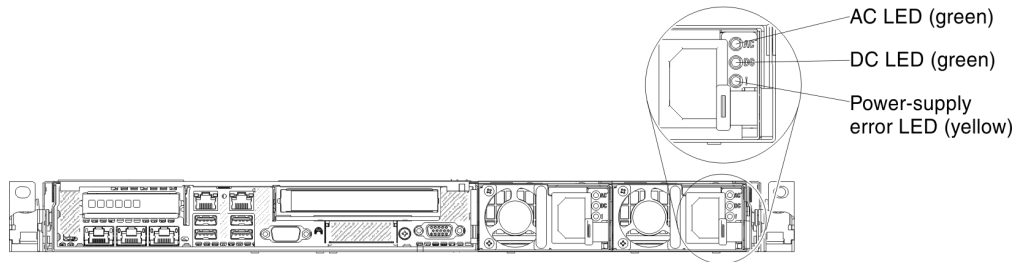The following illustration shows the locations of the power-supply LEDs on the dc power supply.
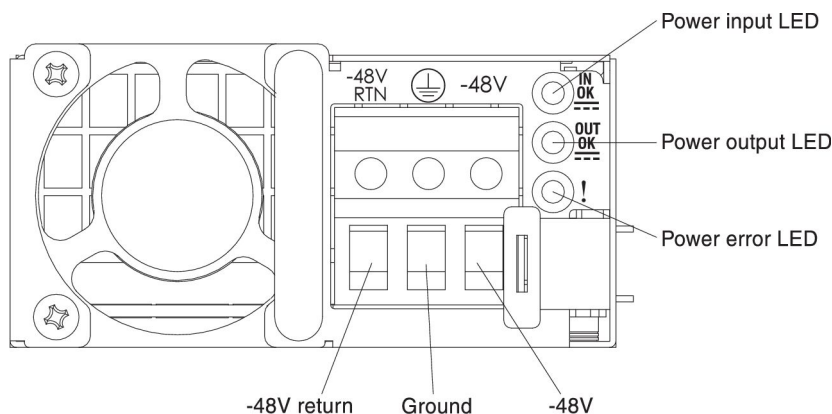

Figure 85. DC power-supply LEDs

The following table describes the problems that are indicated by various combinations of the power-supply LEDs on a dc power supply and suggested actions to correct the detected problems.

DC power-supply LEDs					
IN OK	OUT OK	Error (!)	Description	Action	Notes
On	On	Off	Normal operation.		

DC power-supply LEDs					
IN OK	OUT OK	Error (!)	Description	Action	Notes
Off	Off	Off	No dc power to the server or a problem with the dc power source.	1. Check the dc 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 dc power is present.
Off	Off	On	The power supply has failed.	Replace the power supply.	
Off	On	Off	The power supply has failed.	Replace the power supply.	
Off	On	On	The power supply has failed.	Replace the power supply.	
On	Off	Off	Power-supply not fully seated, faulty system board, or the power supply has failed.	1. Reseat the power supply. 2. Follow actions in the "Power problems" on page 155. 3. If the OVER SPEC LED on the light path diagnostics is lit, follow the actions in "Light path diagnostics LEDs" on page 126. 4. If the OVER SPEC LED on the light path diagnostics is not lit, check the error LEDs on the system board and the IMM2 error messages. Follow steps in "Power problems" on page 155 and "Solving power problems" on page 164 until the problem is solved.	Typically indicates a power-supply is not fully seated.
On	Off	On	The power supply has failed.	Replace the power supply.	
On	On	On	The power supply has failed.	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" on page 32 for the location of these LEDs).

Table 15. 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.
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.

PCI riser-card LEDs

The following illustration shows the location of the PCI riser-card LEDs.
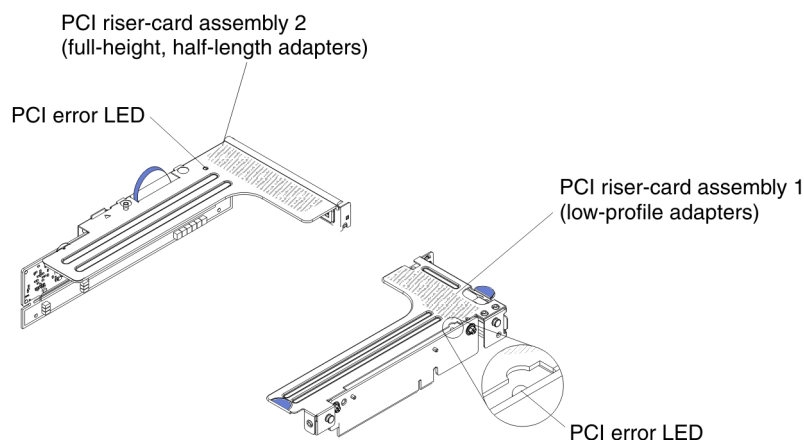

Figure 86. PCI riser-card LEDs

Event logs

Error codes and messages displayed in POST event log, system-event log, integrated management module (IMM2) event log, and DSA event log.

- **POST event log:** This log contains the most recent error codes and messages that were generated during POST. You can view the contents of the POST event log from the Setup utility (see "Starting the Setup utility" on page 96). For more information about POST error codes, see Appendix C, "UEFI/POST diagnostic codes," on page 397.

- **System-event log:** This log contains POST and system management interrupt (SMI) events and all events that are generated by the baseboard management controller that is embedded in the integrated management module (IMM). You can view the contents of the system-event log through the Setup utility and through the Dynamic System Analysis (DSA) program (as 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 clear the system-event log through the Setup utility. When you are troubleshooting an error, you might have to save and then clear the system-event log to make the most recent events available for analysis. For more information about the system-event log, see Appendix B, "Integrated management module II (IMM2) error messages," on page 339.

  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 IMM 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 II (IMM2) event log:** This log contains a filtered subset of all IMM, POST, and system management interrupt (SMI) events. You can view the IMM event log through the IMM web interface. For more information, see "Logging on to the web interface" on page 107. You can also view the IMM event log through the Dynamic System Analysis (DSA) program (as the ASM event log). For more information about IMM error messages, see Appendix B, "Integrated management module II (IMM2) error messages," on page 339.

- **DSA event 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 IMM chassis-event log (as the ASM event log), and the operating-system event logs. You can view the DSA event log through the DSA program (see "Viewing event logs without restarting the server" on page 137). For more information about DSA and DSA messages, see "IBM Dynamic System Analysis" on page 139 and Appendix A, "DSA messages," on page 305.

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 Viewers**.
   - To view the system-event log, select **System Event Log**.

Viewing event logs without restarting the server

If the server is not hung and the IMM is connected to a network, 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), or the IMM 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 or check for and download a later version of DSA Preboot CD image, go to http://www.ibm.com/support/entry/portal/docdisplay?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 IMM 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 107.

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 16. Methods for viewing event logs

Condition	Action
The server is not hung and is connected to a network (using an operating system controlled network ports).	Use any of the following methods: • Run DSA Portable to view the diagnostic event log (requires IPMI driver) or create an output file that you can send to IBM service and support (using ftp or local copy). • Use IPMItool to view the system-event log (requires IPMI driver). • Use the web browser interface to the IMM to view the system-event log locally (requires RNDIS USB LAN driver).

Table 16. Methods for viewing event logs (continued)

Condition	Action
The server is not hung and is not connected to a network (using an operating system controlled network ports).	• Run DSA Portable to view the diagnostic event log (requires IPMI driver) or create an output file that you can send to IBM service and support (using ftp or local copy). • Use IPMItool to view the system-event log (requires IPMI driver). • Use the web browser interface to the IMM to view the system-event log locally (requires RNDIS USB LAN driver).
The server is not hung and the integrated management module II (IMM2) is connected to a network.	In a web browser, type the IP address for the IMM2 and go to the **Event Log** page. For more information, see "Obtaining the IMM host name" on page 106 and "Logging on to the web interface" on page 107.
The server is hung, and no communication can be made with the IMM.	• If DSA Preboot is installed, restart the server and press F2 to start DSA Preboot and view the event logs (see "Running the DSA Preboot diagnostic programs" on page 141 for more information). • 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 137.

Clearing the event logs

To clear the event logs, complete the following steps.

Note: The POST error log is automatically cleared each time the server is restarted.

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. To clear the IMM system-event log, select **System Event Logs** > **Clear System Event Log**, then, press **Enter** twice.

POST

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.

Note: This server does not use beep codes for server status.

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 detects a problem, an error message is displayed. See Appendix C, "UEFI/POST diagnostic codes," on page 397 for more information.

If POST detects a problem, an error message is sent to the POST event log, see "Event logs" on page 136 for more information.

IBM Dynamic System Analysis

IBM Dynamic System Analysis (DSA) collects and analyzes system information to aid in diagnosing server problems.

DSA collects the following information about the server:
- Drive health information
- Event logs for ServeRAID controllers and service processors
- Hardware inventory, including PCI and USB information
- Installed applications and hot fixes (available in DSA Portable only)
- Kernel modules (available in DSA Portable only)
- Light path diagnostics status
- Network interfaces and settings
- Performance data and details about processes that are running
- RAID controller configuration
- Service processor (integrated management module) status and configuration
- System configuration
- Vital product data and firmware information

For system-specific information about the action that you should take as a result of a message that DSA generates, see Appendix A, "DSA messages," on page 305.

If you cannot find a problem by using DSA, see "Solving undetermined problems" on page 166 for information about testing the server.

Note: DSA Preboot might appear to be unresponsive when you start the program. This is normal operation while the program loads.

Make sure that the server has the latest version of the DSA code. To obtain DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www.ibm.com/systems/support/supportsite.wss/ docdisplay?brandind=5000008&lndocid=SERV-DSA.

DSA editions

Two editions of Dynamic System Analysis are available.

- **DSA Portable**

  DSA Portable Edition runs within the operating system; you do not have to restart the server to run it. It is packaged as a self-extracting file that you download from the web. When you run the file, it self-extracts to a temporary folder and performs comprehensive collection of hardware and operating-system information. After it runs, it automatically deletes the temporary files and folder and leaves the results of the data collection and diagnostics on the server.

  If you are able to start the server, use DSA Portable.

- **DSA Preboot**

  DSA Preboot runs outside of the operating system; you must restart the server to run it. It is provided in the flash memory on the server, or you can create a bootable media such as a CD, DVD, ISO, USB, or PXE using the IBM ToolsCenter Bootable Media Creator (BoMC). For more details, see the BoMC *User Guide* at http://www.ibm.com/systems/support/supportsite.wss/ docdisplay?lndocid=TOOL-BOMC&brandind=5000016. In addition to the capabilities of the other editions of DSA, DSA Preboot includes diagnostic routines that would be disruptive to run within the operating-system environment (such as resetting devices and causing loss of network connectivity). It has a graphical user interface that you can use to specify which diagnostics to run and to view the diagnostic and data collection results.

  DSA Preboot provides diagnostics for the following system components, if they are installed:

  - Emulex network adapter
  - Optical devices (CD or DVD)
  - Tape drives (SCSI, SAS, or SATA)
  - Memory
  - Microprocessor
  - Checkpoint panel
  - I2C bus
  - SAS and SATA drives

  If you are unable to restart the server or if you need comprehensive diagnostics, use DSA Preboot.

For more information and to download the utilities, go to http://www.ibm.com/ systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-DSA.

Running the DSA Preboot diagnostic programs

Note: The DSA memory test might take up to 30 minutes to run. If the problem is not a memory problem, skip the memory test.

To run the DSA Preboot 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 `<F2> Diagnostics` is displayed, press F2.

    Note: The DSA Preboot diagnostic program might appear to be unresponsive for an unusual length of time 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 type **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 operation, 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.

If the server stops during testing and you cannot continue, restart the server and try running the DSA Preboot 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.

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

Additional information concerning test failures is available in the extended diagnostic results for each test.

Viewing the test log results and transferring the DSA collection

To view the test log for the results when the tests are completed, click the **Success** link in the Status column, if you are running the DSA graphical user interface, or type `:x` to exit the Execute Tests menu, if you are running the DSA interactive menu, or select **Diagnostic Event Log** in the graphical user interface. To transfer DSA Preboot collections to an external USB device, type the `copy` command in the DSA interactive menu.

- If you are running the DSA graphical user interface (GUI), click the **Success** link in the Status column.
- If you are running the DSA interactive menu (CLI), type `:x` to exit the Execute Tests menu; then, select **completed tests** to view the results.

You can also send the DSA error log to IBM support to aid in diagnosing the server problems.

Automated service request (call home)

IBM provides tools that can automatically collect and send data or call IBM Support when an error is detected. These tools can help IBM Support speed up the process of diagnosing problems. The following sections provide information about the call home tools.

IBM Electronic Service Agent

IBM Electronic Service Agent monitors, tracks, and captures system hardware errors and hardware and software inventory information, and reports serviceable problems directly to IBM Support. You can also choose to collect data manually. It uses minimal system resources, and can be downloaded from the IBM website. For more information and to download IBM Electronic Service Agent, go to http://www.ibm.com/support/electronic/portal/.

Error messages

This section provides the list of error codes and messages for UEFI/POST, IMM2, and DSA that are generated when a problem is detected.

See Appendix C, "UEFI/POST diagnostic codes," on page 397, Appendix B, "Integrated management module II (IMM2) error messages," on page 339, and Appendix A, "DSA messages," on page 305 for more information.

Troubleshooting by symptom

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

If you cannot find a solution to the problem in these tables, see Appendix A, "DSA messages," on page 305 for information about testing the server and "Running the DSA Preboot diagnostic programs" on page 141 for additional information about running DSA Preboot program. For additional information to help you solve problems, see "Start here" on page 117.

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 system-error LED on the operator information panel; if it is lit, check the light path diagnostics LEDs (see "Light path diagnostics" on page 123).
2. Remove the software or device that you just added.
3. Run IBM Dynamic System Analysis (DSA) to determine whether the server is running correctly (for information about using DSA, see Appendix A, "DSA messages," on page 305).
4. Reinstall the new software or new device.

CD/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/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

The optional DVD drive is not recognized.	1. Make sure that:
	• The SATA connector to which the DVD drive is attached (primary or secondary) is enabled in the Setup utility.
	• All cables and jumpers are installed correctly.
	• 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 cable
	4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
	5. (Trained technician only) Replace the system board.

A CD or DVD is not working correctly.	1. Clean the CD or DVD. 2. Replace the CD or DVD with new CD or DVD media. 3. Run the DVD drive diagnostic programs. 4. Reseat the DVD drive. 5. 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/supportportal/ 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/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	
Symptom	**Action**
A cover latch 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 the 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 170 for more information. 2. See "Recovering the server firmware (UEFI update failure)" on page 168 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/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	
Symptom	**Action**
A hard disk drive has failed, and the associated yellow hard disk drive status LED is lit.	Replace the failed hard disk drive (see "Removing hot-swap hard disk drives" on page 203 and "Replacing hot-swap hard disk drives" on page 204).

- **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.**

Symptom	Action
A newly installed hard disk drive is not recognized.	1. Make sure that the installed hard disk drive or ServeRAID adapter is supported. For a list of supported optional devices, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. 2. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault. 3. If the LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane. 4. Observe the associated green hard disk drive activity LED and the yellow status LED: • If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the DSA diagnostics program to determine whether the drive is detected. • If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding. • If neither LED is lit or flashing, check the hard disk drive backplane (go to step 5). • If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step 5. If the activity of the LEDs changes, return to step 2. 5. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane. 6. Reseat the backplane power cable and repeat steps 2 through 4. 7. Reseat the backplane signal cable and repeat steps 2 through 4. 8. Suspect the backplane signal cable or the backplane: • If the server has eight hot-swap bays: a. Replace the affected backplane signal cable. b. Replace the affected backplane. 9. See "Problem determination tips" on page 167.
Multiple hard disk drives fail.	Make sure that the hard disk drive, SAS/SATA adapter, and server device drivers and firmware are at the latest level. **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.
Multiple hard disk drives are offline.	1. Review the storage subsystem logs for indications of problems within the storage subsystem, such as backplane or cable problems. 2. See "Problem determination tips" on page 167.
A replacement hard disk drive does not rebuild.	1. Make sure that the hard disk drive is recognized by the adapter (the green hard disk drive activity LED is flashing). 2. Review the SAS/SATA adapter documentation to determine the correct configuration parameters and settings.

• 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.	

Symptom	Action
A green hard disk drive activity LED does not accurately represent the actual state of the associated drive.	If the green hard disk drive activity LED does not flash when the drive is in use, run the DSA Preboot diagnostic programs to collect error logs (see "Running the DSA Preboot diagnostic programs" on page 141). • If there is a hard disk drive error log, replace the affected hard disk drive. • If there is no disk drive error log error log, replace the affected backplane.

An yellow hard disk drive status LED does not accurately represent the actual state of the associated drive.	1. If the yellow hard disk drive LED and the RAID adapter software do not indicate the same status for the drive, complete the following steps:
	  a. Turn off the server.
	  b. Reseat the SAS/SATA adapter.
	  c. Reseat the backplane signal cable and backplane power cable.
	  d. Reseat the hard disk drive.
	  e. Turn on the server and observe the activity of the hard disk drive LEDs.
	2. See "Problem determination tips" on page 167.

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/supportportal/ 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 269 and "Replacing a USB embedded hypervisor flash device" on page 270). 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/supportportal/ 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-error log or IMM event logs (see "Event logs" on page 136).

The server resets (restarts) occasionally.	1. If the reset occurs during POST and the POST watchdog timer is enabled (click **System Settings** > **Recovery** > **System Recovery** > **POST Watchdog Timer** in the Setup utility to see the POST watchdog setting), make sure that sufficient time is allowed in the watchdog timeout value (**POST Watchdog Timer**). If the server continues to reset during POST, see Appendix C, "UEFI/POST diagnostic codes," on page 397 and Appendix A, "DSA messages," on page 305. 2. If neither condition applies, check the system-error log or IMM system-event log (see "Event logs" on page 136).

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/supportportal/ 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. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
	3. 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.
	4. Replace the keyboard.

• 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.	
Symptom	**Action**
The mouse or USB-device does not work.	1. Make sure that: • 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 option 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 mouse or USB-device.

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/supportportal/ 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.	**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 that: • No error LEDs are lit on the operator information panel. • No DIMM error LEDs are lit on the system board. • Memory mirrored channel 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. • There is no memory mismatch when the server is at the minimum memory configuration. 2. Reseat the DIMMs, and then restart the server. 3. 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, reseat the DIMM; then, run the Setup utility and enable the DIMM. 4. Check that all DIMMs are initialized in the Setup utility; then, run memory diagnostics (see "Running the DSA Preboot diagnostic programs" on page 141). 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. Re-enable all DIMMs using the Setup utility, and then restart the server. 7. (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. 8. (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/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	

Symptom	Action
Multiple DIMMs in a channel are identified as failing.	**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; then, restart the server. 2. Remove the highest-numbered DIMM of those that are identified and replace it with an identical known good DIMM; then, restart the server. Repeat as necessary. If the failures continue after all identified DIMMs are replaced, go to step 4. 3. Return the removed DIMMs, one at a time, to their original connectors, restarting the server after each DIMM, until a DIMM fails. Replace each failing DIMM with an identical known good DIMM, restarting the server after each DIMM replacement. Repeat step 3 until you have tested all removed DIMMs. 4. Replace the highest-numbered DIMM 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/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.	

Symptom	Action

The server goes directly to the POST Event Viewer when it is turned on.	1. Correct any errors that are indicated by the light path diagnostics LEDs (see "Light path diagnostics" on page 123).
	
	2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size. To view the microprocessor information, run the Setup utility and select **System Information** > **System Summary** > **Processor Details**.
	
	3. (Trained technician only) Make sure that microprocessor 1 is seated correctly.
	
	4. (Trained technician only) Remove microprocessor 2 and restart the server.
	
	5. Replace the following components one at a time, in the order shown, restarting the server each time:
	
	  a. (Trained technician only) Microprocessor
	
	  b. (Trained technician only) System board

Monitor and video 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. If you cannot diagnose the problem, call for service.

- **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.**

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. The IMM2 remote presence function is disabled if you install an optional video adapter. To use the IMM2 remote presence function, remove the optional video adapter. 3. If the server installed with the graphical adapters while turning on the server, the IBM logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads. 4. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 155. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. 5. Make sure that the correct server is controlling the monitor, if applicable. 6. Make sure that damaged server firmware is not affecting the video; see "Updating the firmware" on page 91. 7. Observe the checkpoint LEDs on the system board; if the codes are changing, go to step 6. 8. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. Video adapter (if one is installed) c. (Trained technician only) System board. 9. See "Solving undetermined problems" on page 166.

- **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.**

Symptom	Action

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 DSA Preboot diagnostic programs" on page 141).
	  • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 166.
	  • (Trained technician only) If the server fails the video diagnostics, replace the system board.

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, fluorescents, 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 cable. 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time: a. Monitor cable b. Video adapter (if one is installed) c. Monitor d. (Trained technician only) System board.
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the server firmware to the latest level (see "Updating the firmware" on page 91) with the correct language. 2. Reseat the monitor cable. 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time: a. Monitor cable b. Video adapter (if one is installed) c. Monitor d. (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/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

Symptom	Action

Unable to wake the server using the Wake on LAN feature.	1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see "Event logs" on page 136), make sure:
	
	  a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
	
	  b. The room temperature is not too high (see "Server features and specifications" on page 7).
	
	  c. The air vents are not blocked.
	
	  d. The air baffle is installed securely.
	
	2. Reseat the dual-port network adapter (see "Removing the dual-port network adapter" on page 241 and "Replacing the dual-port network adapter" on page 243).
	
	3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
	
	4. If the problem still remains, replace the dual-port network adapter.

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/supportportal/ 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/systems/info/x86servers/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.

• 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.	

Symptom	Action
An IBM optional device that worked previously does not work now.	1. Make sure that all of the 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/supportportal/ 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, and the reset button does not work (the server does not start).
Note: The power-control button will not function until approximately 5 to 10 seconds after the server has been connected to 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 cable, and then repeat steps 1a and 1b.
	    • (Trained technician only) If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	    • If the server does not start, bypass the power-control button by using the force power-on jumper (see "System-board switches, jumpers, and buttons" on page 29). If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	2. Make sure that the reset button is working correctly:
	  a. Disconnect the server power cords.
	  b. Reconnect the power cords.
	  c. (Trained technician only) Reseat the operator information panel cable, and then repeat steps 2a and 2b.
	    • (Trained technician only) If the server starts, replace the operator information panel.
	    • If the server does not start, go to step 3.
	3. Make sure that both power supplies installed in the server are of the same type. Mixing different power supplies in the server will cause a system error (the system-error LED on the front panel turns on and the PS and CONFIG LEDs on the operator information panel are lit).
	4. 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 DIMMs are fully seated.
	  • The LEDs on the power supply do not indicate a problem.
	  • The microprocessors are installed in the correct sequence.
	5. Reseat the following components:
	  a. Operator information panel connector
	  b. Power supplies
	6. Replace the components listed in step 5 one at a time, in the order shown, restarting the server each time.
	7. 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.
	8. See "Power-supply LEDs" on page 131.
	9. See "Solving undetermined problems" on page 166.

- **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.**

Symptom	Action
The OVER SPEC LED on the light path diagnostics panel is lit, or the Pwr rail 1 error has been recorded in the IMM event log.	1. Disconnect the server power cords. 2. (Trained technician only) remove microprocessor 1 if the Pwr rail 1 error has been recorded in the IMM event log. 3. (Trained technician only) replace the system board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301). 4. Reinstall the component; then, restarting the server. If the Pwr rail 1 error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component. • (Trained technician only) Microprocessor 1 (see "Removing a microprocessor and heat sink" on page 286 and "Replacing a microprocessor and heat sink" on page 289). 5. Replace the power supply if the OVER SPEC LED on the light path diagnostics panel is still lit.
The OVER SPEC LED on the light path diagnostics panel is lit, or the Pwr rail 2 error has been recorded in the IMM event log.	1. Disconnect the server power cords. 2. (Trained technician only) remove microprocessor 2 if Pwr rail 2 error has been recorded in the IMM event log. 3. Restart the server. If the Pwr rail 2 error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301). 4. Reinstall the component; then, restarting the server. If the Pwr Rail 2 error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component. • (Trained technician only) Microprocessor 2 (see "Removing a microprocessor and heat sink" on page 286 and "Replacing a microprocessor and heat sink" on page 289). 5. Replace the power supply if the OVER SPEC LED on the light path diagnostics panel is still lit.

- **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.**

Symptom	Action
The OVER SPEC LED on the light path diagnostics panel is lit, or the Pwr rail 3 error has been recorded in the IMM event log.	1. Disconnect the server power cords. 2. Remove the following components if Pwr rail 3 error has been recorded in the IMM2 event log: • Optional adapter (if one is present) installed in PCI riser-card assembly 1 • PCI riser-card assembly 1 • ServeRAID SAS/SATA adapter (if one is present) • DIMMs 1 through 6 3. Restart the server. If the Pwr rail 3 error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301). 4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail 3 error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component. • DIMMs 1 through 6 (see "Removing a memory module" on page 219 and "Installing a memory module" on page 48). • ServeRAID SAS/SATA adapter (see "Removing a ServeRAID SAS/SATA controller" on page 234 and "Replacing a ServeRAID SAS/SATA controller" on page 235). • PCI riser-card assembly 1 (see "Removing a PCI riser-card assembly" on page 226 and "Replacing a PCI riser-card assembly" on page 227). • Optional adapter (if one is present) installed in PCI riser-card assembly 1 (see "Removing an adapter" on page 230 and "Replacing an adapter" on page 231). 5. Follow actions in "Solving power problems" on page 164, if the OVER SPEC LED on the light path diagnostics panel is still lit. 6. Replace the power supply if the OVER SPEC LED on the light path diagnostics panel is still lit.

- **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.**

Symptom	Action
The OVER SPEC LED on the light path diagnostics panel is lit, or the Pwr rail 4 error has been recorded in the IMM event log.	1. Disconnect the server power cords. 2. Remove the following components if the Pwr rail 4 error has been recorded in the IMM event log: • Optional PCI adapter power cable (if one is present) • Fan 1 • Fan 2 • Hard disk drives • DIMMs 7 through 12 3. Restart the server. If the Pwr rail 4 error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301). 4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr Rail 4 error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component. • DIMMs 7 through 12 (see "Removing a memory module" on page 219 and "Installing a memory module" on page 48). • Hard disk drives • Fan 2 (see "Removing a hot-swap fan" on page 259 and "Replacing a hot-swap fan" on page 260). • Fan 1 • Optional PCI adapter power cable (if one is present) 5. Follow actions in "Solving power problems" on page 164, if the OVER SPEC LED on the light path diagnostics panel is still lit. 6. Replace the power supply if the OVER SPEC LED on the light path diagnostics panel is still lit.

- **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.**

Symptom	Action

The OVER SPEC LED on the light path diagnostics panel is lit, or the Pwr rail 5 error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	
	2. Remove the following components if the Pwr rail 5 error has been recorded in the IMM event log:
	  • DVD drive (if one is installed)
	  • Fan 3
	  • Fan 4
	  • Hard disk drives
	  • DIMMs 13 through 18
	
	3. Restart the server. If the Pwr rail 5 error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301).
	
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr Rail 5 error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component.
	  • DIMMs 13 through 18 (see "Removing a memory module" on page 219 and "Installing a memory module" on page 48).
	  • Hard disk drives
	  • Fan 4 (see "Removing a hot-swap fan" on page 259 and "Installing a memory module" on page 48).
	  • Fan 3
	  • DVD drive, if one is present (see "Removing a DVD drive" on page 209 and "Replacing a DVD drive" on page 211).
	
	5. Follow actions in "Solving power problems" on page 164, if the OVER SPEC LED on the light path diagnostics panel is still lit.
	
	6. Replace the power supply if the OVER SPEC LED on the light path diagnostics panel is still lit.

- 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.

Symptom	Action

The OVER SPEC LED on the light path diagnostics panel is lit, or the Pwr rail 6 error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	2. Remove the following components if the Pwr rail 6 error has been recorded in the IMM event log:
	  • Optional adapter (if one is present) installed in PCI riser-card assembly 2
	  • PCI riser-card assembly 2
	  • Dual-port network adapter (if one is present)
	  • Fan 5
	  • Fan 6
	  • DIMMs 19 through 24
	3. Restart the server. If the Pwr rail 6 error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 298 and "Replacing the system board" on page 301).
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr Rail 6 error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component.
	  • DIMMs 19 through 24 (see "Removing a memory module" on page 219 and "Installing a memory module" on page 48).
	  • Fan 6 (see "Removing a hot-swap fan" on page 259 and "Replacing a hot-swap fan" on page 260).
	  • Fan 5
	  • Dual-port network adapter, if one is present (see "Removing the dual-port network adapter" on page 241 and "Replacing the dual-port network adapter" on page 243).
	  • PCI riser-card assembly 2 (see "Removing a PCI riser-card assembly" on page 226 and "Replacing a PCI riser-card assembly" on page 227).
	  • Optional adapter (if one is present) installed in PCI riser-card assembly 2 (see "Removing an adapter" on page 230 and "Replacing an adapter" on page 231).
	5. Follow actions in "Solving power problems" on page 164, if the OVER SPEC LED on the light path diagnostics panel is still lit.
	6. Replace the power supply if the OVER SPEC LED on the light path diagnostics panel is still lit.

• 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.	

Symptom	Action
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 and hold it down 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 20 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.
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See "Solving undetermined problems" on page 166.

Serial-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/supportportal/ 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 (see "System-board internal connectors" on page 28). 2. Reseat the following components: a. Failing serial device b. Serial cable 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time. 4. (Trained technician only) Replace the 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/supportportal/ 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) CD or DVD drive. 2. If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence. 3. If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The MegaRAID Storage 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/SATA 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. For a list of supported operating-system versions, 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

Symptom	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.	
• 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.	
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 received any error messages when using 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

Symptom	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.	
• 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.	
Symptom	**Action**

A USB device does not work.	1. Make sure that:
	   • The correct USB device driver is installed.
	   • The operating system supports USB devices.
	2. Make sure that the USB configuration options are set correctly in the Setup utility (see "Using the Setup utility" on page 96 for more information).
	3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Video problems

See "Monitor and video problems" on page 151.

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 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. Check the lit LEDs on the light path diagnostics panel (see "Light path diagnostics LEDs" on page 126).
4. If the check log LED on the light path diagnostics panel is lit, check the IMM event log for faulty Pwr rail and complete the following steps. Table 17 identifies the components that are associated with each Pwr rail and the order in which to troubleshoot the components.

   a. Disconnect the cables and power cords to all internal and external devices (see "Internal cable routing and connectors" on page 185). Leave the power-supply cords connected.

   b. For Pwr rail 1 error, complete the following steps:

      1) (Trained technician only) Replace the system board.
      2) (Trained technician only) Replace the microprocessor.

   c. For other rail errors (Pwr rail 1 error, see step 4b), remove each component that is associated with the faulty Pwr rail, one at a time, in the sequence indicated in Table 17, restarting the server each time, until the cause of the overcurrent condition is identified.

Table 17. Components associated with power rail errors

Pwr rail error in the IMM event log	Components
Pwr rail 1 error	• Microprocessor 1
Pwr rail 2 error	• Microprocessor 2
Pwr rail 3 error	• Optional adapter (if one is installed) in PCI riser-card assembly 1 • PCI riser-card assembly 1 • ServeRAID SAS/SATA adapter • DIMMs 1 through 6
Pwr rail 4 error	• PCI adapter power cable (if one is installed) • Fan 1 • Fan 2 • Hard disk drives • DIMMs 7 through 12
Pwr rail 5 error	• DVD drive (if one is installed) • Fan 3 • Fan 4 • Hard disk drives • DIMMs 13 through 18

Table 17. Components associated with power rail errors (continued)

Pwr rail error in the IMM event log	Components
Pwr rail 6 error	• Optional adapter (if one is installed) in PCI riser-card assembly 2 • PCI riser-card assembly 2 • Dual-port network adapter (if one is installed) • Fan 5 • Fan 6 • DIMMs 19 through 24

    d. Replace the identified component.

5. 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 "Power-supply LEDs" on page 131 for the minimum configuration).

6. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, see "Power-supply LEDs" on page 131 to 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 you set the Ethernet controller 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 is off, make sure that the hub and network are operating and that the correct device drivers are installed.

- Check the LAN activity LED 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 Dynamic System Analysis (DSA) 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 163.

Corrupted data in CMOS memory or corrupted UEFI firmware can cause undetermined problems. To reset the CMOS data, use the CMOS clear jumper (JP1) to clear the CMOS memory and override the power-on password; see Table 2 on page 30 for more information. If you suspect that the UEFI firmware is corrupted, see "Recovering the server firmware (UEFI update failure)" on page 168.

If 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).
   - Printer, mouse, and non-IBM devices.
   - Each adapter.
   - Hard disk drives.
   - Memory modules. The minimum configuration requirement is 2 GB DIMM in slot 1.
4. Turn on the server.

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 riser 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 can encounter, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from IBM.

The model name and serial number are located on the ID label on the front of the server as shown in the following illustration.

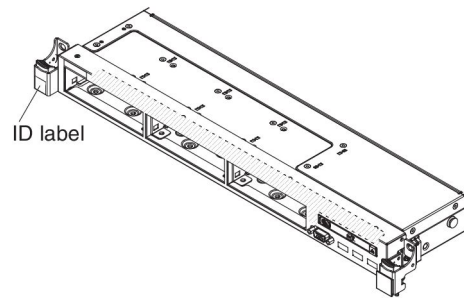**Note:** The illustrations in this document might differ slightly from your hardware.

Figure 87. ID label

- Machine type and model
- Microprocessor or hard disk drive upgrades
- Failure symptom
  - 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)
- UEFI firmware level
- IMM firmware level
- Operating system software

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
- UEFI firmware level
- IMM 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 D, "Getting help and technical assistance," on page 411 for information about calling IBM for service.

Recovering the server firmware (UEFI update failure)

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.
- **Out-of-band method:** Use the IMM web interface to update the firmware, using the latest server firmware update package.

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, go to http://www.ibm.com/supportportal/.

The flash memory of the server consists of a primary bank and a backup bank. You must maintain a bootable UEFI firmware image in the backup bank. If the server firmware in the primary bank becomes corrupted, you can either manually boot the backup bank with the UEFI boot backup jumper (JP2), 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 "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server, and disconnect all power cords and external cables.
3. Remove the cover (see "Removing the cover" on page 36).
4. Locate the UEFI boot backup jumper (JP2) on the system board.
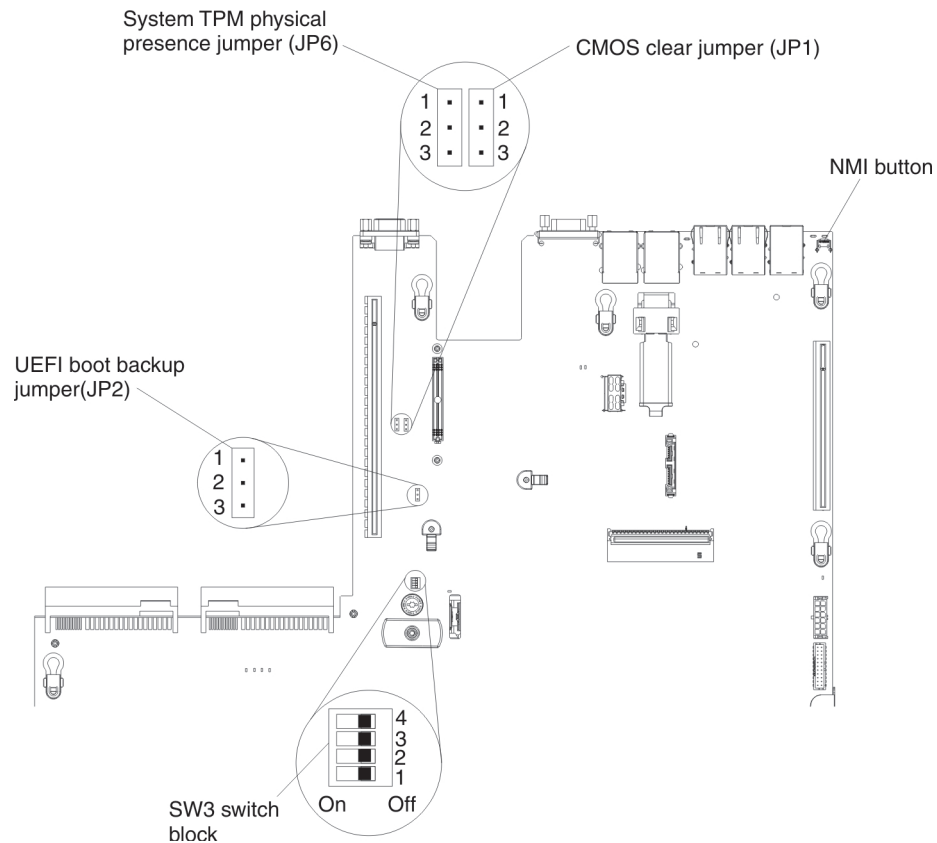
Figure 88. UEFI boot backup jumper (JP2) location

5. Move the UEFI boot backup jumper (JP2) from pins 1 and 2 to pins 2 and 3 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 cover (see "Removing the cover" on page 36).

11. Move the UEFI boot backup jumper (JP2) from pins 2 and 3 back to the primary position (pins 1 and 2).

12. Reinstall the cover (see "Replacing the cover" on page 195).

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 cover (see "Removing the cover" on page 36).

16. Reset the CMOS by removing the system battery (see "Removing the system battery" on page 271).

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

18. Reinstall the system battery (see "Replacing the system battery" on page 273).

19. Reinstall the cover (see "Replacing the cover" on page 195).

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

Chapter 4. Troubleshooting **169**

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 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.

Out-of-band method

See the IMM2 documentation (*Integrated Management Module II User's Guide*) at www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5089484 &brandind=5000008.

Automated boot recovery (ABR)

While the server is starting, if the integrated management module II 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 firmware, see "Recovering the server firmware (UEFI update failure)" on page 168. 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).

Chapter 5. Parts listing, System x3550 M4 Type 7914

The following replaceable components are available for the System x3550 M4 Type 7914 server, except as specified otherwise in "Replaceable server components." For an updated parts listing, go to http://www.ibm.com/supportportal/.

Replaceable server components

Replaceable components consist of consumable parts, structural parts, and field replaceable units (FRUs):

- **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. See "Structural parts" on page 180 for the list of structural parts.
- **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.

For information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document that comes with the server. For more information about getting service and assistance, see Appendix D, "Getting help and technical assistance," on page 411.

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware. For a list of structural parts, see "Structural parts" on page 180.
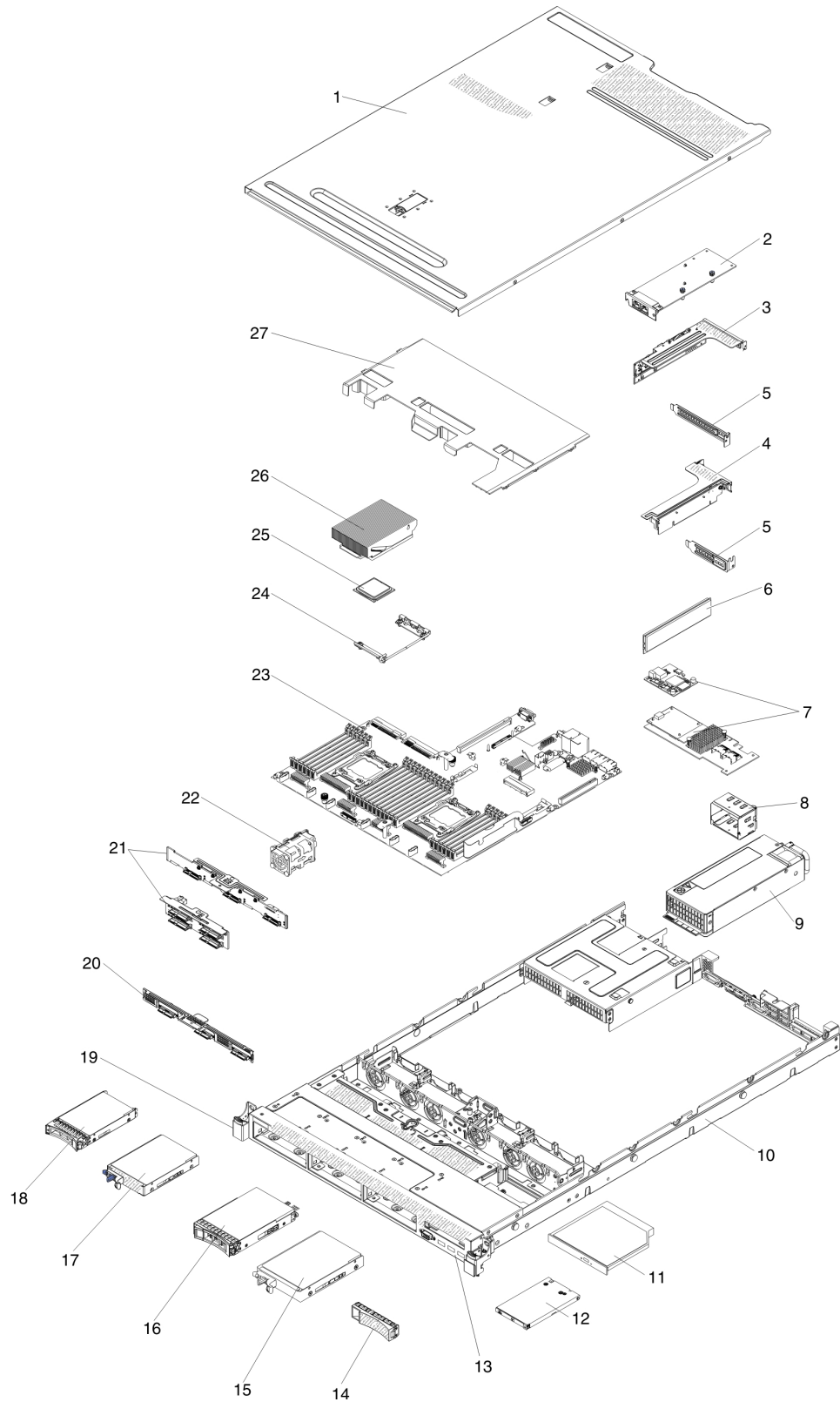
Figure 89. Server components

The following table lists the part numbers for the server replaceable components.

Table 18. Parts listing, Type 7914

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
2	Mellanox ConnectX-3 dual-port QDR/FDR10 mezz card	90Y4956	
2	Qlogic dual-port 10GbE SFP+ Embedded VFA	90Y5099	
2	Emulex dual-port 10GbE SFP+ Embedded VFA III	90Y5100	
2	Dual-port FDR embedded adapter	90Y6606	
3	PCI bracket 2	94Y7566	
3	PCI Express riser card, Gen3 x8	94Y7589	
3	PCI-X riser card	94Y7590	
3	PCI Express riser card, Gen3 x16 (full-height/half-length slot)	94Y7591	
4	PCI bracket 1	94Y7565	
4	PCI Express riser card, Gen3 x16 (low-profile slot)	94Y7588	
6	Memory, 2 GB single-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1423	
6	Memory, 4 GB single-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1424	
6	Memory, 4 GB single-rank 1.5 V, DDR3, 1600MHz, RDIMM	49Y1561	
6	Memory, 4 GB dual-rank 1.35 V, DDR3, 1333MHz, UDIMM	49Y1422	
6	Memory, 4 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1425	
6	Memory, 4 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	90Y3180	
6	Memory, 8 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1415	
6	Memory, 8 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	90Y3111	
6	Memory, 8 GB quad-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1417	
6	Memory, 16 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1565	
6	Memory, 16 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	00D4970	
6	Memory, 32 GB dual-rank 1.35 V, DDR3, 1333MHz, LRDIMM	90Y3107	
7	IBM 6Gb performance optimized HBA	46C8937	
7	ServeRAID H1110 SAS/SATA adapter	81Y4494	
7	ServeRAID M1115 SAS/SATA adapter	46C8928	
7	ServeRAID M5100 series 512 MB cache (RAID 5 upgrade)	81Y4485	
7	ServeRAID M5100 series 512 MB flash (RAID 5 upgrade)	46C9027	
7	ServeRAID M5100 series 1 GB flash (RAID 5 upgrade)	46C9029	
7	ServeRAID M5110 SAS/SATA adapter	90Y4449	
7	ServeRAID M5120 SAS/SATA adapter	81Y4479	
9	Power supply, 550 W, ac	43X3312	
9	Power supply, 550 W, ac	94Y8075	
9	Power supply, 750 W, ac	69Y5747	
9	Power supply, 750 W, ac	94Y8071	
9	Power supply, 750 W, ac	94Y8086	
9	Power supply, 750 W, high efficiency, -48 V, dc	69Y5742	
11	DVD-ROM drive	44W3254	
11	DVD-RW drive	44W3256	
12	Operator information panel assembly	90Y5821	

Table 18. Parts listing, Type 7914 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
12	Operator information panel assembly, advanced	00D3863	
	USB assembly, front	00J6143	
	USB assembly, front dual-port	00J6144	
13	Bezel, 2.5-inch hard disk bays and 1 optical drive bay	94Y7606	
13	Bezel, 3.5-inch hard disk bays	94Y7607	
15	Hard disk drive, 3.5-inch simple-swap, 500 GB, 7.2 K	81Y9803	
15	Hard disk drive, 3.5-inch simple-swap, 1 TB, 7.2 K	81Y9807	
15	Hard disk drive, 3.5-inch simple-swap, 2 TB, 7.2 K	81Y9811	
15	Hard disk drive, 3.5-inch simple-swap, 3 TB, 7.2 K	81Y9815	
16	Hard disk drive, 3.5-inch hot-swap, 500 GB, 7.2 K	81Y9787	
16	Hard disk drive, 3.5-inch hot-swap, 1 TB, 7.2 K	81Y9791	
16	Hard disk drive, 3.5-inch hot-swap, 2 TB, 7.2 K	81Y9795	
16	Hard disk drive, 3.5-inch hot-swap, 3 TB, 7.2 K	81Y9799	
16	Hard disk drive, 3.5-inch hot-swap, 1 TB, 7.2 K	90Y8568	
16	Hard disk drive, 3.5-inch hot-swap, 2 TB, 7.2 K	90Y8573	
16	Hard disk drive, 3.5-inch hot-swap, 3 TB, 7.2 K	90Y8578	
17	Solid state drive, 2.5-inch simple-swap, SATA, 200 GB	43W7745	
17	Solid state drive, 2.5-inch simple-swap, SATA, 256 GB	90Y8664	
17	Solid state drive, 2.5-inch simple-swap, SATA, 128 GB	90Y8669	
18	Solid state drive, 2.5-inch hot-swap, SATA, 200 GB	43W7721	
18	Solid state drive, 2.5-inch hot-swap, SATA, 256 GB	90Y8644	
18	Solid state drive, 2.5-inch hot-swap, SATA, 128 GB	90Y8649	
18	Hard disk drive, 2.5-inch hot-swap, 900 GB, 10 K	81Y9651	
18	Hard disk drive, 2.5-inch hot-swap, 300 GB, 15 K	81Y9671	
18	Hard disk drive, 2.5-inch hot-swap, 1 TB, 7.2 K	81Y9691	
18	Hard disk drive, 2.5-inch hot-swap, 250 GB, 7.2 K	81Y9723	
18	Hard disk drive, 2.5-inch hot-swap, 500 GB, 7.2 K	81Y9727	
18	Hard disk drive, 2.5-inch hot-swap, 1 TB, 7.2 K	81Y9731	
18	Hard disk drive, 2.5-inch hot-swap, 600 GB, 10 K	90Y8873	
18	Hard disk drive, 2.5-inch hot-swap, 300 GB, 10 K	90Y8878	
18	Hard disk drive, 2.5-inch hot-swap, 300 GB, 10 K, SED	90Y8914	
18	Hard disk drive, 2.5-inch hot-swap, 146 GB, 15 K	90Y8927	
18	Hard disk drive, 2.5-inch hot-swap, 146 GB, 15 K, SED	90Y8945	
18	Hard disk drive, 2.5-inch hot-swap, 500 GB, 7.2 K	90Y8954	
20	Backplate assembly, 3.5-inch simple-swap hard disk drive	94Y7611	
21	Backplane, 3.5-inch hot-swap hard disk drive	90Y5088	
21	Backplane, 2.5-inch hot-swap hard disk drive	94Y7587	
22	Fan module, hot-swap	94Y7564	
23	System board		00J6192

Table 18. Parts listing, Type 7914 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
24	Retention module, heat sink		94Y7739
25	Microprocessor, Intel Xeon E5-2690, 2.90 GHz, 20 MB, 1600 MHz, 135 W (8-core)		49Y8115
25	Microprocessor, Intel Xeon E5-2637, 3.00 GHz, 5 MB, 1066 MHz, 80 W (2-core)		49Y8124
25	Microprocessor, Intel Xeon E5-2665, 2.40 GHz, 20 MB, 115 W (8-core)		49Y8142
25	Microprocessor, Intel Xeon E5-2650L, 1.80 GHz, 20 MB, 1600 MHz, 70 W (8-core)		81Y5160
25	Microprocessor, Intel Xeon E5-2603, 1.80 GHz, 10 MB, 1066 MHz, 80 W (4-core)		81Y5161
25	Microprocessor, Intel Xeon E5-2609, 2.40 GHz, 10 MB, 1066 MHz, 80 W (4-core)		81Y5163
25	Microprocessor, Intel Xeon E5-2620, 2.00 GHz, 15 MB, 1333 MHz, 95 W (6-core)		81Y5164
25	Microprocessor, Intel Xeon E5-2630, 2.30 GHz, 15 MB, 1333 MHz, 95 W (6-core)		81Y5165
25	Microprocessor, Intel Xeon E5-2640, 2.50 GHz, 15 MB, 1333 MHz, 95 W (6-core)		81Y5166
25	Microprocessor, Intel Xeon E5-2650, 2.00 GHz, 20 MB, 1600 MHz, 95 W (8-core)		81Y5167
25	Microprocessor, Intel Xeon E5-2660, 2.20 GHz, 20 MB, 1600 MHz, 95 W (8-core)		81Y5168
25	Microprocessor, Intel Xeon E5-2680, 2.70 GHz, 20 MB, 1600 MHz, 130 W (8-core)		81Y5169
25	Microprocessor, Intel Xeon E5-2667, 2.90 GHz, 15 MB, 1600 MHz, 130 W (6-core)		81Y5170
25	Microprocessor, Intel Xeon E5-2643, 3.30 GHz, 10 MB, 1600 MHz, 130 W (4-core)		81Y5171
25	Microprocessor, Intel Xeon E5-2630L 2.00 GHz, 15 MB, 1333 MHz, 60 W (6-core)		81Y5204
25	Microprocessor, Intel Xeon E5-2670, 2.60 GHz, 20 MB, 1600 MHz, 115 W (8-core)		81Y9419
25	Microprocessor, Intel Xeon E5-2648L, 1.80 GHz, 20 MB, 1600 MHz, 70 W (8-core)		95Y4671
25	Microprocessor, Intel Xeon E5-2658, 1.80 GHz, 20 MB, 1600 MHz, 95 W (8-core)		95Y4676
	Microprocessor installation tool		94Y9955
26	Heat sink assembly, 95 W		94Y7602
26	Heat sink assembly, 130 W		94Y7603
	Thermal grease kit		41Y9292
	Alcohol wipes		59P4739
	Bracket, 3.5-inch to 5.25-inch conversion kit	32P4743	
	Bracket, tape mount kit	41Y7711	
	Mellanox ConnectX-3 VPI single-port QSFP FDR14 40GbE HCA	00W0039	

Table 18. Parts listing, Type 7914 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Qlogic 10Gb converged network adapter (CNA)	00Y3274	
	Adapter, DVI to VGA adapter	25R9043	
	HBA 4Gb FC PCIe dual-port adapter	39R6528	
	NetXtreme II 1000 express Ethernet adapter	39Y6070	
	PRO/1000 PF adapter	42C1752	
	QLogic 10Gb virtual fabric and SR optical transceiver	42C1816	
	Brocade 10Gb adapter	42C1822	
	Emulex 8Gb FC single-port host bus adapter	42D0491	
	Emulex 8Gb FC dual-port host bus adapter	42D0500	
	QLogic 8Gb FC single-port host bus adapter	42D0507	
	QLogic 8Gb FC dual-port host bus adapter	42D0516	
	Video adapter, NVIDIA Quadro 600	43V5931	
	Video adapter, NVIDIA Quadro 2000	43V5939	
	4Gb FC PCIe single-port adapter	43W7510	
	4Gb FC PCIe dual-port adapter	43W7512	
	IBM 6Gb SAS host bus adapter (HBA)	46C8935	
	Brocade 10Gb virtual fabric and SR optical transceiver	46C9297	
	Brocade 8Gb FC single-port host bus adapter	46M6061	
	Brocade 8Gb FC dual-port host bus adapter	46M6062	
	Intel I340-T2 Ethernet dual-port adapter	49Y4232	
	Intel I340-T4 Ethernet quad-port adapter	49Y4242	
	Broadcom NetXtreme II dual-port 10Gb adapter	49Y7912	
	NetXtreme II 1000 express Ethernet dual-port adapter	49Y7947	
	NetXtreme II 1000 express Ethernet quad-port adapter	49Y7949	
	Intel X520-DA2 dual-port 10Gb virtual fabric adapter	49Y7962	
	Brocade 4Gb FC single-port host bus adapter	59Y1992	
	Brocade 4Gb FC dual-port host bus adapter	59Y1998	
	Emulex 16Gb FC single-port HBA	81Y1658	
	Emulex 16Gb FC dual-port HBA	81Y1665	
	Brocade 16Gb FC single-port HBA	81Y1671	
	Brocade 16Gb FC dual-port HBA	81Y1678	
	Mellanox ConnectX-3 EN dual-port QSFP+ 40GbE adapter	95Y3461	
	Emulex 10GbE virtual fabric adapter III	95Y3766	
	Battery, 3.0 volt	33F8354	
	Battery, ServeRAID	81Y4579	
	Bracket assembly, rear I/O	94Y7567	
	Cable, power cord	39M5377	
	Cable, mini SAS 1 m	39R6530	
	Cable, mini SAS 3 m	39R6532	

Table 18. Parts listing, Type 7914 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Cable, SAS 610 mm	00D3276	
	Cable, SAS 710 mm	69Y1328	
	Cable, SAS 820 mm	81Y6674	
	Cable, SAS Y-cable	44E8878	
	Cable, USB	00J6142	
	Cable, USB conversion	39M2909	
	Cable, USB	44E8883	
	Cable, USB 1 m	44E8893	
	Cable, USB 3 m	44E8891	
	Cable, USB dongle	44E8894	
	Cable, USB 3.0	46C2598	
	Cable, USB	46M6475	
	Cable, USB	46M6477	
	Cable, USB	81Y3643	
	Cable, serial conversion	46M4027	
	Cable, virtual media Gen 2	46M4028	
	Cable, power, 3.5-inch HDD	81Y6661	
	Cable, power, 2.5-inch HDD	81Y6663	
	Cable, backplane, 3.5-inch hot-swap HDD	81Y6665	
	Cable, backplane, 2.5-inch hot-swap HDD	81Y6667	
	Cable, operator information panel	81Y6669	
	Cable, SATA DVD	81Y6671	
	Cable, video	81Y6673	
	Cable, adapter power	81Y6676	
	Cable, ServeRAID battery	90Y7309	
	Cable, ServeRAID power module	90Y7310	
	Cable, SPECpower	00W2465	
	Drive, 5.25-inch, 36 GB, USB	99Y3868	
	Drive, 5.25-inch, 80 GB, USB	99Y3870	
	Hypervisor, embedded USB flash device	42D0545	
	Labels, system service and FRU/CRU (3.5-inch)	00D4097	
	Labels, chassis	94Y7604	
	Labels, system service and FRU/CRU (2.5-inch)	94Y7605	
	Half high LTO Gen 3 SAS tape drive	46X5663	
	Half high LTO Gen 4 SAS tape drive	46X5672	
	Half high LTO Gen 5 SAS tape drive	46X5683	
	RDX 160 GB cartridge	46C5393	
	RDX 320 GB cartridge	46C5394	
	RDX 500 GB cartridge	46C5395	

Table 18. Parts listing, Type 7914 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Internal RDX USB 3.0 drive dock	46C2346	
	External RDX USB 3.0 drive dock	46C2347	
	External RDX power adapter	81Y8905	
	Screw, four M3x5 screws	42C3933	

Structural parts

Structural parts are not covered by the IBM Statement of Limited Warranty. The following structural parts are available for purchase from the retail store.

Table 19. Structural parts, Type 7914

Index	Description	Part number
1	Top cover	94Y7569
	Filler, EMC	44T2248
	Filler, DVD drive bay	49Y4868
	Filler, hard disk drive bay	59Y3925
14	Filler, 3.5-inch hot-swap hard disk drive	69Y5364
14	Filler, 3.5-inch simple-swap hard disk drive	69Y5368
	Filler, fan	94Y7572
5	Filler, PCI	94Y7608
8	Filler, power supply bay	94Y7610
10	Chassis assembly, 2.5-inch HDD (without front bezel)	94Y7573
10	Chassis assembly, 3.5-inch HDD (without front bezel)	94Y7574
19	EIA bracket	94Y7570
27	Air baffle	94Y7568
	Remote RAID battery tray	94Y7609
	ServeRAID M5110 series battery kit	81Y4491
	CMA kit	49Y4817
	Slide rail kit, Gen-III	94Y6625
	CMA kit, Gen-III	94Y6626
	Slide rail kit, universal	94Y6719

Table 19. Structural parts, Type 7914 (continued)

Index	Description	Part number

	Miscellaneous parts kit includes:
	    Cable clip (front, internal)
	    Cable retainer (rear, external)
	    DVD filler
	    DVD retention bracket
	    IBM logo (EIA bracket)
	    Fan filler
	    M2.5x3.5 screw
	    M3x0.5 screw
	    M3.5x5 screw
	    PCI riser 1 bracket
	    PCI riser 2 bracket
	    Power supply filler
	    Rubber stopper
		94Y7571

To order a 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.

Power cords

For your safety, a power cord with a grounded attachment plug is provided to use with this 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.

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

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

Power cord part number	Used in these countries and regions
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
39M5219	Korea (Democratic People's Republic of), Korea (Republic of)
39M5199	Japan
39M5068	Argentina, Paraguay, Uruguay
39M5226	India
39M5240	Brazil

Chapter 6. Removing and replacing server components

This section provides information for removing and replacing components in the server.

Returning a device or component

If you are instructed to return a device or component, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Internal cable routing and connectors

This section provides information about routing the cables when you install some components in the server.

For more information about the requirements for cables and connecting devices, see the documentation that comes with these devices.

Cabling SAS/SATA ServeRAID Controller

The following illustrations show the internal routing and connectors for the SAS/SATA signal cables.

Notes:

1. To connect the SAS/SATA signal cables, make sure that you first connect the signal cable, and then the power cable and configuration cable.
2. To disconnect the SAS/SATA signal cables, make sure that you first disconnect the power cable, and then the signal cable and configuration cable.
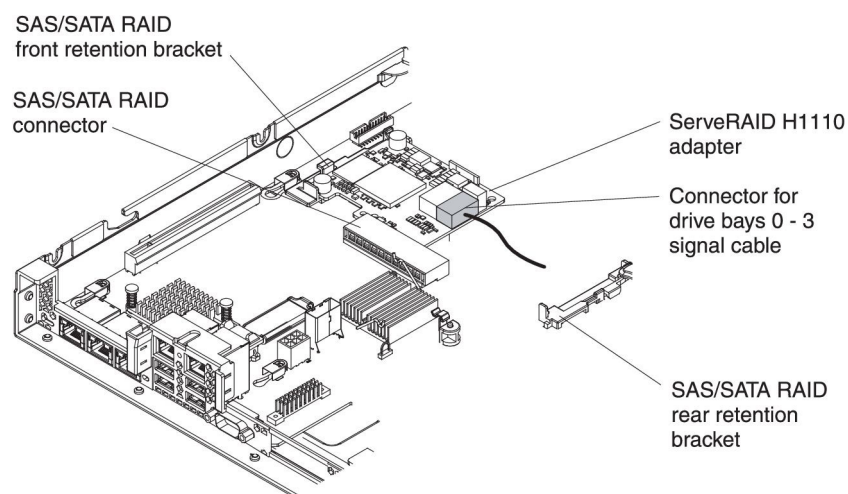
Figure 90. ServeRAID-H1110 cable connection

SAS/SATA RAID
front retention bracket

SAS/SATA RAID
connector

Connector for
drive bays 4 - 7
signal cable

Connector for
drive bays 0 - 3
signal cable

ServeRAID M1115
adapter

SAS/SATA RAID
rear retention
bracket
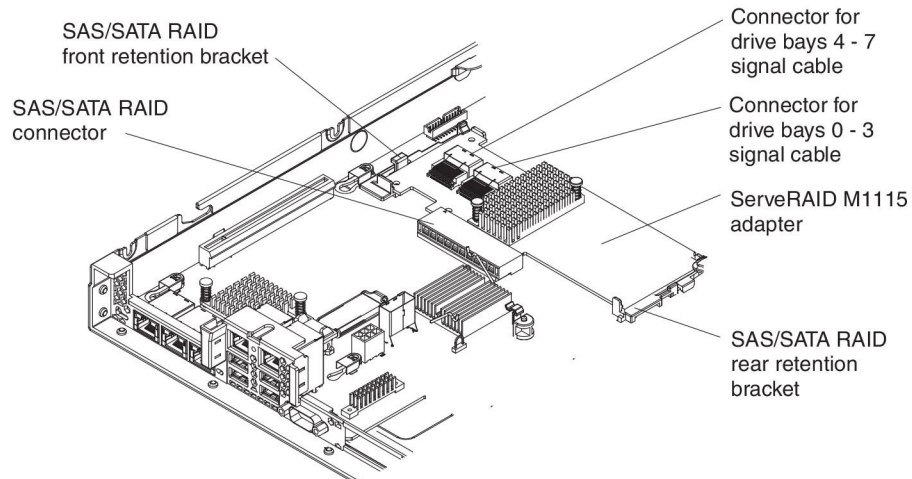
Figure 91. ServeRAID-M1115 cable connection

SAS/SATA RAID
front retention bracket

SAS/SATA RAID
connector

Connector for
drive bays 4 - 7
signal cable

Connector for
drive bays 0 - 3
signal cable

ServeRAID M5110
adapter

SAS/SATA RAID
rear retention
bracket
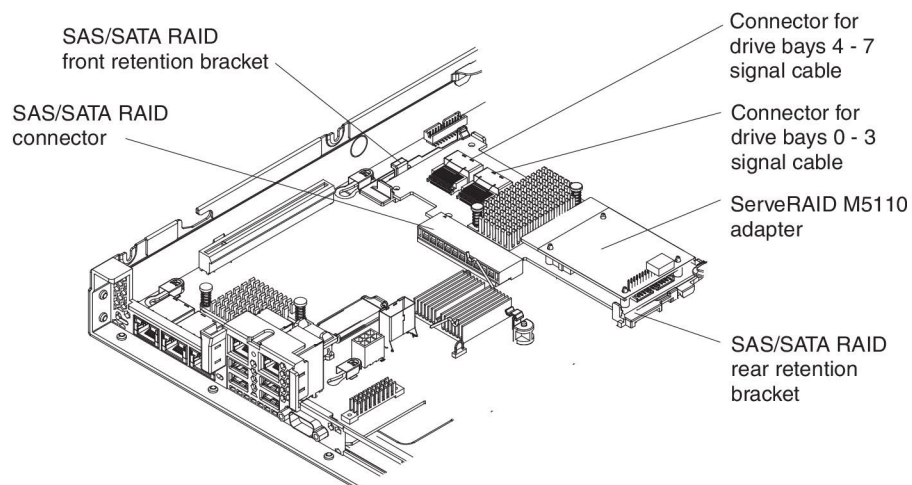
Figure 92. ServeRAID-M5110 cable connection

Cabling backplane

The following illustration shows the internal routing and connectors for the 3.5-inch simple-swap hard disk drives SATA signal and power cables.
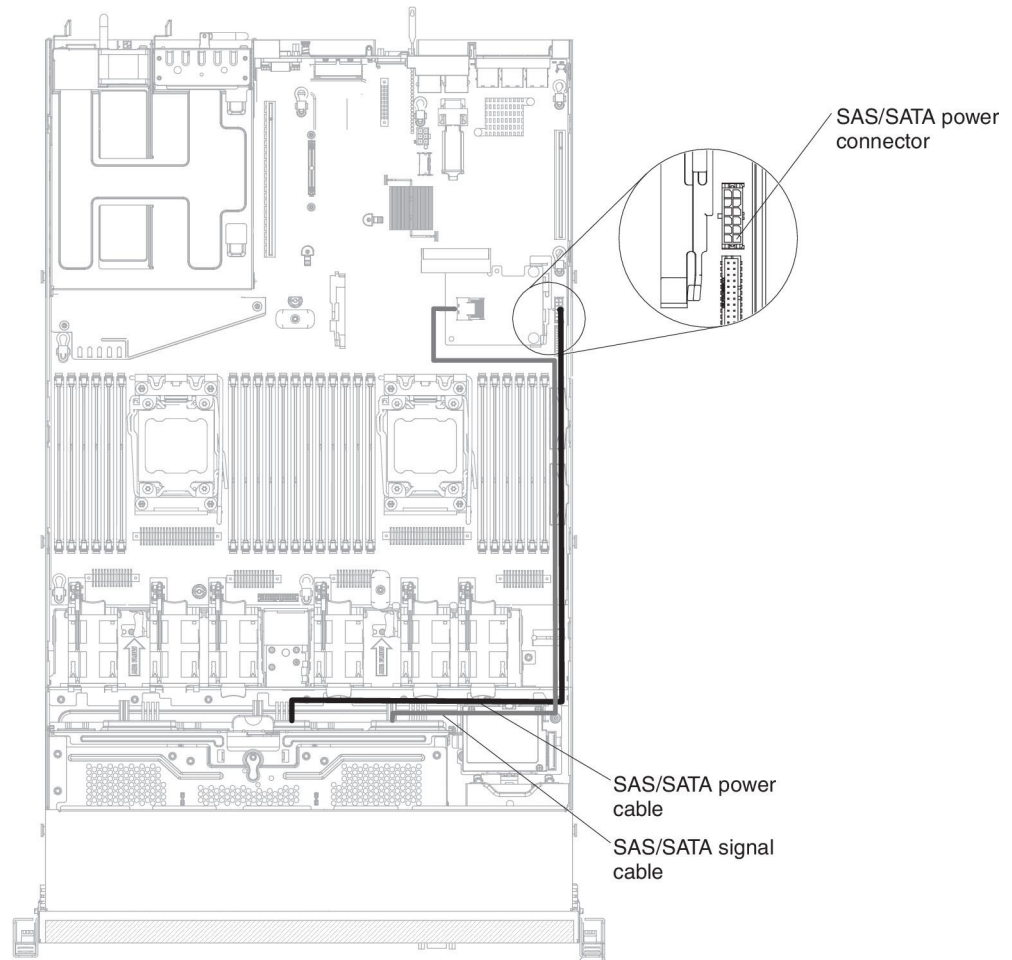
Figure 93. 3.5-inch simple-swap backplate assembly cable connection

The following illustration shows the internal routing and connectors for the 3.5-inch hot-swap hard disk drives SAS/SATA signal, power and configuration cables with the SAS/SATA adapter installed.
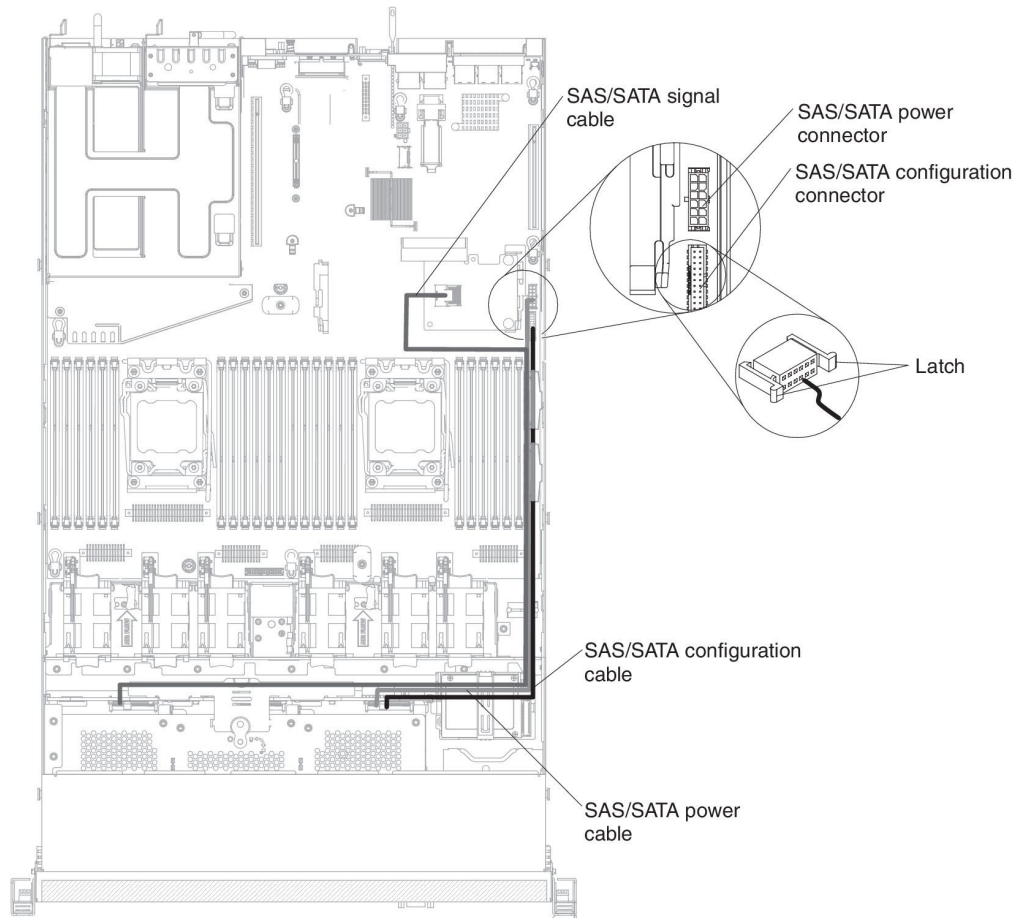
Figure 94. 3.5-inch hot-swap backplane cable connection

The following illustration shows the internal routing and connectors for the SAS/SATA signal, power and configuration cables with the SAS/SATA adapter installed.
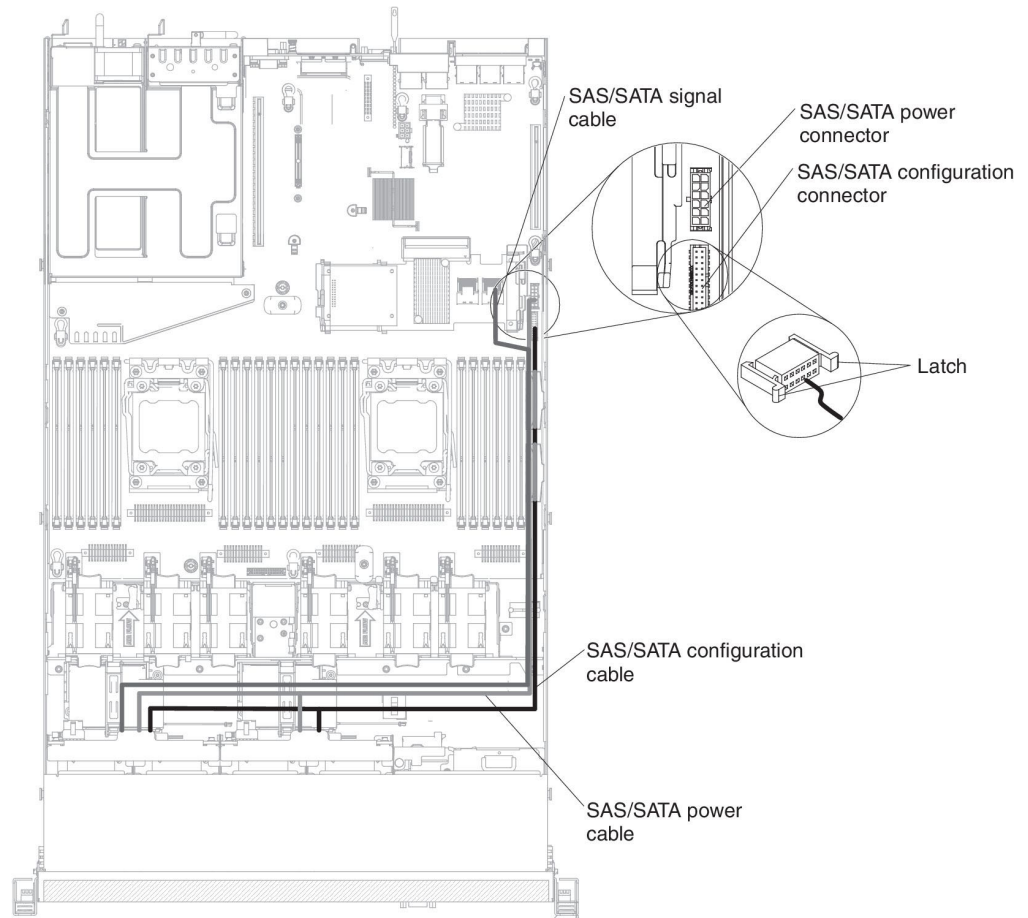
Figure 95. 2.5-inch hot-swap backplane cable connection

Cabling RAID adapter battery

The following illustration shows the internal routing and connectors for the RAID adapter battery cable with the SAS/SATA adapter installed.

RAID adapter battery cable
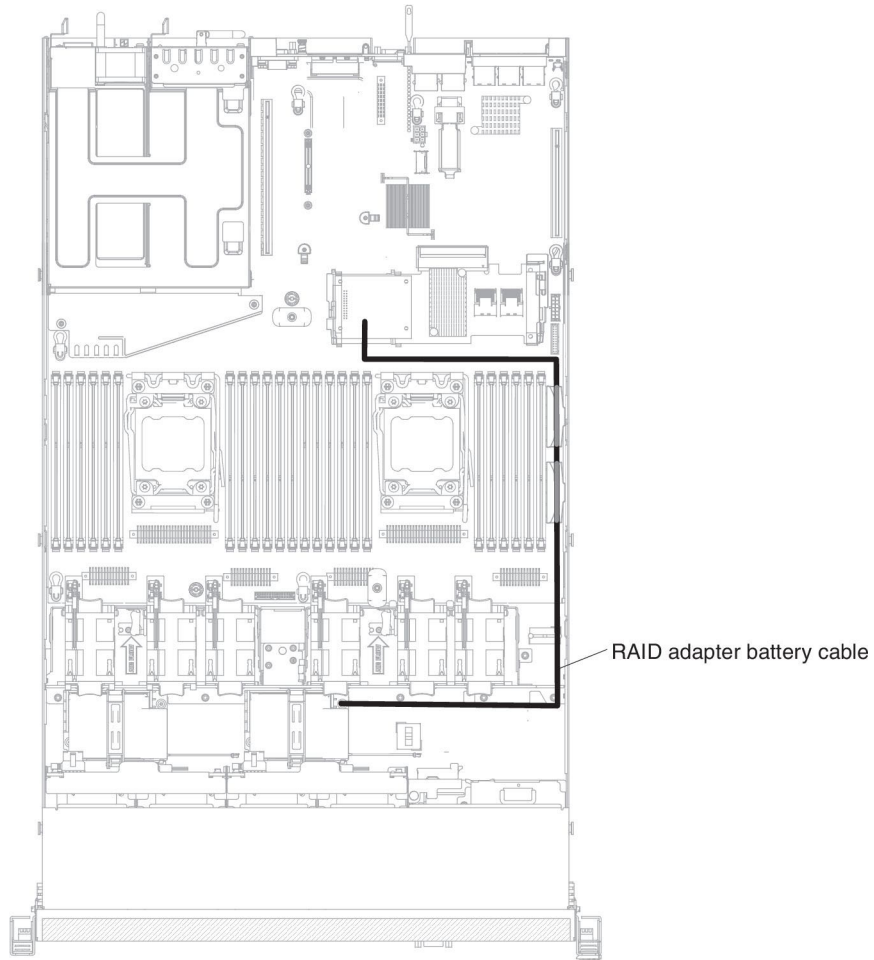
Figure 96. RAID adapter battery cable connection

Cabling SPECpower

The following illustration shows the internal routing and connectors for the server models with one 2.5-inch simple-swap hard disk drives.

Drive bay 0
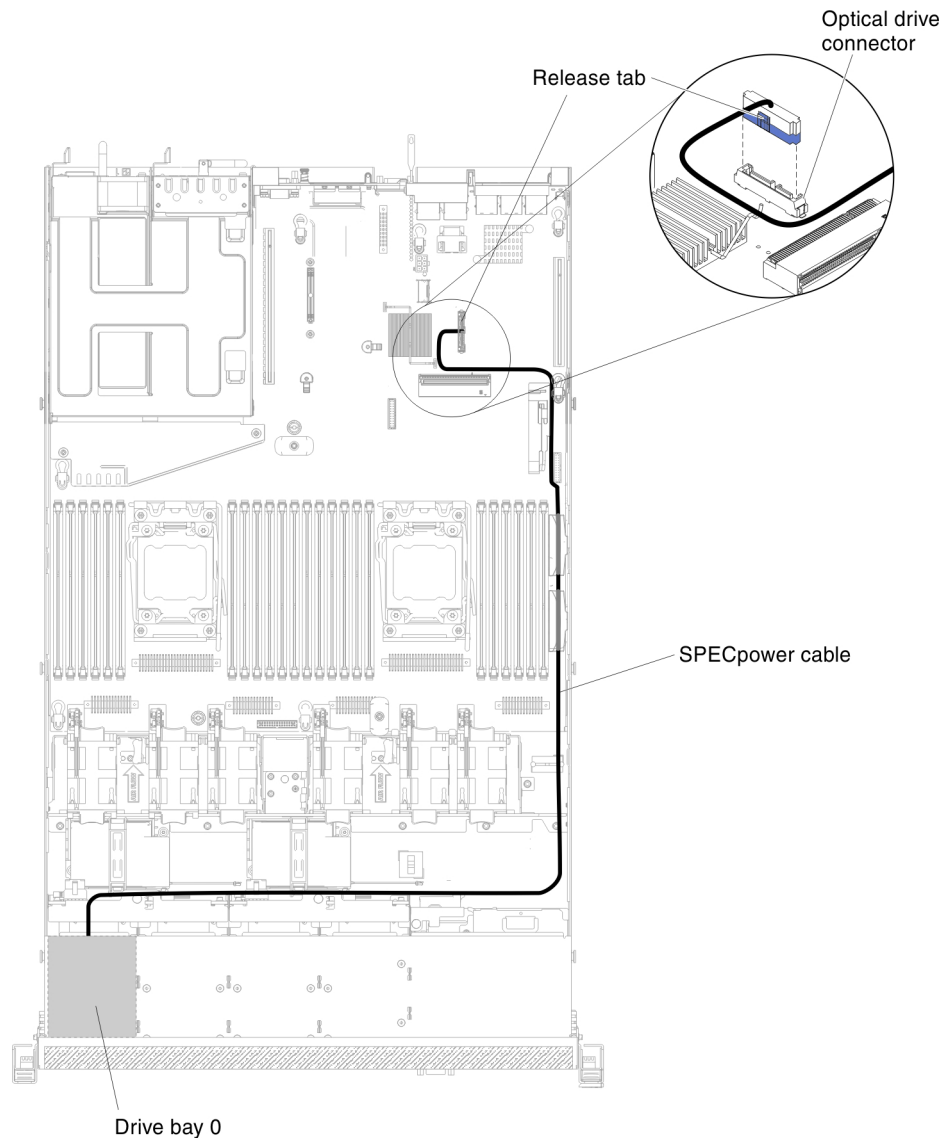
Figure 97. SPECpower cable connection

Cabling DVD drive

The internal routing and connectors for the DVD drive.

Notes:

1. To disconnect the optional optical drive cable, you must first press the connector release tab, and then disconnect the cable from the connector on the system board. Do not disconnect the cable by using excessive force.

2. Follow the optical drive cable routing as the illustration shows. Route the cable from the connector on the system board along PCI assembly 1. Do not bend the cable under PCI assembly 1.

3. Make sure that the cable is not pinched and does not cover any connectors or obstruct any components (for example, the ServeRAID adapter or PCI assembly 1) on the system board.
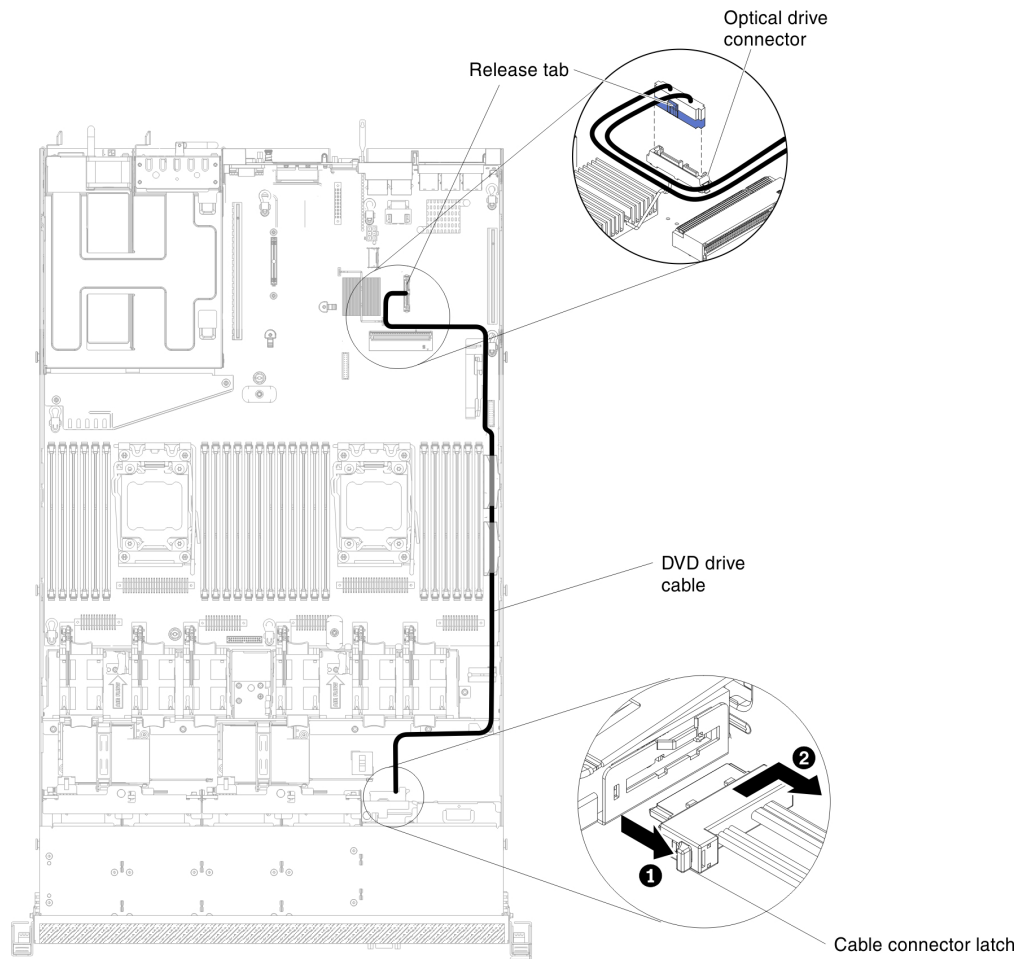
Figure 98. DVD drive cable connection

Cabling operator information panel

The internal routing and connectors for the operator information panel.

The following notes describe additional information you must consider when you install or remove the operator information panel cable:

- To remove the operator information panel cable, slightly press the cable toward the fan cage; then, pull to remove the cable from the connector on the system board. Pulling the cable out of the connector by excessive force might cause damage to the cable or connector.
- To connect the operator information panel cable on the system board, press evenly on the cable. Pressing on one side of the cable might cause damage to the cable or connector.
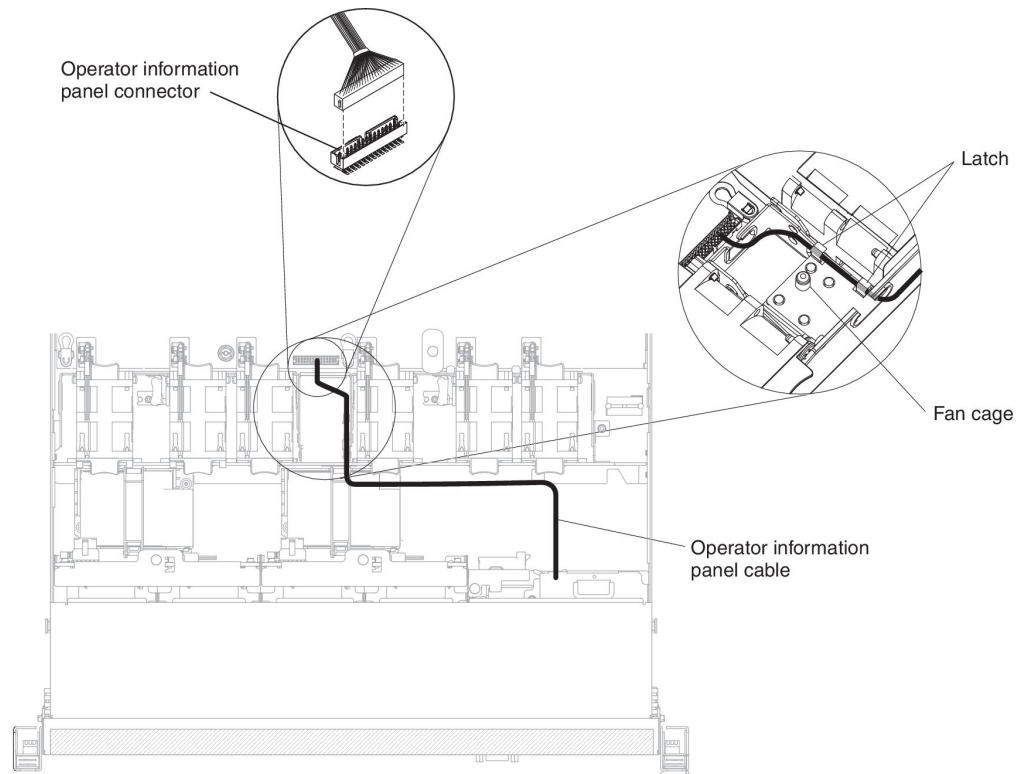
Figure 99. Operator information panel cable connection

Cabling front USB and video connector

The internal routing and connectors for the front USB and video cables.

The following notes describe additional information you must consider when you install or remove the front USB and video cables:

- To remove the front USB and video cables, slightly press the cables toward the chassis; then, pull to remove the cables from the connectors on the system board. Pulling the cable out of the connector by excessive force might cause damage to the cable or connector.
- To connect the front USB and video cables on the system board, press evenly on the cables. Pressing on one side of the cable might cause damage to the cable or connector.
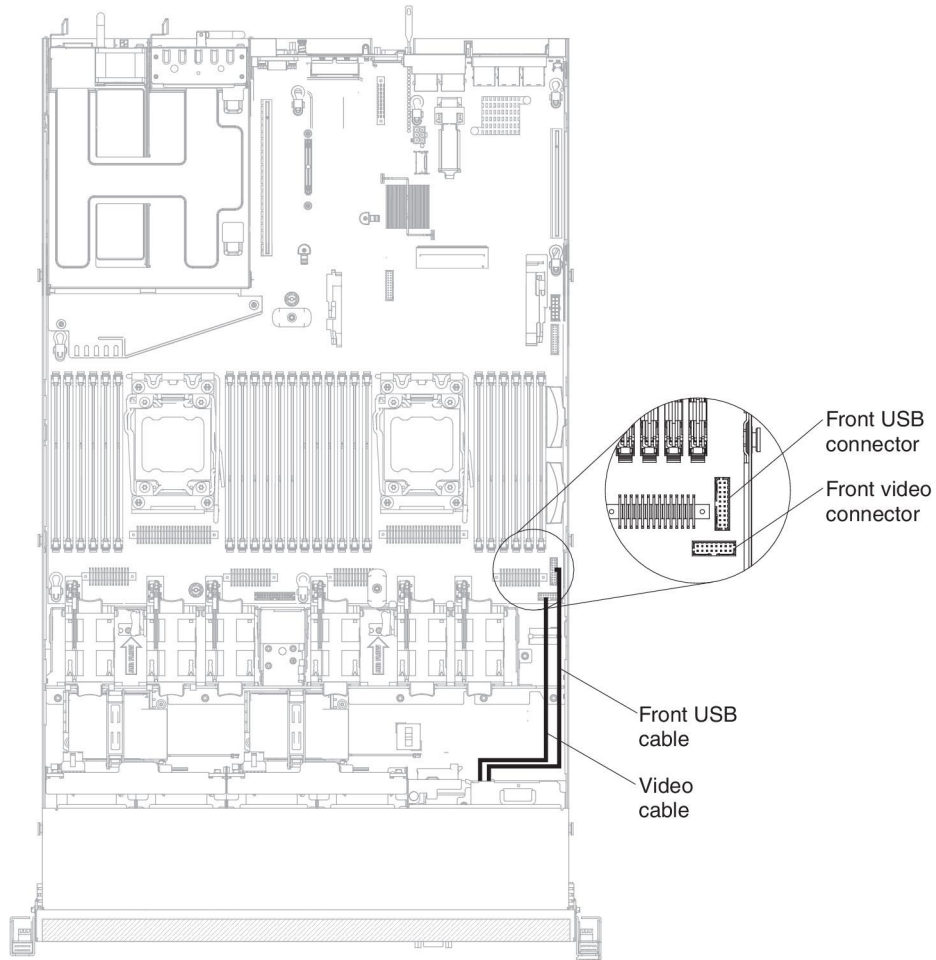
Figure 100. Front USB and video cables connection

Removing and replacing server components

This section provides information for removing and replacing components in the server.

Removing and replacing structural parts

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

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

Removing the cover

To remove the server cover, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. If the server has been installed in a rack, slide the server out from the rack enclosure.
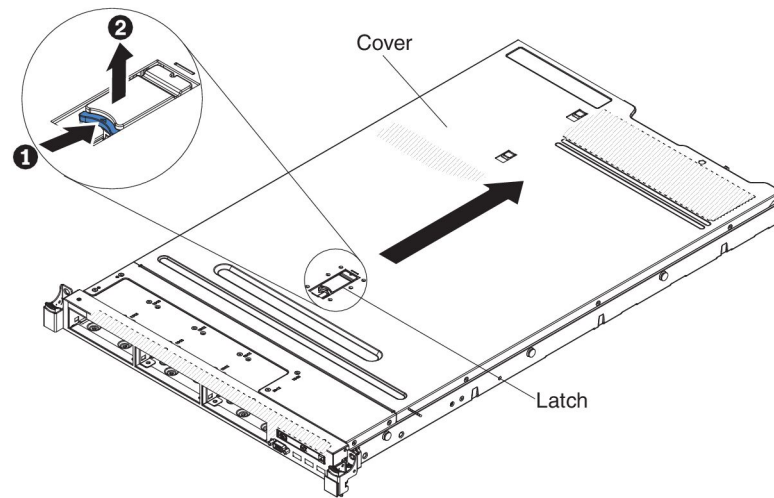
Figure 101. Cover removal

4. Pull up firmly on the blue latch on the top (in the center of the front of the server) of the cover and slide the cover toward the rear of the server until the cover has disengaged from the chassis.
5. Lift the server cover off the server and set it aside.

   Attention: For proper cooling and airflow, replace the server cover before you turn on the server.

Replacing the cover

To replace the server cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.

   Important: Before you slide the cover forward, make sure that all the tabs on the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

2. Position the cover on top of the server.
3. Slide the cover toward the front of the server.
4. Make sure that the cover correctly engages all the inset tabs on the server.
5. Press down the blue latch on the top (in the center of the front of the server) of the cover.

Figure 102. Cover installation

6. Slide the server all the way into the rack until it latches.
7. Reconnect the external cables and power cords.

Removing the air baffle

To remove the air baffle, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables (see "Turning off the server" on page 23).
3. Remove the cover (see "Removing the cover" on page 36).
4. Grasp the air baffle, disengage pins from pin holes; then, lift the air baffle up.
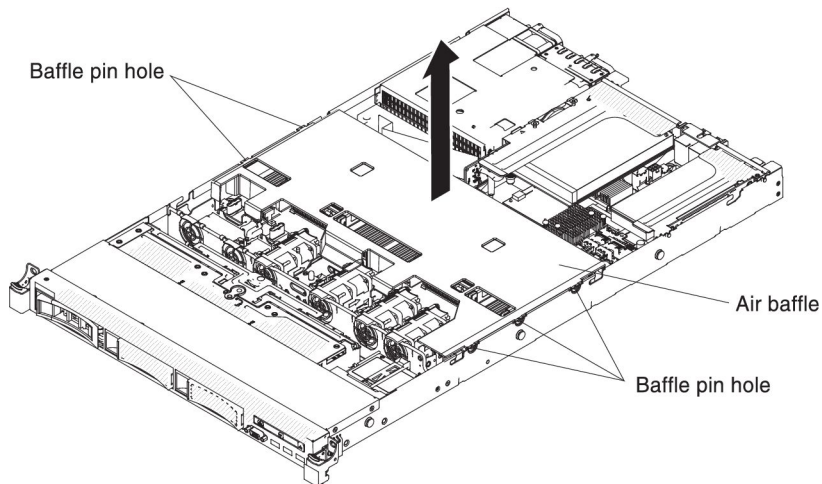
Figure 103. Air baffle removal

5. Remove the air baffle from the server and set it aside.

    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.

Replacing the air baffle

To install the air baffle, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Align the air baffle pins with the baffle pin holes on both sides of the chassis; then, lower the air baffle into the server. Press the air baffle down until it is securely seated.

   Note: Close the retaining clip on each end of the DIMM connector before installing the air baffle for proper cooling.
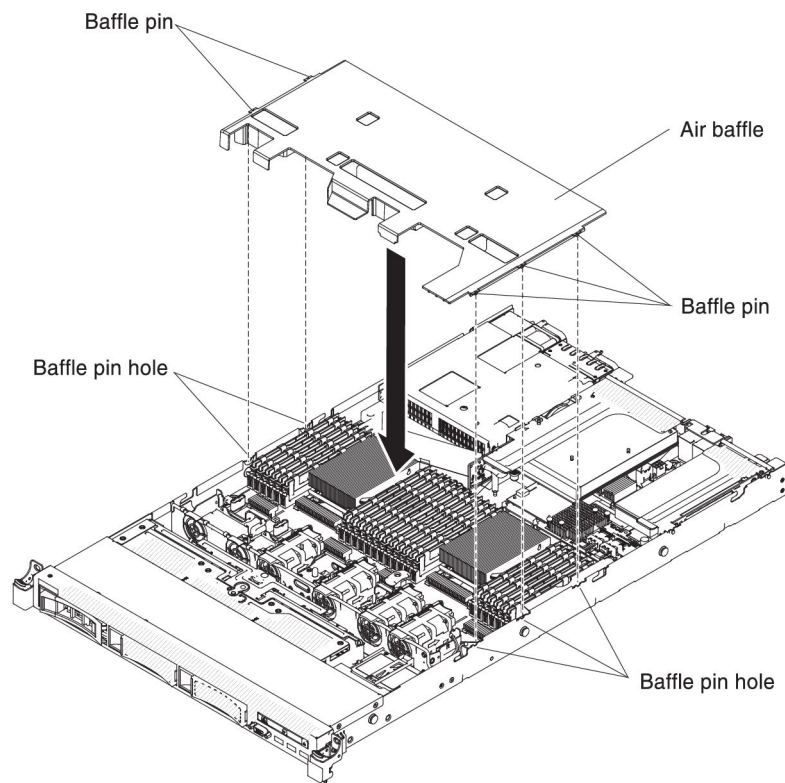
Figure 104. Air baffle installation

5. Reinstall the cover (see "Replacing the cover" on page 195).

6. Slide the server into the rack.

7. Reconnect the power cords and any cables that you removed.

8. Turn on the peripheral devices and the server.

Removing a remotely installed RAID adapter battery

If a RAID adapter battery is installed near the fan cage and you need to replace it, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove any cable covering or obstructing the battery holder before opening the battery holder.
5. Pull the release tab toward the fan cage and unlock the battery retention clip.
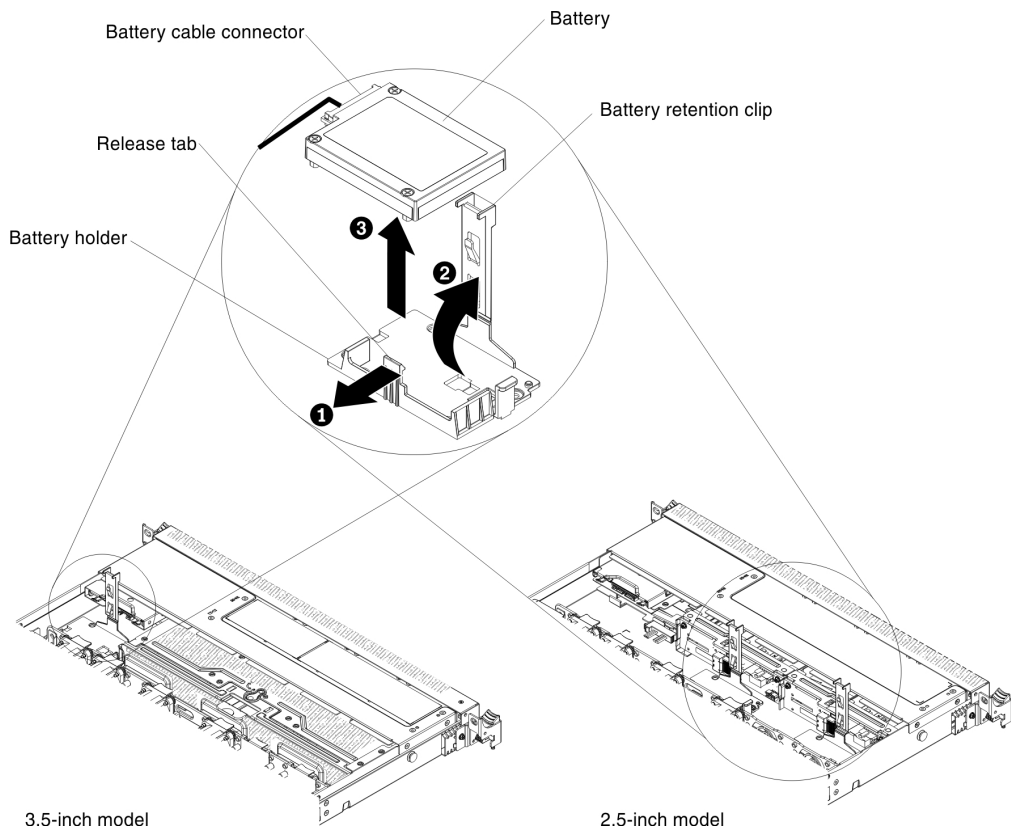
Figure 105. RAID adapter battery removal

> **Attention:** Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

6. Disconnect the battery cable from the battery cable connector on the battery.
7. Lift the battery up to remove the battery from the battery holder.

If you are instructed to return the RAID adapter battery, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a RAID adapter battery remotely in the server

When you install any RAID adapter that comes with batteries, it is sometimes necessary to install the batteries in another location in the server to prevent the batteries from overheating. Depending on your server model, a battery must be installed remotely near the optical drive cage or the backplane. The 2.5-inch server models support up to two batteries.

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

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords and external devices.
3. Remove the cover (see "Removing the cover" on page 36).
4. Install the ServeRAID adapter on the system board (see "Replacing a ServeRAID SAS/SATA controller" on page 235) or install the ServeRAID adapter on the riser card and install the riser-card assembly in the server (see "Replacing an adapter" on page 231).
5. Connect one end of the battery cable to the RAID adapter battery connector.
6. Route the remote battery cable along the chassis.
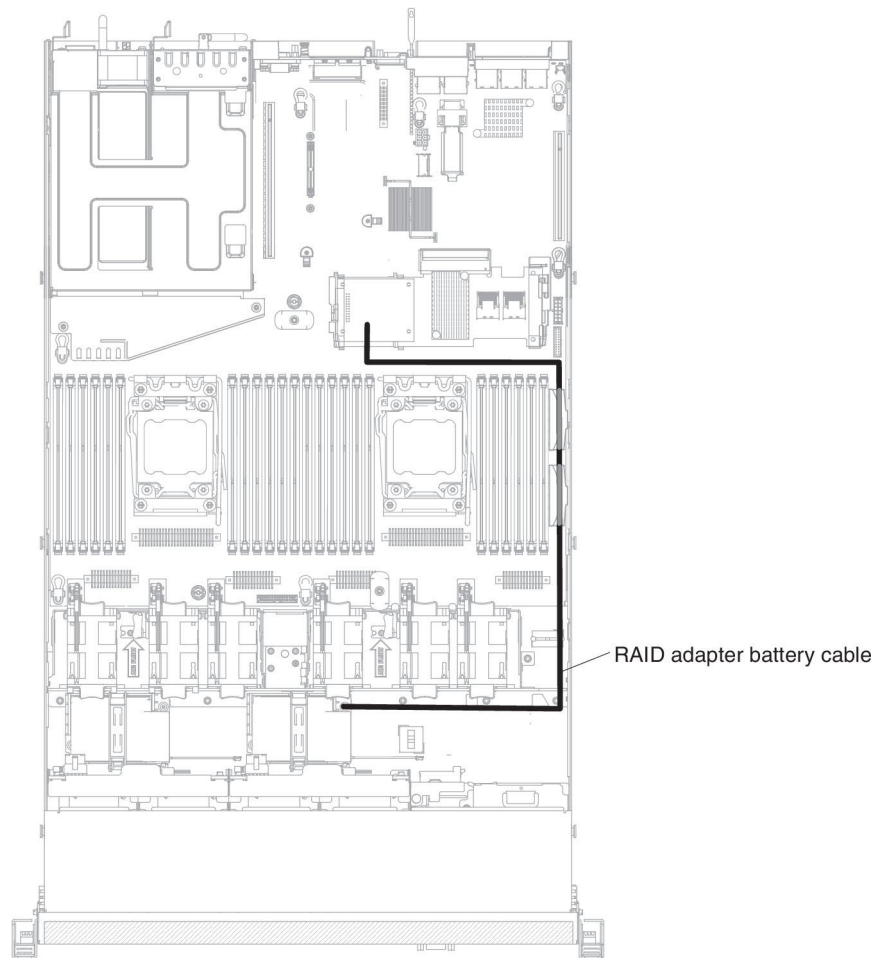
Figure 106. RAID adapter battery cabling

Attention: Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

7. Remove any cable covering or obstructing the battery holder before opening the battery holder.

8. Install the battery:

   a. Release the retention clip in the open position.

   b. 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.
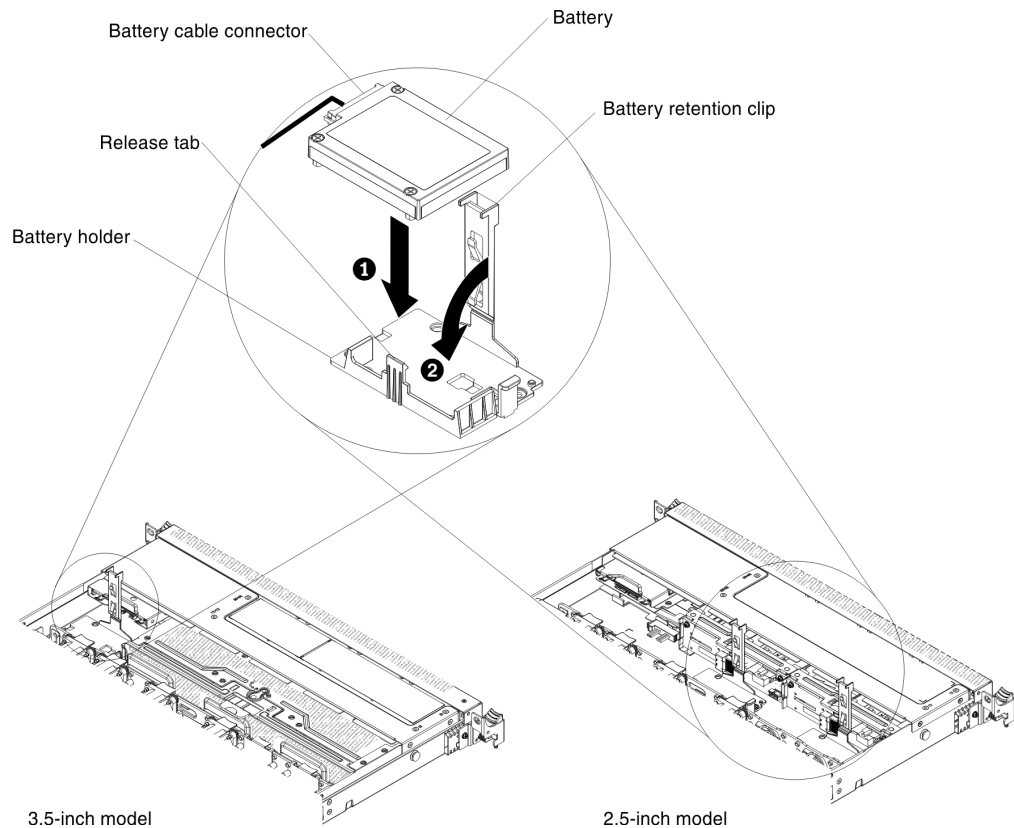
Figure 107. RAID adapter battery installation

> **Note:** The positioning of the remote battery depends on the type of the remote batteries that you install.

   c. Connect the other end of the battery cable to the battery cable connector on the battery.

   d. Lower and press down on the retention clip until it snaps in place to hold the battery firmly in place.

9. Reinstall the cover (see "Replacing the cover" on page 195).

10. Slide the server into the rack.

11. Reconnect the power cords and all external cables, and turn on the server and peripheral devices.

Removing a RAID adapter battery holder

If a RAID adapter battery is installed remotely near the fan cage and you need to replace it, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing the cover" on page 36).

3. Remove the remotely installed RAID adapter battery (see "Removing a remotely installed RAID adapter battery" on page 198).

4. Loosen the two screws from the system tray.
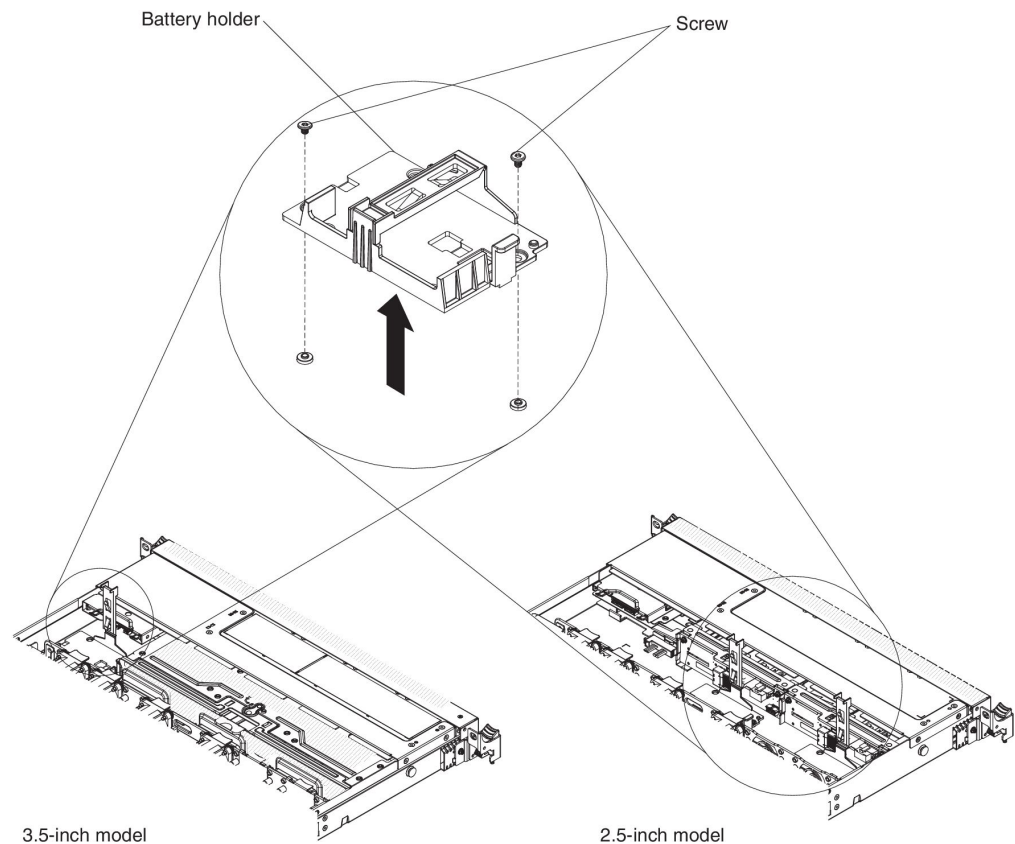
Figure 108. RAID adapter battery holder removal

5. Lift the battery holder up to remove the battery holder from the system tray.

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.

Replacing a RAID adapter battery holder

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

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect all power cords and external devices; then, remove the cover (see "Removing the cover" on page 36).

3. Align the battery holder and place the battery holder on the system tray.

   Notes:
   - There is one battery holder can be installed in the 3.5-inch models.
   - There are two battery holders can be installed in the 2.5-inch models.
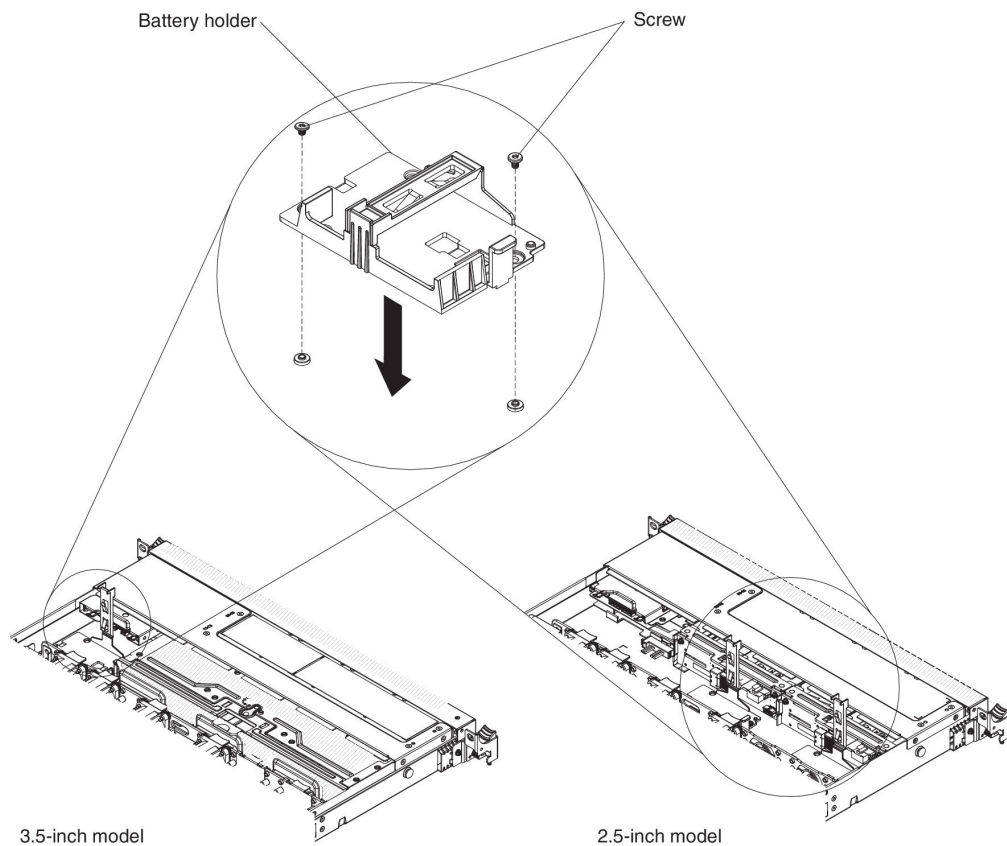
Figure 109. RAID adapter battery holder installation

4. Fasten the two screws come with the battery holder and make sure that the battery holder is secured firmly on the system tray.

5. Replacing the cover (see "Replacing the cover" on page 195).

6. Slide the server into the rack.

7. Reconnect the power cords and all external cables, and turn on the server and peripheral devices.

Removing and replacing Tier 1 CRUs

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.

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

Removing hot-swap hard disk drives

Attention:

- To avoid damage to the hard disk drive connectors, make sure that the server cover is in place and fully closed whenever you install or remove a hard disk drive.
- To make sure that there is adequate system cooling, do not operate the server for more than 2 minutes without either a hard disk drive or a filler panel installed in each bay.
- Before you make changes to disk drives, disk drive controllers (including controllers that are integrated on the system board), disk drive backplanes, or disk drive cables, back up all important data that is stored on hard disks.
- Before you remove any component of a RAID array, back up all RAID configuration information.

To remove a hot-swap hard disk drive, complete the following steps.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
3. Slide the release latch (orange) gently to the left to unlock the drive handle.
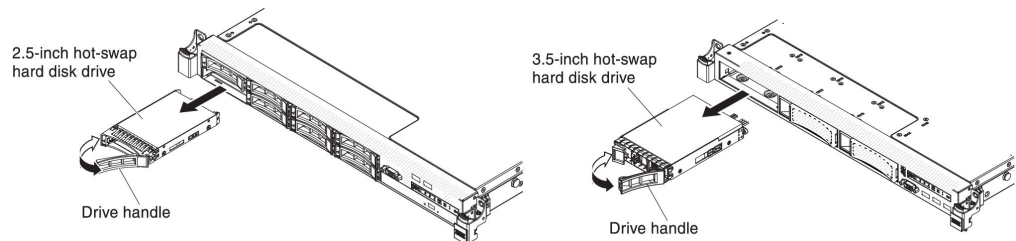
Figure 110. Hot-swap hard disk drives removal

4. Grasp the handle and slide the drive out of the drive bay.
5. Reinstall the drive bay filler panel.
6. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing hot-swap hard disk drives

The following notes describe the type of hard disk drives that the server supports and other information that you must consider when you install a hard disk drive. For a list of supported hard disk drives, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

- Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA hard disk drive, be sure to set the SAS or SATA ID for that device.
- The hot-swap server models support up to eight 2.5-inch or three 3.5-inch hot-swap SAS or SATA hard disk drives.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

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

Note: If you have only one hard disk drive, you must install it in the bay 0 (upper-left).

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Remove the filler panel from the empty drive bay. Keep the filler panel in a safe place.
3. 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.
4. Install the hard disk drive in the drive bay:
   a. Make sure that the tray handle is in the open (unlocked) position.
   b. Align the drive with the guide rails in the bay.

Figure 111. Hot-swap hard disk drives installation

   c. Gently push the drive into the bay until the drive stops.
   d. Rotate the tray handle to the closed (locked) position.

e. Check the hard disk drive status LED to verify that the hard disk drive is operating correctly. If the yellow hard disk drive status LED of a drive 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.

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

5. If you are installing additional hot-swap hard disk drives, do so now.
6. Turn on the peripheral devices and the server.

Drive IDs:

The drive ID that is assigned to each drive is printed on the front of the server. The following illustrations show the locations of the IDs of the drives. The ID numbers and the drive bay numbers are the same.
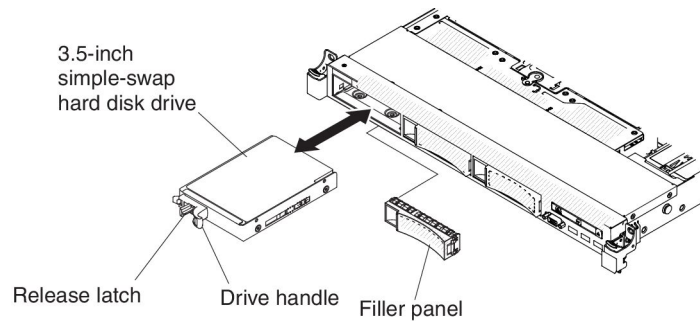
2.5-inch hot-swap hard disk drive IDs: The hot-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.
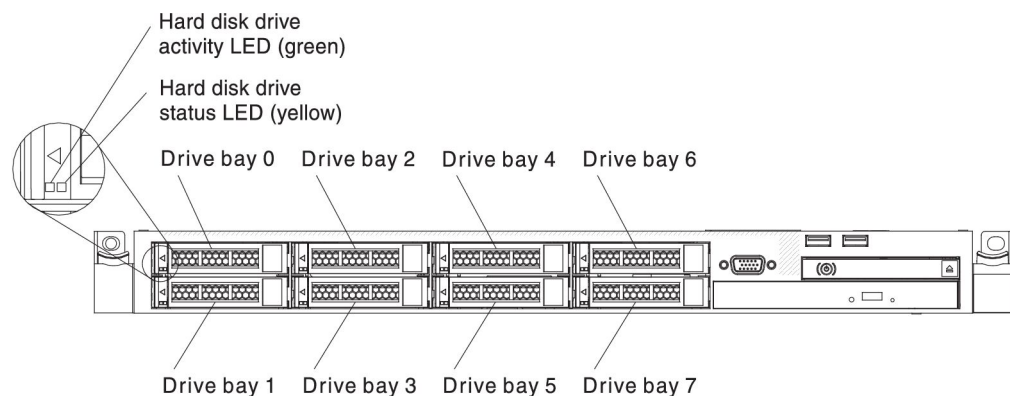
Figure 112. 2.5-inch hot-swap hard disk drive IDs

3.5-inch hot-swap hard disk drive IDs: The hot-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.
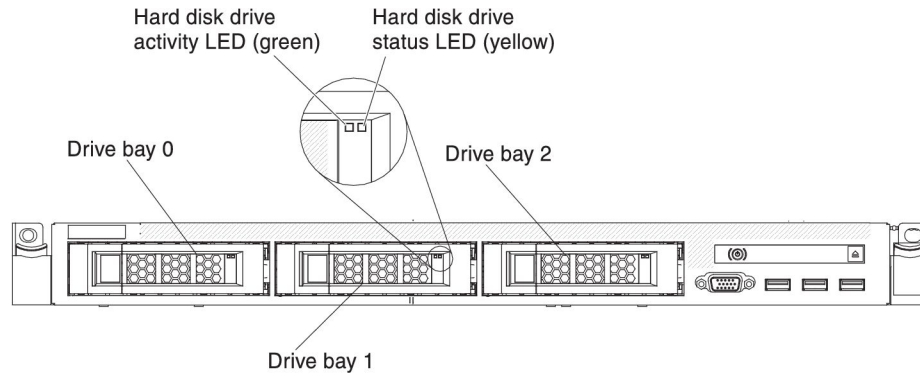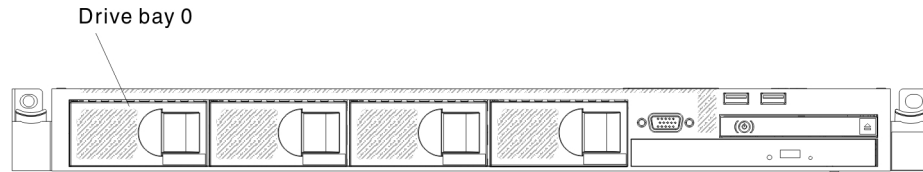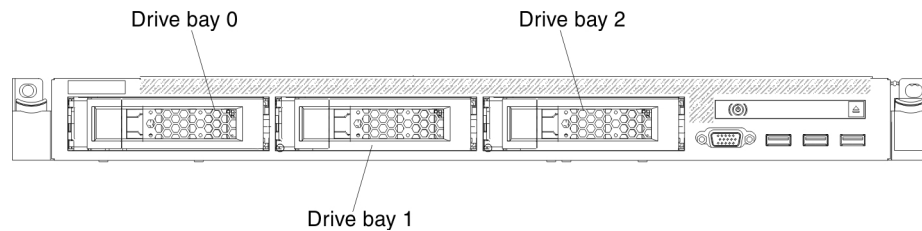

Figure 113. 3.5-inch hot-swap hard disk drive IDs

Removing simple-swap hard disk drives

You must turn off the server before removing simple-swap drives from the server. To remove a simple-swap SATA hard disk drive, complete the following steps.

Attention:

- To avoid damage to the hard disk drive connectors, make sure that the server cover is in place and fully closed whenever you install or remove a hard disk drive.
- To make sure that there is adequate system cooling, do not operate the server for more than 2 minutes without either a hard disk drive or a filler panel installed in each bay.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. 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.
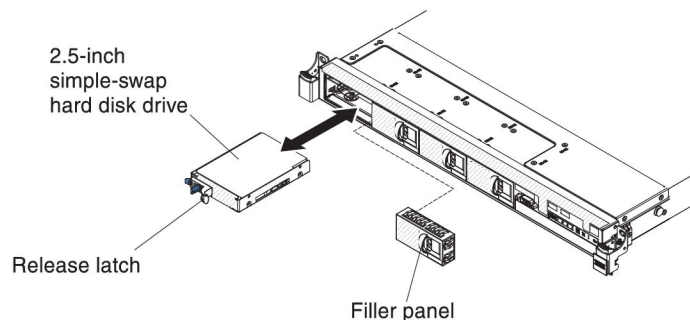
Figure 114. 2.5-inch simple-swap hard disk drive removal

3.5-inch
simple-swap
hard disk drive

Release latch   Drive handle   Filler panel
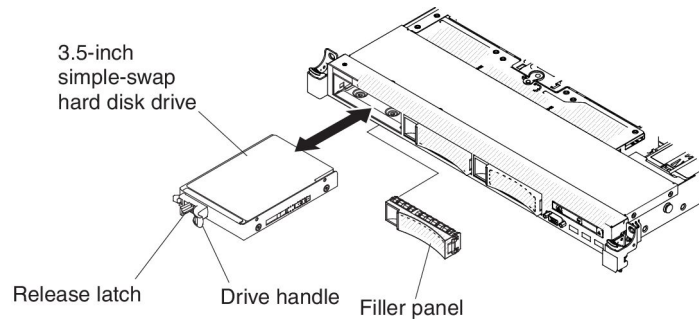
Figure 115. 3.5-inch simple-swap hard disk drive removal

4. Reinstall the drive bay filler panel that you removed earlier.
5. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing simple-swap hard disk drives

You must turn off the server before installing simple-swap drives in the server. Before you install a simple-swap SATA hard disk drive, read the following information. For a list of supported hard disk drives, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

- Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to determine whether you have to set any switches or jumpers on the drive. If you are installing a SATA device, be sure to set the SATA ID for that device.
- You can install up to three 3.5-inch simple-swap SATA hard disk drives in the server. Do not install hot-swap drives into a simple-swap server model, it is not supported.
- You can install one 2.5-inch simple-swap SATA hard disk drives in bay 0 in the server. Do not install hot-swap drives into a simple-swap server model, it is not supported.
- The simple-swap server models are available only in non-RAID configurations.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.

To install a simple-swap hard disk drive, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the filler panel from the empty drive bay.
4. 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.

5. Install the hard disk drive in the drive bay:
   a. 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.

Figure 116. 2.5-inch simple-swap hard disk drive installation

Figure 117. 3.5-inch simple-swap hard disk drive installation

   b. Gently push the drive into the bay until the drive stops.
6. Reinstall the drive bay filler panel that you removed earlier.
7. If you are installing additional simple-swap hard disk drives, do so now.
8. Turn on the peripheral devices and the server.

Drive IDs:

The drive ID that is assigned to each drive is printed on the front of the server. The following illustrations show the locations of the IDs of the drives. The ID numbers and the drive bay numbers are the same.

2.5-inch simple-swap hard disk drive IDs: The simple-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.

Drive bay 0

Figure 118. 2.5-inch simple-swap hard disk drive IDs

3.5-inch simple-swap hard disk drive IDs: The simple-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the hard disk drives. The ID numbers and the drive bay numbers are the same.

Drive bay 0   Drive bay 2

Drive bay 1

Figure 119. 3.5-inch simple-swap hard disk drive IDs

Removing a DVD drive

To remove an optional DVD drive, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the server cover (see "Removing the cover" on page 36).
4. Press and hold the release tab down as you push the drive from the rear to slide it out of the bay.
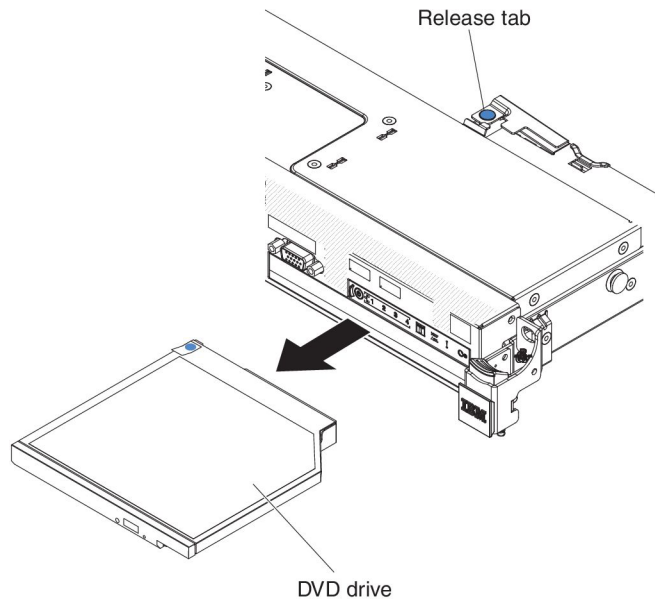
Figure 120. DVD drive removal

5. Slide the drive retention clip from the side of the drive. Save the clip to use when you install the replacement drive or replace the DVD drive filler panel.
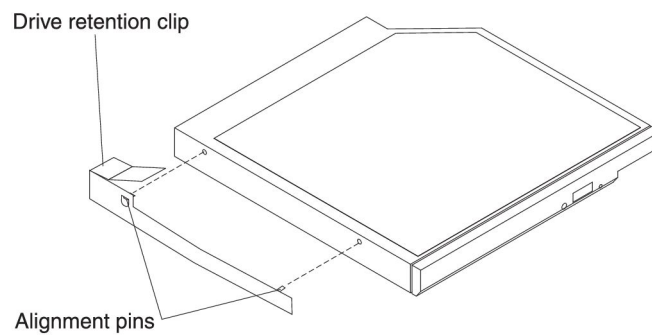
Figure 121. DVD drive retention clip removal

6. Attach the drive retention clip to the side of the DVD drive filler panel that you removed in step 4 on page 211.
7. Slide the DVD drive filler panel into the DVD drive bay until the DVD drive filler panel clicks into place.

DVD drive filler panel
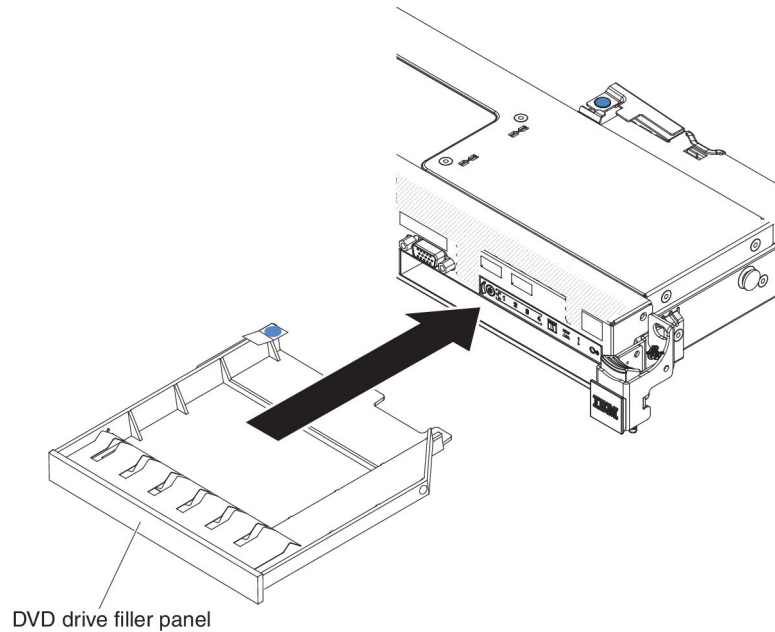
Figure 122. DVD drive filler panel installation

8. 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.

Replacing a DVD drive

The following notes describe the type of drives that the server supports and other information that you must consider when you install a drive. For a list of supported drives, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

• Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.

• Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.

• The server supports one ultra-slim SATA optical drive.

To install an optional DVD drive, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

   **Note:** When you disconnect the power source from the server, you lose the ability to view the LEDs because the LEDs are not lit when the power source is removed. Before you disconnect the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel, on the light path diagnostics panel, and LEDs inside the server on the system board.

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the DVD drive filler panel if it is installed. Locate the blue release tab on the rear of the DVD drive filler panel; then, while you press the tab, push the DVD drive filler panel out of the drive bay.

Release tab

Figure 123. DVD drive filler panel removal

5. Remove the retention clip from the side of the DVD drive filler panel. Save the DVD drive filler panel for future use.

    Note: If you are installing an optical 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

6. Touch the static-protective package that contains the new optical drive to any unpainted metal surface on the server; then, remove the optical drive from the package and place it on a static-protective surface.
7. Follow the instructions that come with the drive to set any jumpers or switches.
8. Attach the drive retention clip that you removed from the DVD drive filler panel to the side of the new DVD drive.
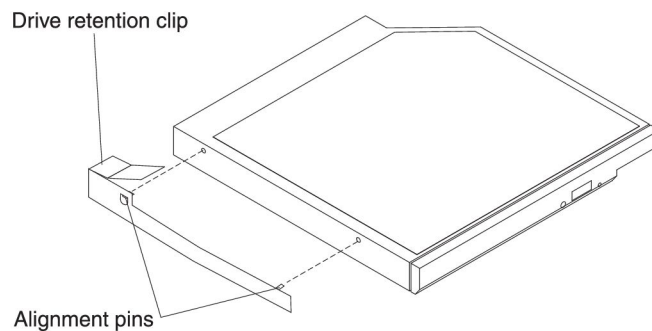
Figure 124. DVD drive retention clip installation

9. Align the DVD drive in the drive bay and slide the DVD drive into the optical drive bay until the DVD drive clicks into place.
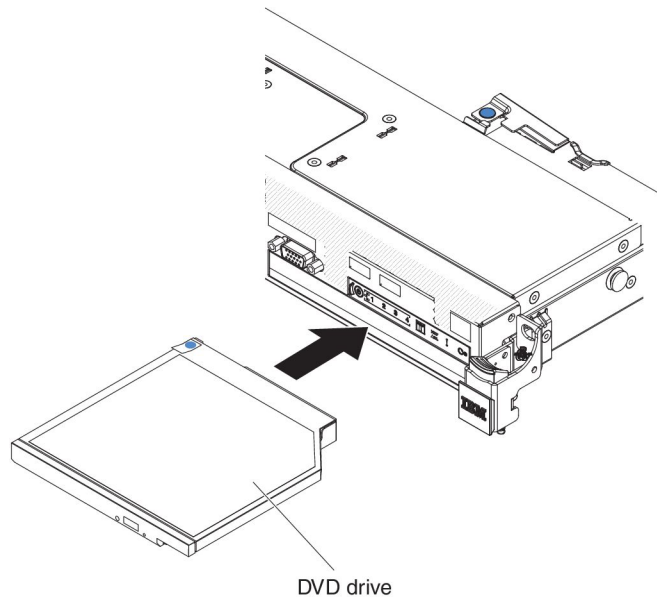
Figure 125. DVD drive installation

10. Connect the DVD drive cable (see "Replacing the DVD drive cable" on page 217). The following illustration shows the cable routing for the DVD drive:
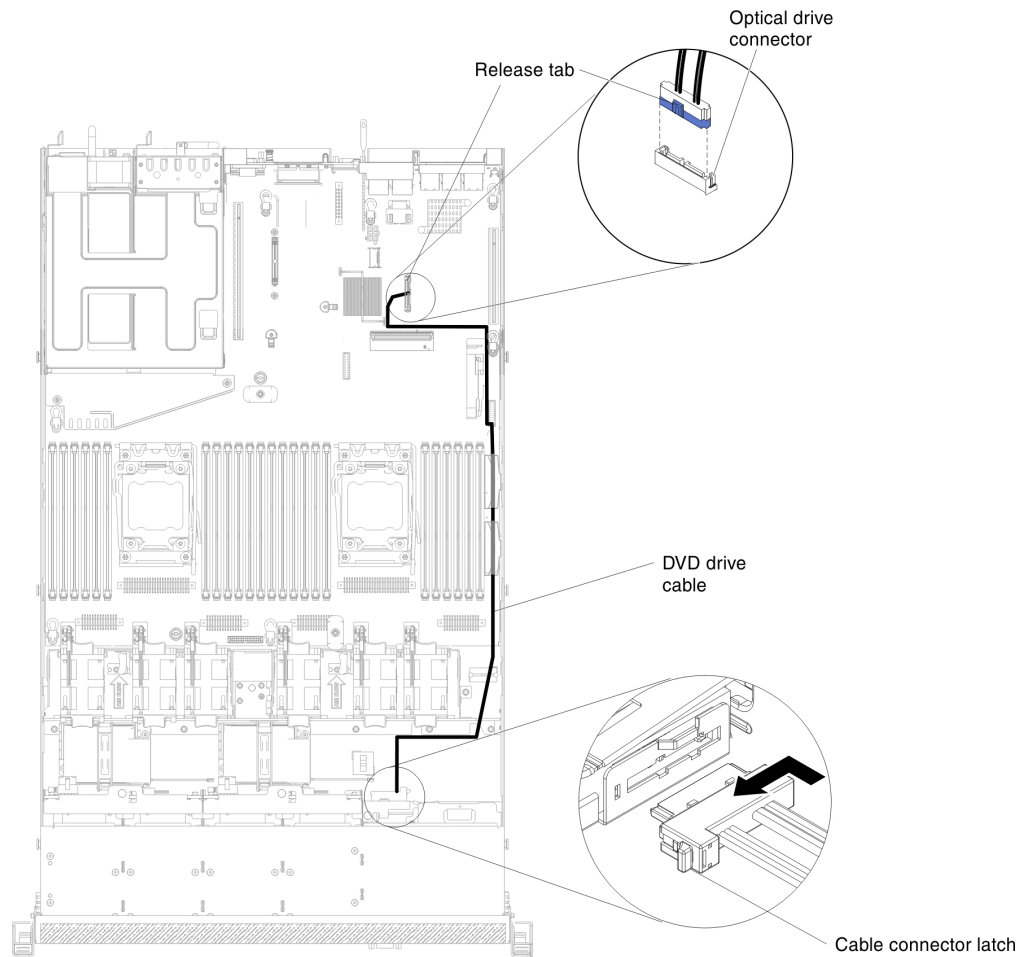
Figure 126. DVD drive cable routing

11. Reconnect the power cords and any cables that you removed.

12. Turn on the peripheral devices and the server.

Removing the DVD drive cable

To remove the DVD cable, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect the power cords.

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the air baffle (see "Removing the air baffle" on page 37).

5. Press and hold the connector release tab; then, remove the DVD drive cable from the connector on the system board.

   Attention: You must press the connector release tab in order to disconnect the DVD drive cable from the system board. Do not disconnect the DVD drive cable by using excessive force.
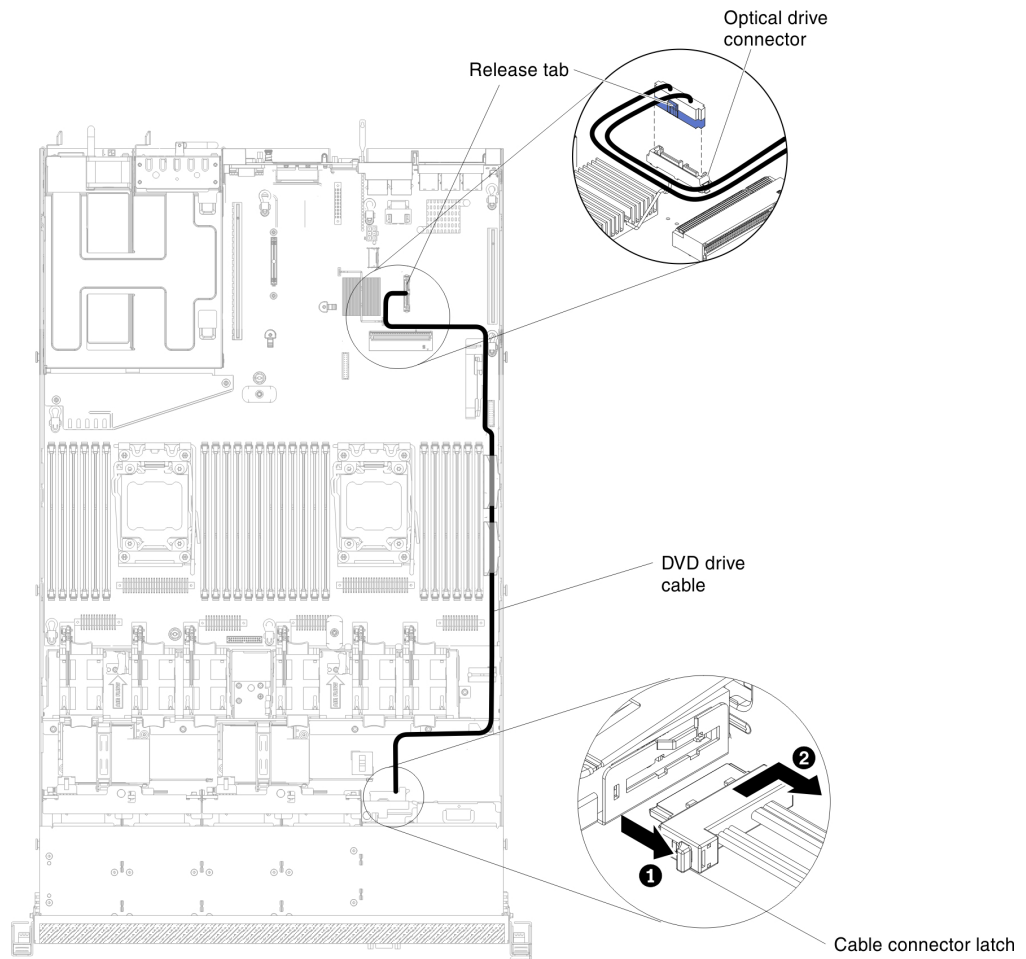
Figure 127. DVD drive cable routing

6. From the rear of the DVD drive cage, press and hold the connector latch (on the left of the cable connector) and grasp the cable connector and slide it to the right; then, remove the DVD drive cable from the connector on the back of the DVD drive and set it aside.
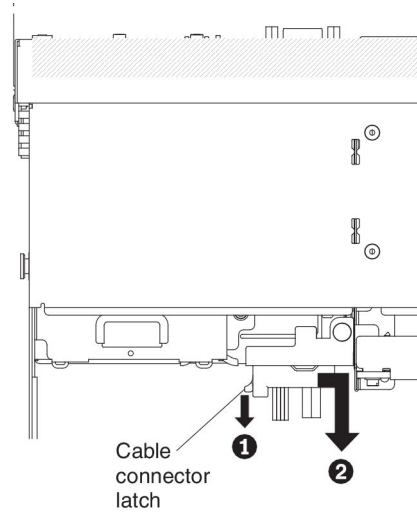
Figure 128. DVD drive cable latch

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

Replacing the DVD drive cable

To install the DVD drive cable, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and
   "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords
   and all external cables.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Align the cable connector with the connector on the rear of the DVD drive
   cage. Press the cable connector into the optical drive cage connector and slide
   it to the left until it is firmly seated.

Figure 129. DVD drive cable latch

The following illustration shows cable routing for the DVD cable:

Attention: Follow the optical drive cable routing as the illustration shows. Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.
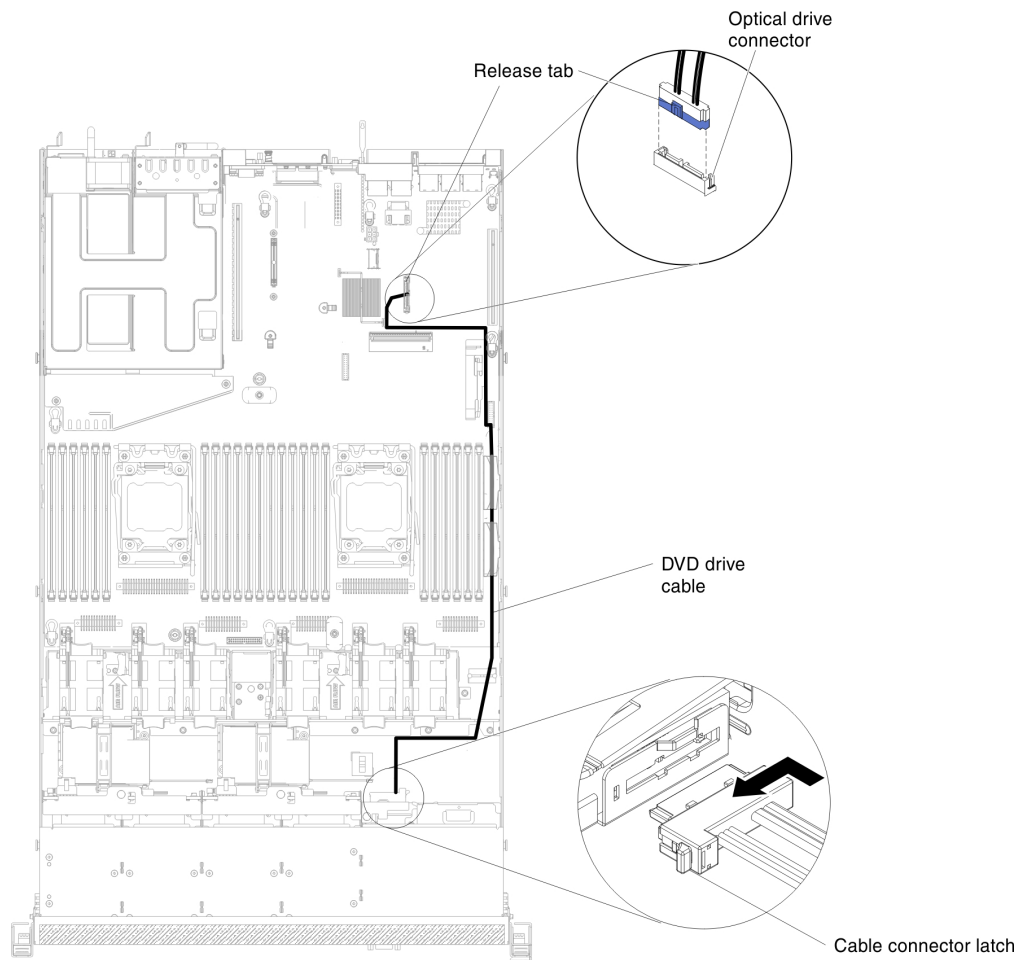
Figure 130. DVD drive cable routing

6. Replace the air baffle (see "Replacing the air baffle" on page 197).
7. Replace the cover (see "Replacing the cover" on page 195).
8. Slide the server into the rack.
9. Reconnect the power cords and any cables that you removed.
10. Turn on the peripheral devices and 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 "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
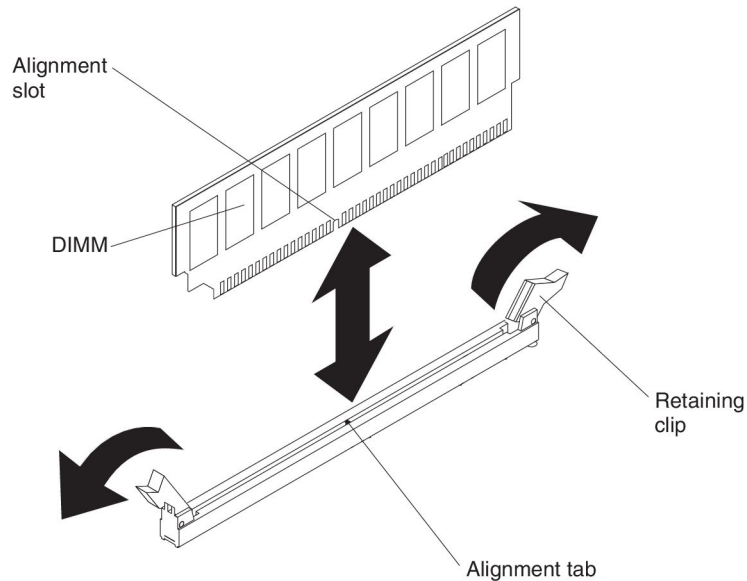
Figure 131. DIMM removal

6. 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/systems/info/x86servers/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 20. Maximum memory installation using ranked DIMMs

Number of DIMMs	DIMM type	DIMM size	Total memory
16	Dual-rank UDIMMs	4 GB	64 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 4 GB. The server supports a minimum of 4 GB and a maximum of 64 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 92.
- 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.

Notes:

1. 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.
2. DIMM slots 13-24 are reserved for microprocessor 2; thus, DIMM slots 13-24 are enabled when microprocessor 2 is installed.

The following illustration shows the location of the DIMM connectors on the system board.

Figure 132. DIMM connectors location

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 genaral, all three channels on the memory interface for each microprocessor can be populated in any order and have no matching requirements.

Table 21. Normal mode DIMM installation sequence

Number of installed microprocessor	DIMM connector population sequence
One microprocessor installed	1, 4, 9, 12, 2, 5, 8, 11, 3, 6, 7, 10
Two microprocessors installed	1, 13, 4, 16, 9, 21, 12, 24, 2, 14, 5, 17, 8, 20, 11, 23, 3, 15, 6, 18, 7, 19, 10, 22

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. To enable memory mirrored channel through the Setup utility, select **System Settings** > **Memory**. For more information, see "Using the Setup utility" on page 96. 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 channel 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 channel.

• 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 in memory mirrored channel mode.

The following diagram lists the DIMM connectors on each memory channel.

Figure 133. Connectors on each memory channel

The following table shows the installation sequence for memory mirrored channel mode:

Table 22. 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	3, 6
Sixth pair of DIMMs	1	7, 10
Seventh pair of DIMMs	2	13, 16
Eighth pair of DIMMs	2	21, 24
Ninth pair of DIMMs	2	14, 17
Tenth pair of DIMMs	2	20, 23
Eleventh pair of DIMMs	2	15, 18
Twelfth pair of DIMMs	2	19, 22

Table 22. Memory mirrored channel mode DIMM population sequence (continued)

Number of DIMMs	Number of installed microprocessor	DIMM connector
Note: DIMM connectors 3, 6, 7, 10, 15, 18, 19, and 22 are not used in memory mirrored channel mode when UDIMMs are installed in the server.		

Memory rank sparing:

The memory rank sparing feature disables the failed memory from the system configuration and activates a rank sparing DIMM to replace the failed active DIMM.

You can enable rank sparing memory in the Setup utility, select **System Settings** > **Memory**. For more information, see "Using the Setup utility" on page 96. When you use the memory rank sparing feature, consider the following information:
- The memory rank sparing feature is supported on server models with an Intel Xeon™ E5-2600 series microprocessor.
- The maximum available memory is reduced when memory rank sparing mode is enabled.

The following diagram lists the DIMM connectors on each memory channel.

Figure 134. Connectors on each memory channel

Follow the installation sequence for rank sparing mode:
- Install at least one quad-rank DIMM in a channel.
- Install at least two single-rank or dual-rank DIMMs in a channel.

Table 23. 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
Twelfth pair of DIMMs	2	15, 18

Table 23. Memory rank sparing mode DIMM population sequence (continued)

Number of DIMMs	Number of installed microprocessor	DIMM connector
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.		

Replacing a memory module:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
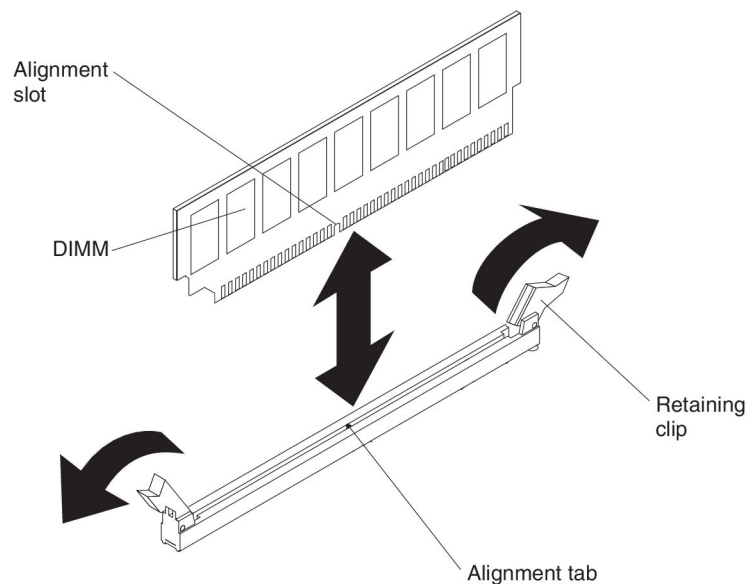
Figure 135. DIMM removal

6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
7. Turn the DIMM so that the alignment slot align correctly with the alignment tab.
8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector (see "System-board optional-device connectors" on page 32 for the locations of the DIMM connectors).
9. 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.

10. Reconnect the power cords and any cables that you removed.
11. Replace the air baffle (see "Replacing the air baffle" on page 197).

    Note: Close all the retaining clips even for slots without DIMMs installed before replacing the air baffle.

12. Replace the cover (see "Replacing the cover" on page 195).
13. Turn on the peripheral devices and the server.

Removing a PCI riser-card assembly

Note: PCI riser-card brackets must be installed even if you do not install an adapter.

To remove a PCI riser-card assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the cover (see "Removing the cover" on page 36).
4. Grasp both ends or the handle of the PCI riser-card assembly and lift it out of the PCI riser-card slot on the system board.
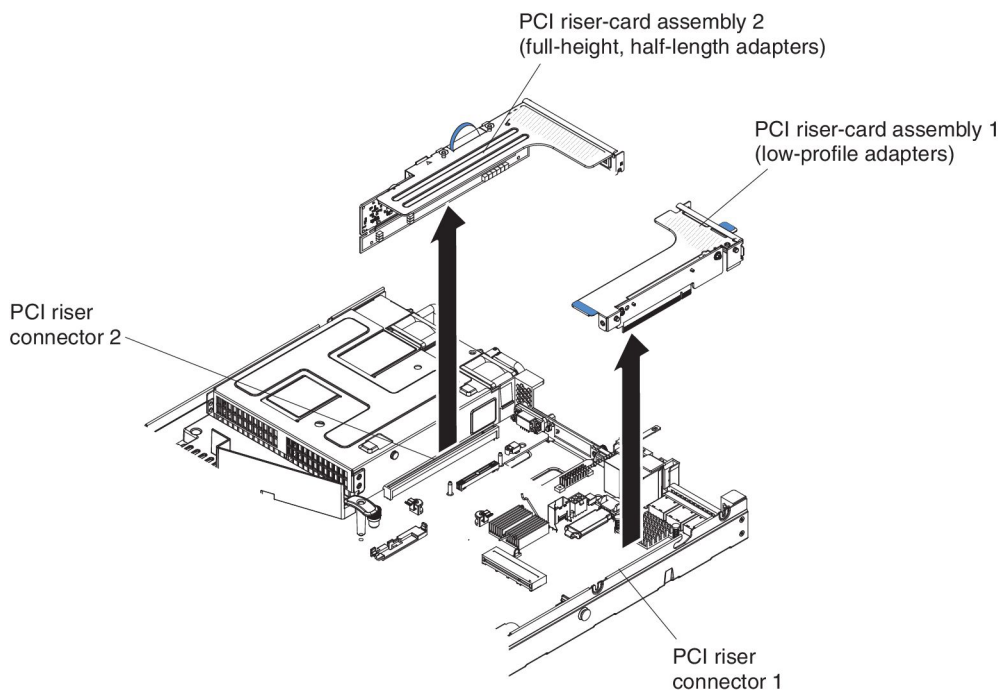
Figure 136. PCI riser-card assembly removal

5. If an adapter is installed in the PCI riser-card assembly, disconnect any cables that are connected to the adapter.
6. Remove the adapter, if one is present, from the PCI riser-card assembly (see "Removing an adapter" on page 230).

7. Set the adapter and the PCI riser-card assembly aside.
8. If you are instructed to return the PCI riser-card assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a PCI riser-card assembly

Note: PCI riser-card brackets must be installed even if you do not install an adapter.

To install a PCI riser-card assembly, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Check whether there are rubber stoppers come with your PCI riser-card assembly 2. If there are rubber stoppers come with your PCI riser-card assembly 2, skip to next step.
   a. There are two kinds of rubber stoppers. Attach the two rubber stoppers on PCI riser-card assembly 2, along the edges of the pin holes, as shown in the following illustration.
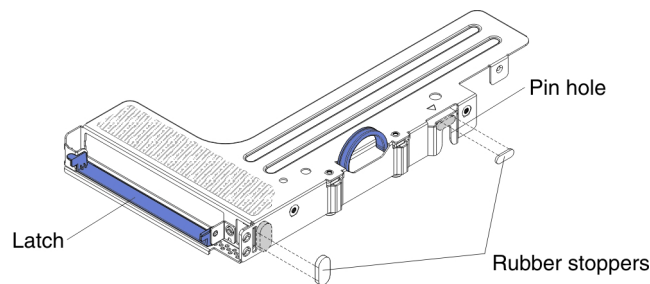
Figure 137. Rubber stoppers installation

   b. Attach the bigger rubber stopper near the latch of PCI riser-card assembly 2.
   c. Attach the smaller rubber stopper near the pin hole of PCI riser-card assembly 2.

   Note: You can purchase the miscellaneous parts kit (FRU part number 94Y7571) to acquire three sets of rubber stoppers. Keep additional rubber stoppers for potential future use.
5. Install the adapter in the new PCI riser-card assembly (see "Replacing an adapter" on page 231).
6. Set any jumpers or switches on the adapter as directed by the adapter manufacturer.
7. Remove the PCI filler panel, if one is present, from the rear of the server.
8. Align the PCI riser-card assembly with the PCI riser connector on the system board; then, press down firmly until the PCI riser-card assembly is seated correctly in the connector on the system board.

   Note: Support the server from the middle of the rear chassis when installing PCI riser-card assembly 2.
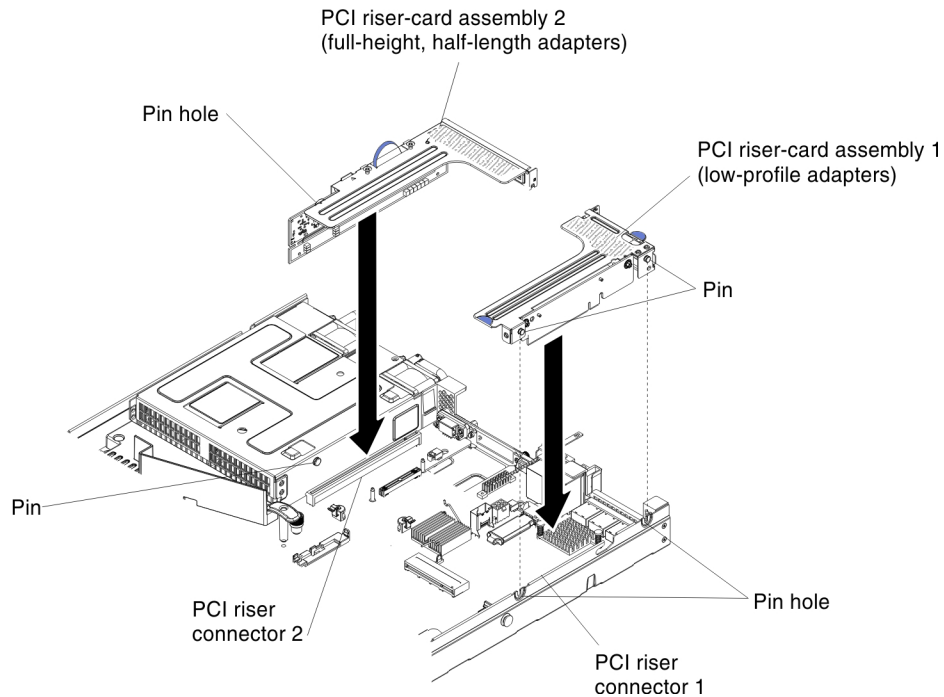
Figure 138. PCI riser-card assembly installation

9. Replace the cover (see "Replacing the cover" on page 195).
10. Slide the server into the rack.
11. Reconnect the power cords and any cables that you removed.
12. Turn on the peripheral devices and the server.

Removing the PCI riser-card bracket from the riser card

Note: PCI riser-card brackets must be installed even if you do not install a riser card.

To remove the PCI riser-card bracket from the riser card, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the PCI riser-card assembly (see "Removing a PCI riser-card assembly" on page 226).
5. Remove the screws that attach the PCI riser card to the riser-card bracket.

PCI riser-card bracket

Screw

PCI riser-card

Screw
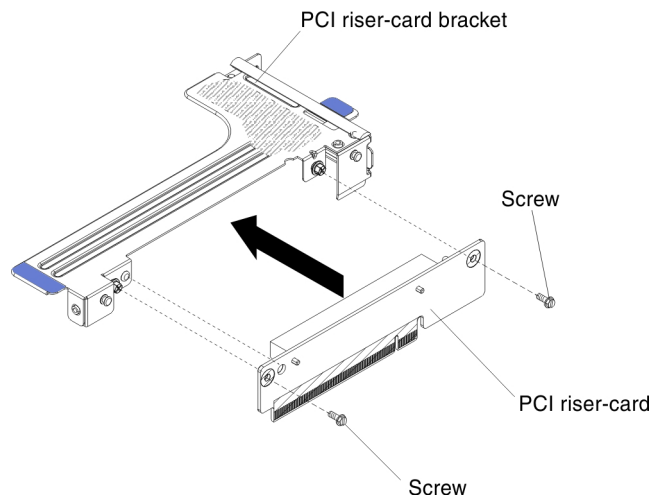
Figure 139. PCI riser-card bracket removal

6. If you are instructed to return the PCI riser-card bracket, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the PCI riser-card bracket to the riser card

Note: PCI riser-card brackets must be installed even if you do not install a riser card.

To install the PCI riser-card bracket to the riser card, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Align the holes on the PCI riser card and the riser-card bracket and install the screws that attach the PCI riser card to the riser-card bracket.

PCI riser-card bracket

Screw

PCI riser-card

Screw
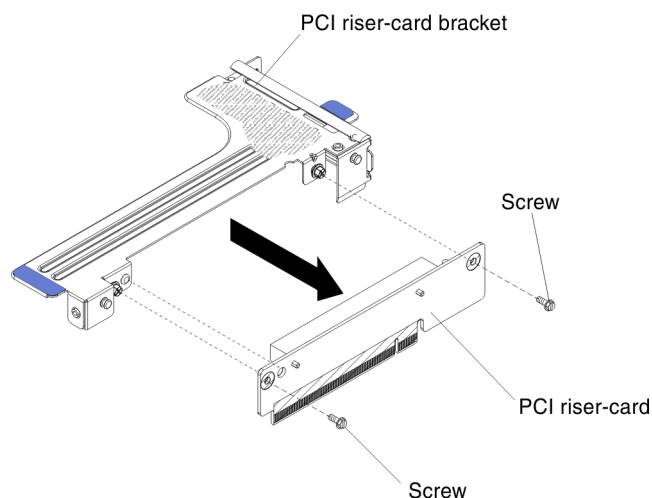
Figure 140. PCI riser-card bracket installation

5. If you need to install an adapter (see "Replacing an adapter" on page 231).

6. Reconnect the cables for the adapter.

7. Replace the PCI riser card assembly (see "Replacing a PCI riser-card assembly" on page 227).

8. Replace the cover (see "Replacing the cover" on page 195).

9. Slide the server into the rack.

10. Reconnect the power cords and any cables that you removed.

11. 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 "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing the cover" on page 36).

3. Disconnect any cables from the adapter. For PCI riser-card assembly 2, push the latch to easily release the network cable, as shown in the following illustration.
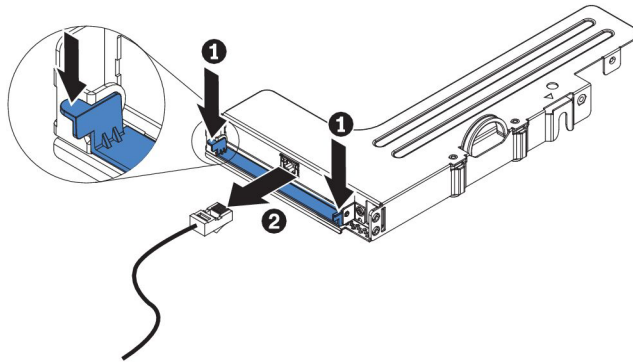
Figure 141. Cable removal

4. Grasp the PCI riser-card assembly at the blue tabs and lift to remove the PCI riser-card assembly.

5. Place the PCI riser-card assembly on a flat and static-protective surface.

6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the PCI riser-card assembly.
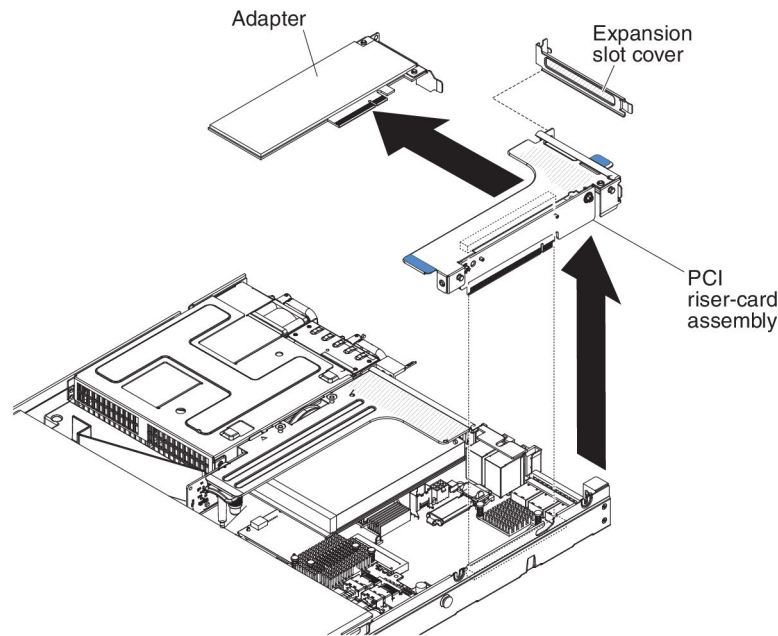
Figure 142. Adapter removal

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

Replacing 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:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section.

- The server provides one internal SAS/SATA RAID connector and two PCI slots on the system board. See "System-board optional-device connectors" on page 32 for the location of the internal SAS/SATA RAID connector and riser-card slots. You can replace the IBM ServeRAID SAS/SATA adapter with an optional IBM ServeRAID SAS/SATA adapter in the slot. For configuration information, see the ServeRAID documentation at http://www.ibm.com/supportportal/.

- 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.

- Read the following table before installing memory modules when any Quadro adapters is installed.

Table 24. NVIDIA Quadro video adapter configurations

Description	Supported maximum total memory size
Quadro 600 adapter	128 GB
Quadro 2000 adapter	512 GB

- Read the following table before installing NAND flash adapters.

Table 25. NAND flash configurations

Description	Option part number	PCI riser 1	PCI riser 2
IBM 365 GB High IOPS MLC mono adapter	46C9078	Two microprocessors installed	Two microprocessors installed
IBM 785 GB High IOPS MLC mono adapter	46C9081	Two microprocessors installed	Two microprocessors installed
IBM 1.2 TB high IOPS MLC mono adapter	90Y4377	Two microprocessors installed	Two microprocessors installed
IBM 2.4 TB high IOPS MLC duo adapter	90Y4397	Not supported	Two microprocessors installed

- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported
- The server does not support full-length, full-height PCI adapters or legacy 5V PCI adapters.
- When you install any PCI adapter, the power cords must be disconnected from the power source before you remove the PCI Express riser-card assembly and the PCI-X riser-card assembly. Otherwise, the active power management event signal will be disabled by the system-board logic, and the Wake on LAN feature might not work. However, after the server is powered-on locally, the active power manager active power management event signal will be enabled by the system-board logic.
- The server provides two PCI riser-card slots on the system board. The following information indicates the riser-card slots and the type of adapters that the riser cards support:
  - If you want to install a PCI Express or PCI-X adapter, you must order the PCI riser-card option.
  - PCI riser slot 1. This slot supports only low-profile adapters.
  - PCI riser slot 2. This slot supports full-height, half-length adapters.

  The following table lists the supported configurations for the PCI riser-card slots.

Table 26. PCI riser slots supported configurations

PCI riser-card slot number	Configuration 1	Configuration 2 (Two microprocessors installed)	Configuration 3
Slot 1	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket
Slot 2	PCI Express 3.0 (x8) card with a PCI Express riser card with a standard bracket	PCI Express 3.0 (x16) card with a PCI Express riser card with a standard bracket	PCI-X 64-bit/133 MHz card with a PCI-X riser card with a standard bracket

Notes:

1. The instructions in this section apply to any PCI adapter (for example, video graphics adapters or network adapters).
2. 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.
3. Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported.

To install an adapter, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the server cover (see "Removing the cover" on page 36).
4. Follow the cabling instructions, if any come with the adapter. Route the adapter cables before you install the adapter.
5. Insert the adapter into the PCI riser-card assembly, aligning the edge connector on the adapter with the connector on the PCI riser-card assembly. Press the edge of the connector *firmly* into the PCI riser-card assembly. Make sure that the adapter snaps into the PCI riser-card assembly securely.

Figure 143. Adapter installation

> **Attention:** When you install an adapter, make sure that the adapter is correctly seated in the riser-card assembly and that the riser-card assembly is securely seated in the riser-card connector on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.

6. Install the PCI riser-card assembly in the server (see "Replacing a PCI riser-card assembly" on page 227).
7. Connect the cable to the newly-installed adapter.

Note: You might need to remove the blue latch from PCI riser-card assembly 2 to easily connect the cables.
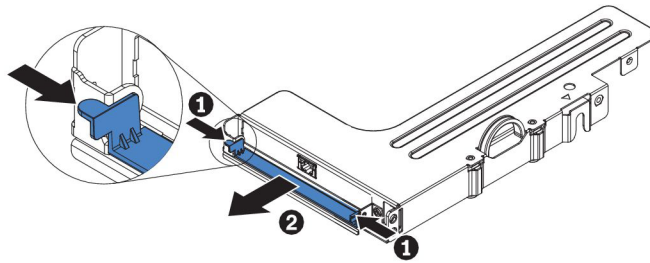
Figure 144. Latch removal

8. Perform any configuration tasks that are required for the adapter.
9. Reinstall the cover (see "Replacing the cover" on page 195).
10. Slide the server into the rack.
11. Reconnect the power cords and any cables that you removed.
12. Turn on the peripheral devices and the server.

Removing a ServeRAID SAS/SATA controller

The ServeRAID SAS/SATA controller can be installed in the dedicated connector on the system board or PCI riser-card slots (see "System-board internal connectors" on page 28 for the location of the connectors).

You can replace the ServeRAID controller with another supported ServeRAID controller. For a list of supported ServeRAID controllers, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

Note: For brevity, in this documentation the ServeRAID SAS/SATA controller is often referred to as the *SAS/SATA adapter* or the *ServeRAID adapter*.

To remove the SAS/SATA adapter from the system board, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove PCI riser-card assembly 1 if necessary (see "Removing a PCI riser-card assembly" on page 226).
5. Locate the SAS/SATA adapter between PCI slot 1 and microprocessor 1.
6. Disconnect the signal cables and power cables from the connectors on the SAS/SATA adapter and note their locations.
7. Grasp the end of the SAS/SATA adapter near microprocessor 1 while you slide the brackets. Slide the retention bracket (near the chassis) toward the chassis; then, slide the other retention bracket toward the power supplies.
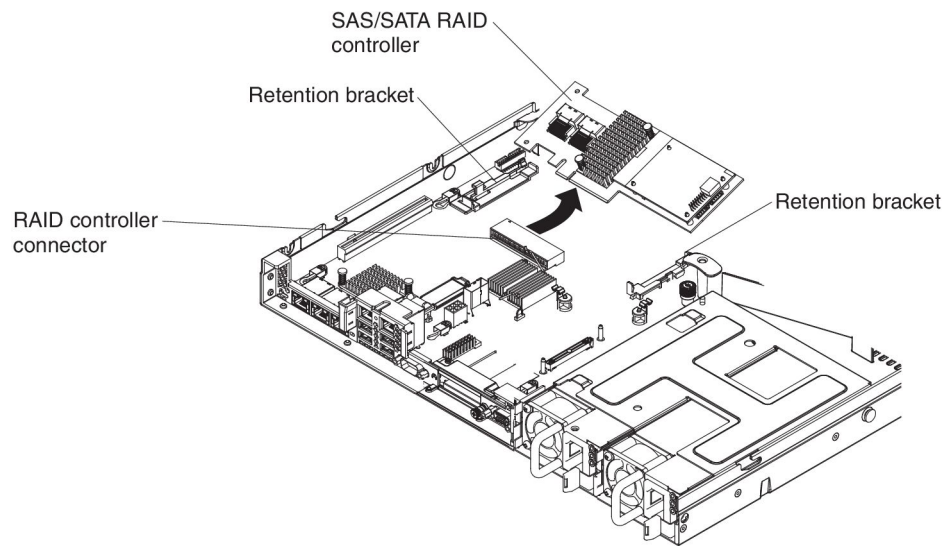
Figure 145. ServeRAID adapter removal

> **Note:** If you have installed the optional ServeRAID adapter memory module, remove it and keep it in future use (see "Removing the ServeRAID adapter memory module" on page 240).

8. Pull the SAS/SATA adapter horizontally out of the connector on the system board.

9. If you are instructed to return the SAS/SATA adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a ServeRAID SAS/SATA controller

The ServeRAID SAS/SATA controller can be installed in the dedicated connector on the system board or PCI riser-card slots (see "System-board internal connectors" on page 28 for the location of the connectors). To install a SAS/SATA adapter, complete the following steps:

Depending on the server model, the server comes with a ServeRAID H1110, a ServeRAID M1115, a ServeRAID M5110, or a ServeRAID 5210 SAS/SATA adapter installed.

Note: Remove the PCI bracket that come with ServeRAID H1110, ServeRAID M1115, ServeRAID M5110 SAS/SATA, or a ServeRAID 5210 adapter before installing a SAS/SATA adapter in the dedicated connector on the system board.

Attention:

- You can not install ServeRAID H1110 when microprocessor Intel Xeon E5-2637 (FRU part number 49Y8124) is installed.
- You can not install ServeRAID M1115 or IBM 6Gb performance optimized HBA when Quadro 2000 is installed.

You can replace the ServeRAID controller with another supported ServeRAID controller. For a list of supported ServeRAID controllers, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

Note: For brevity, in this documentation the ServeRAID SAS/SATA controller is often referred to as the *SAS/SATA adapter* or the *ServeRAID adapter*.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove PCI riser-card assembly 1 if necessary (see "Removing a PCI riser-card assembly" on page 226).
5. If you are installing a new or replacement SAS/SATA adapter, touch the static-protective package that contains the new SAS/SATA adapter to any unpainted metal surface on the server. Then, remove the new SAS/SATA adapter from the package.
6. Align the SAS/SATA adapter so that the keys align correctly with the connector on the system board.
7. Insert the SAS/SATA adapter in the dedicated connector on the system board or PCI riser-card slots.

   Attention: Incomplete insertion might cause damage to the server or the adapter.

   a. Insert the SAS/SATA adapter into the RAID connector on the system board until it is firmly seated. The retention brackets secure the SAS/SATA adapter in place when the adapter is firmly seated into the connector.

      Note: Remove the PCI bracket that come with ServeRAID H1110, ServeRAID M1115, or ServeRAID M5110 SAS/SATA adapter before installing a SAS/SATA adapter in the dedicated connector on the system board.

Figure 146. ServeRAID adapter installation

   b. Insert the SAS/SATA adapter into the PCI riser cards (see "Replacing an adapter" on page 231).

Adapter

Expansion slot cover

PCI riser-card assembly
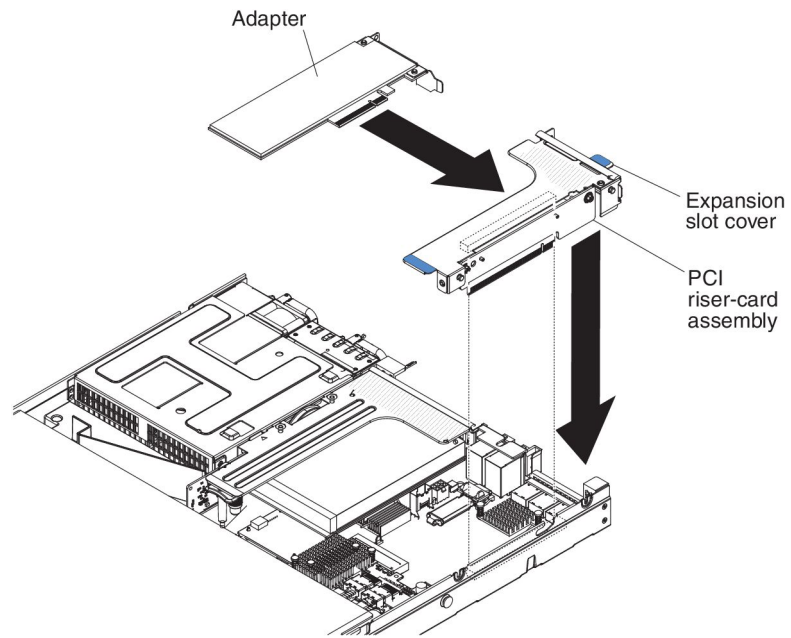
Figure 147. Adapter installation

8. Route the backplane signal cables (see "Cabling backplane" on page 186).
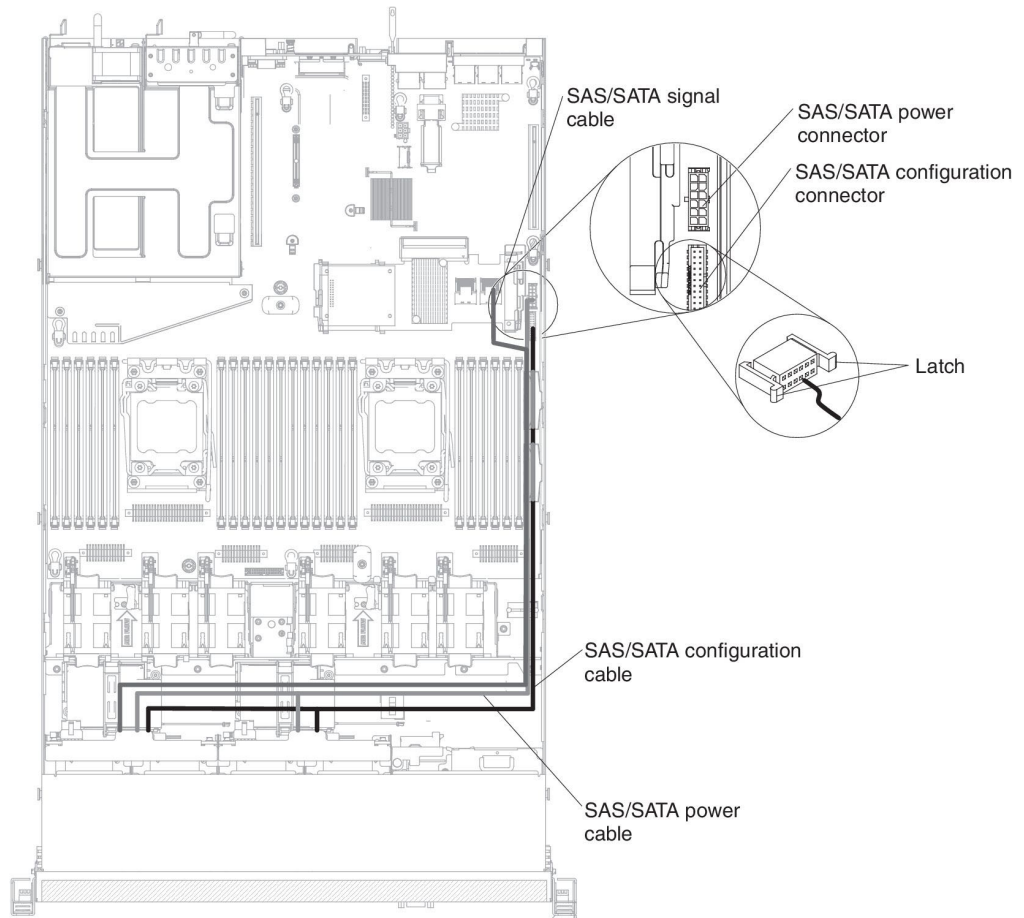
Figure 148. ServeRAID adapter cable routing

9. Connect the signal cables to the SAS/SATA adapter:

   a. **ServeRAID H1110 adapter**: Take the signal cable that is attached to the drive backplane for drive bays 0 through 3 and connect it to the SAS/SATA connector on the ServeRAID adapter.
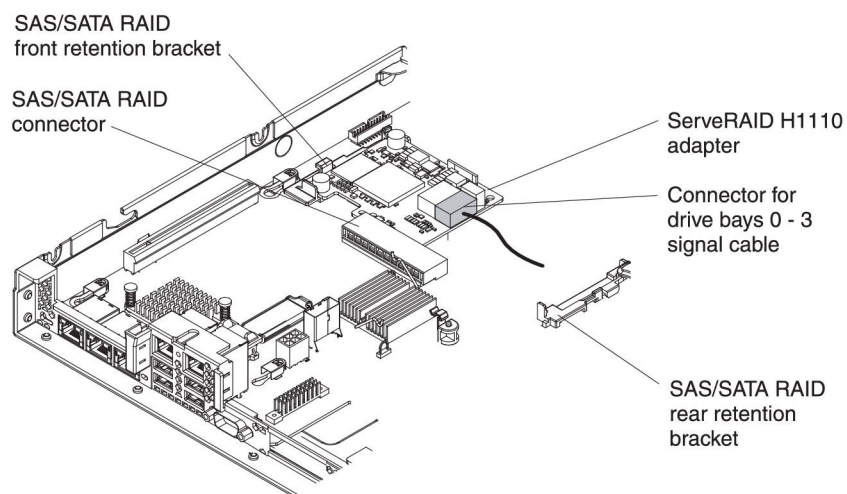
Figure 149. ServeRAID H1110 adapter cable routing

b. **ServeRAID M1115 adapter**: Take the signal cable that is attached to the drive backplane for drive bays 4 through 7 and connect it to the ServeRAID adapter connector for drive bays 4 through 7 (port 1). Connect the other signal cable that is attached to the drive backplane for drive bays 0 through 3 and connect it to the other connector (port 0) on the adapter.
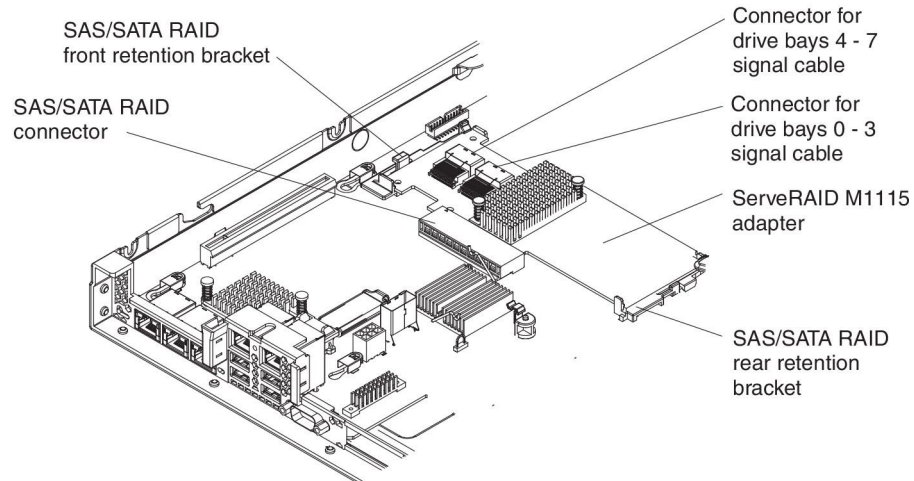
Figure 150. ServeRAID M1115 adapter cable routing

c. **ServeRAID M5110 adapter**: Take the signal cable that is attached to the drive backplane for drive bays 4 through 7 and connect it to the ServeRAID adapter connector for drive bays 4 through 7 (port 1). Connect the other signal cable that is attached to the drive backplane for drive bays 0 through 3 and connect it to the other connector (port 0) on the adapter.
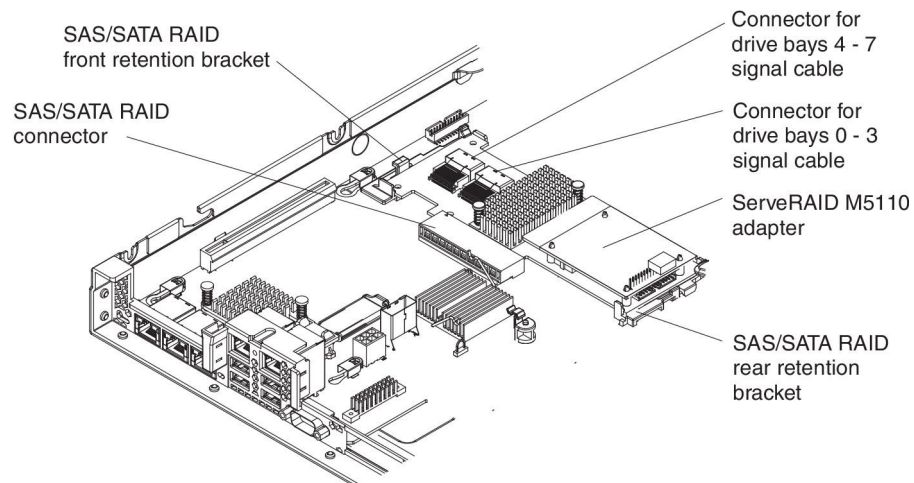
Figure 151. ServeRAID M5110 adapter cable routing

10. Reconnect the power cords and any cables that you removed.
11. Replace PCI riser-card assembly 1 if you have removed it earlier (see "Replacing a PCI riser-card assembly" on page 227).
12. Replace the cover (see "Replacing the cover" on page 195).
13. Turn on the peripheral devices and the server.

Note: When you restart the server, you are prompted to import the existing RAID configuration to the new ServeRAID adapter.

Removing the ServeRAID adapter memory module

To remove the ServeRAID adapter memory module, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the ServeRAID SAS/SATA controller (see "Removing a ServeRAID SAS/SATA controller" on page 234).

5. Grasp the memory module and lift to remove it from the connector on the ServeRAID adapter.
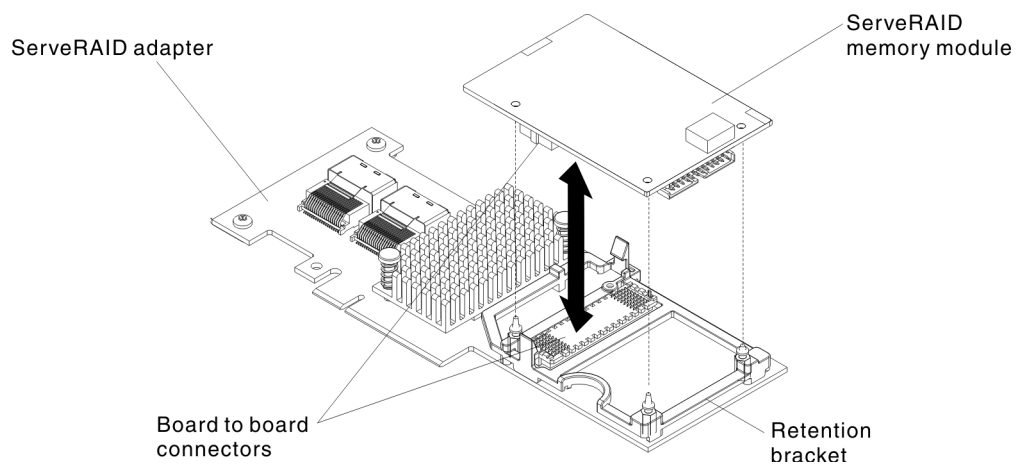
Figure 152. ServeRAID memory module removal

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

Replacing the ServeRAID adapter memory module

To install the ServeRAID adapter memory module, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the ServeRAID SAS/SATA controller (see "Removing a ServeRAID SAS/SATA controller" on page 234).

5. 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
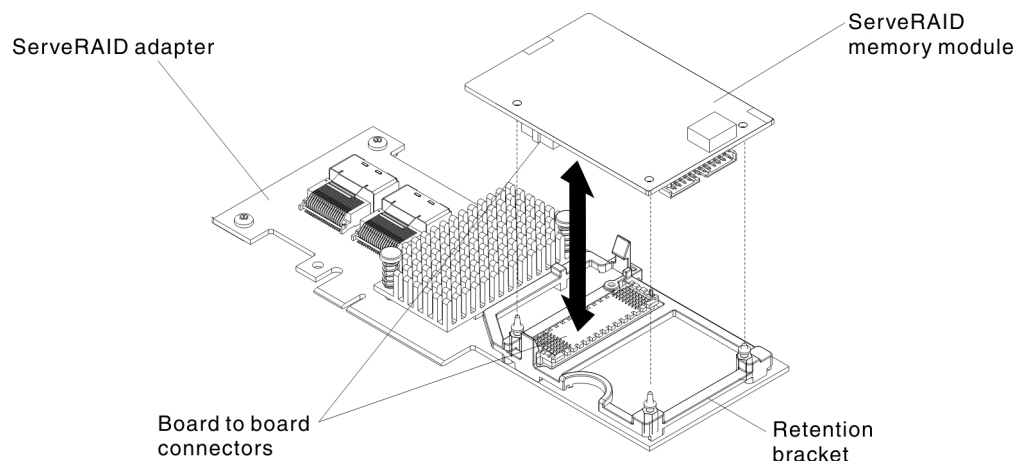
Figure 153. ServeRAID memory module installation

6. Reinstall the ServeRAID SAS/SATA controller (see "Replacing a ServeRAID SAS/SATA controller" on page 235).

7. Reconnect the power cords and any cables that you removed.

8. Reinstall the cover (see "Replacing the cover" on page 195).

9. Slide the server into the rack.

10. Turn on the peripheral devices and the server.

Removing the dual-port network adapter

To remove the dual-port network adapter, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the PCI riser-card assembly (if installed) from PCI riser connector 2 (see "Removing a PCI riser-card assembly" on page 226).

5. Loosen the two captive screws on the network adapter from the screw holes on the system board.
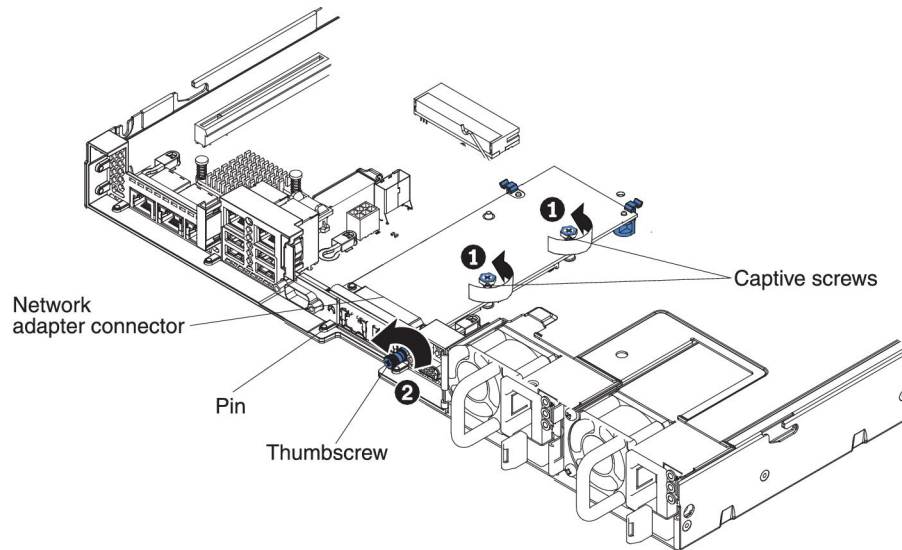
Figure 154. Screws disengagement

6. Loosen the thumbscrew on the chassis.
7. Grasp the network adapter and disengage it from the pin, retention brackets, and the connector on the system board; then, lift the adapter out of the port openings on the rear of the chassis and remove it from the server.
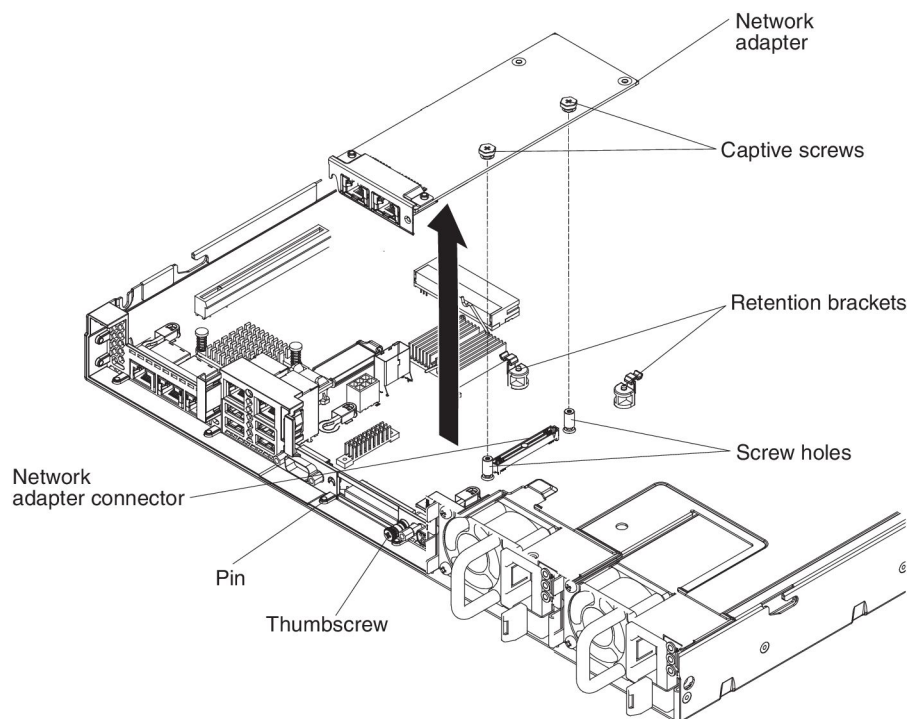
Figure 155. Dual-port network adapter removal

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

Replacing the dual-port network adapter

You can purchase one of the following dual-port network adapters to add two additional network ports in the server. To order a dual-port network adapter option, contact your IBM marketing representative or authorized reseller.

Table 27. Supported dual-port network adapters on the network connector

Dual-port network adapter	Option part number	FRU part number	Remark
Mellanox ConnectX-3 dual-port QDR/FDR10 mezz card	90Y6338	90Y4956	
Qlogic dual-port 10GbE SFP+ Embedded VFA	90Y6454	90Y5099	Two microprocessors installed required.
Emulex dual-port 10GbE SFP+ Embedded VFA III	90Y6456	90Y5100	
Dual-port FDR embedded adapter	00D4143	90Y6606	

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 configure network adapters, complete the following steps:
  1. From the Setup utility main menu (see "Using the Setup utility" on page 96), select **System Settings** > **Network**.
  2. From the **Network Device List**, select one network adapter.

     Note: You might need to enter each item (displaying MAC address) to see detailed information.
  3. Press Enter to configure the network adapter settings.
- To convert the NIC/iSCSI/FCoE for Emulex Dual Port 10GbE SFP+ Embedded VFA III, complete the following steps:
  1. From the Setup utility main menu (see "Using the Setup utility" on page 96), select **System Settings** > **Network** and press Enter.
  2. From the **Network Device List**, select Emulex network adapter.

     Note: You might need to enter each item (displaying MAC address) to see detailed information.
  3. Press Enter to configure Emulex network adapter, select **Personality** and press Enter to change the settings.
     - NIC
     - iSCSI (enabled after FoD installed)
     - FCoE (enabled after FoD installed)
- To download the latest version of drivers for iSCSI and FCoE from the IBM website, complete the following steps:
  1. Go to http://www.ibm.com/support/fixcentral/.
  2. Click **Product support** > **System x** > **Product family** > **System x3550 M4** > **7914**.
  3. From the **Operating system** menu, select your operating system, and then click **Search** to display the available drivers.
  4. Download the latest version of drivers.
     - Emulex iSCSI Device Driver for Windows 2008
     - Emulex FCoE Device Driver for Windows 2008

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

- Port 0 on the Emulex Dual Port 10GbE SFP+ Embedded VFA III can be configured as shared system management.
- When the server is in standby mode, both ports on the Emulex Dual Port 10GbE SFP+ Embedded VFA III function at 100M connection speed with Wake on LAN feature.

The Emulex Dual Port 10GbE SFP+ Embedded VFA III is automatically disabled if one of the following errors occurs:

- An error log indicates a temperature warning for the Ethernet adapter.
- All power supplies are removed or the server is disconnected from the power source.

To install the dual-port network adapter, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the PCI riser-card assembly (if installed) from PCI riser connector 2 (see "Removing a PCI riser-card assembly" on page 226).
5. Remove the adapter filler panel on the rear of the chassis (if it has not been removed already).

Figure 156. Adapter filler panel removal

6. Touch the static-protective package that contains the new adapter to any unpainted metal surface on the server. Then, remove the adapter from the package.
7. Align the adapter so that the port connectors on the adapter line up with the pin and thumbscrew on the chassis; then, align the connector of the adapter with the adapter connector on the system board.
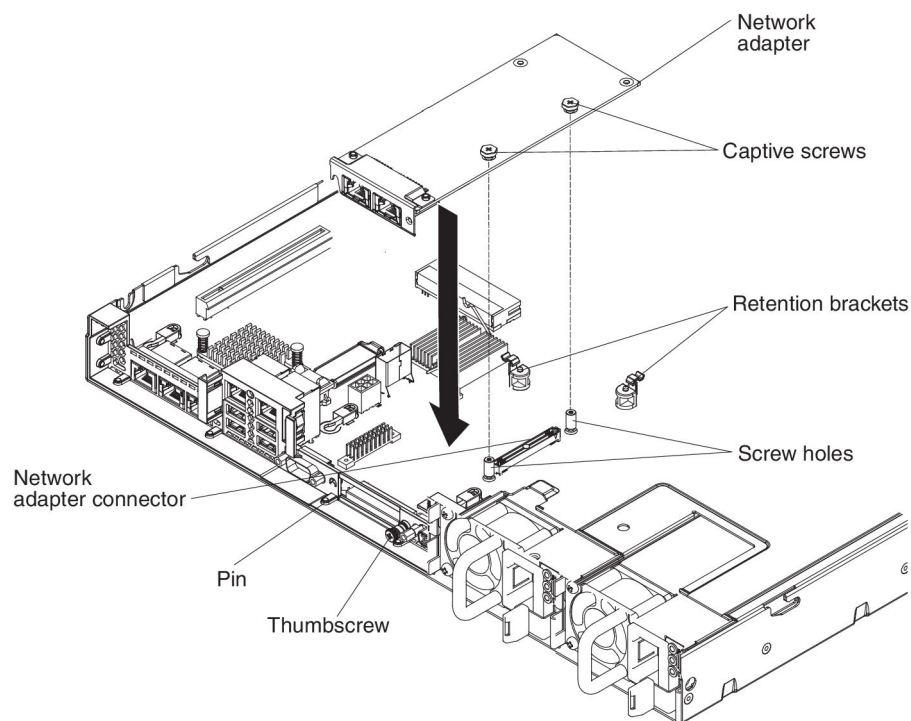
Figure 157. Network adapter installation

8. Press the adapter firmly until the pin, and retention brackets engage the adapter. Make sure the adapter is securely seated on the connector on the system board.

   Attention: Make sure the port connectors on the adapter are aligned properly with the chassis on the rear of the server. An incorrectly seated adapter might cause damage to the system board or the adapter.

9. Fasten the thumbscrew on the rear side of the chassis.
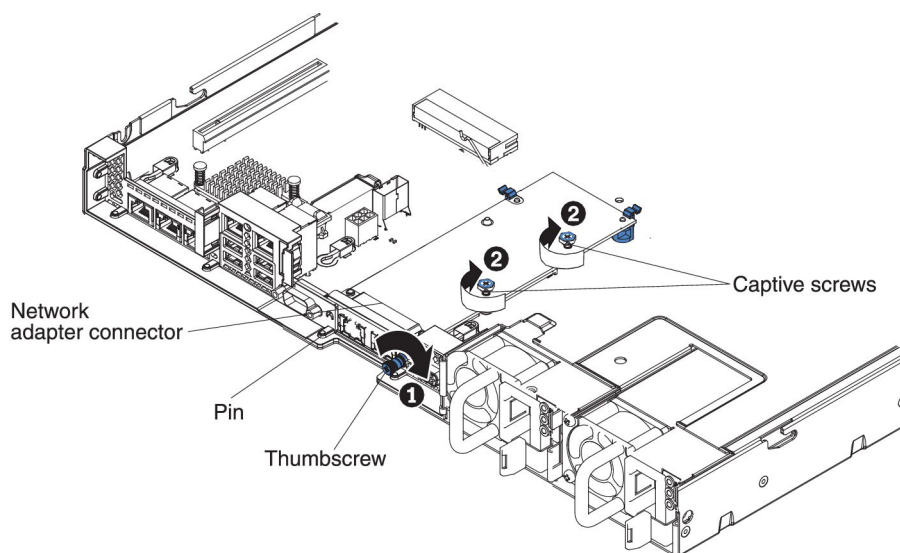
Figure 158. Screws engagement

10. Fasten the two captive screws on the network adapter.

11. Reinstall the PCI riser-card assembly in PCI riser connector 2 if you have removed it previously (see "Replacing a PCI riser-card assembly" on page 227).

12. Replace the cover (see "Replacing the cover" on page 195).

13. Slide the server into the rack.

14. Reconnect the power cords and any cables that you removed.

15. Turn on the peripheral devices and the server.

Removing a hot-swap ac 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.
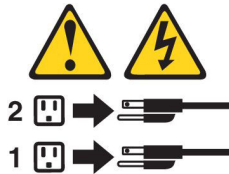
Statement 8

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 ac power supply, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. If only one power supply is installed, turn off the server and peripheral devices and disconnect all power cords.
3. If the server is in a rack, at the back of the server, pull back the cable management arm to gain access to the rear of the server and the power supply.
4. Press and hold the release tab to the left. Grasp the handle and pull the power supply out of the server.
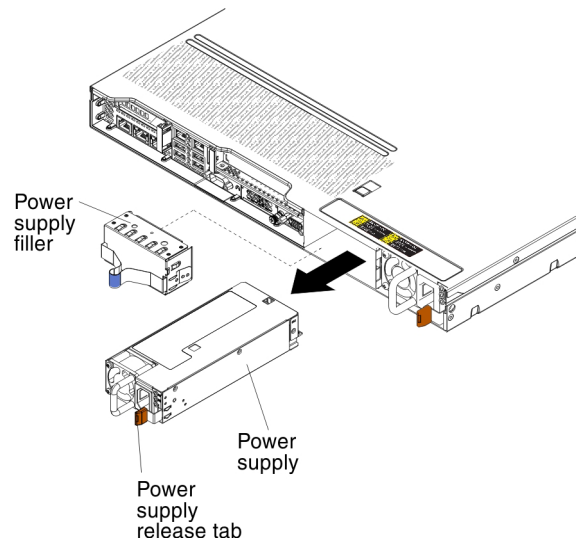
Figure 159. Power supply removal

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

Replacing a hot-swap ac power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- 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 100-127 V ac or 200-240 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. For example, you cannot mix 550-watt and 750-watt power supplies in the server.

- 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 ac power supply, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
3. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler from the power-supply bay.

Figure 160. Power supply installation

4. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply connector.

   Attention: Do not mix 550-watt and 750-watt power supplies 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 the power cord for the new power supply to the power-cord connector on the power supply.

7. Connect the other end of the power cord to a properly grounded electrical outlet.

8. 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.

9. If you are replacing a power supply with one of a different wattage in the server, apply the new power information label provided over the existing power information label on the server. Power supplies in the server must be with the same power rating or wattage to ensure that the server will operate correctly.

Figure 161. Power information label

10. 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.
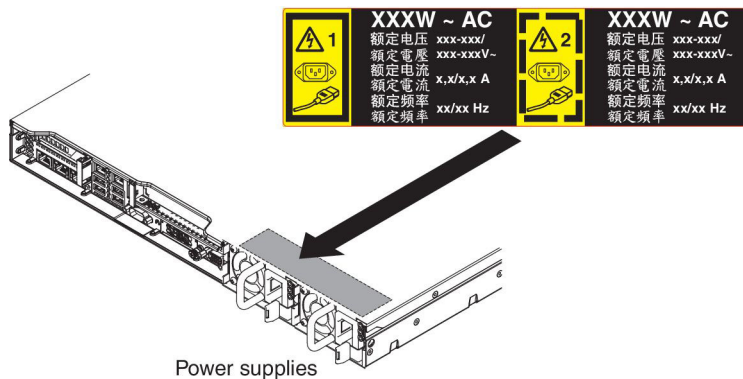
Figure 162. Redundant power information label

Removing a hot-swap dc power supply

When you remove or install a hot-swap dc power supply, observe the following precautions.

Statement 29

CAUTION: This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment.

This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment. If this connection is made, all of the following conditions must be met:

• This equipment shall be connected directly to the dc supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the dc supply system earthing electrode conductor is connected.

• This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same dc supply circuit and the earthing conductor, and also the point of earthing of the dc system. The dc system shall not be earthed elsewhere.

• The dc supply source shall be located within the same premises as this equipment.

• Switching or disconnecting devices shall not be in the earthed circuit conductor between the dc source and the point of connection of the earthing electrode conductor.

Statement 31

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 power source.
- Connect to properly wired power sources 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 ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when you install, move, or open covers on this product or attached devices.

To Connect:	To Disconnect:
1. Turn OFF all power sources and equipment that is to be attached to this product.	1. Turn OFF all power sources and equipment that is to be attached to this product.
2. Attach signal cables to the product.	• For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit.
3. Attach power cords to the product.	
• For ac systems, use appliance inlets.	
• For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety.	• For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables.
4. Attach signal cables to other devices.	2. Remove the signal cables from the connectors.
5. Connect power cords to their sources.	
6. Turn ON all the power sources.	3. Remove all cables from the devices.

Statement 33

CAUTION:
This product does not provide a power-control button. Turning off blades or removing power modules and I/O modules does not turn off electrical current to the product. The product also might have more than one power cord. To remove all electrical current from the product, make sure that all power cords are disconnected from the power source.
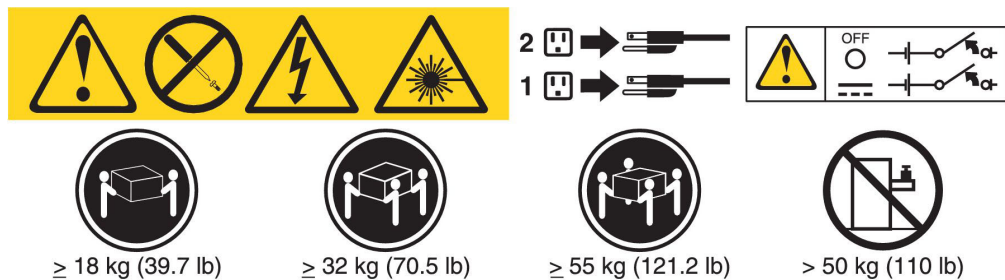
Statement 34

CAUTION:

To reduce the risk of electric shock or energy hazards:

- **This equipment must be installed by trained service personnel in a restricted-access location, as defined by the NEC and IEC 60950-1, First Edition, The Standard for Safety of Information Technology Equipment.**

- **Connect the equipment to a properly grounded safety extra low voltage (SELV) source. A SELV source is a secondary circuit that is designed so that normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).**

- **Incorporate a readily available approved and rated disconnect device in the field wiring.**

- **See the specifications in the product documentation for the required circuit-breaker rating for branch circuit overcurrent protection.**

- **Use copper wire conductors only. See the specifications in the product documentation for the required wire size.**

- **See the specifications in the product documentation for the required torque values for the wiring-terminal screws.**

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)   > 50 kg (110 lb)

Important: Be sure to read the multilingual safety instructions on the CD that comes with the server before you use the product.

To remove a hot-swap dc power supply, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. If only one power supply is installed, turn off the server and peripheral devices and disconnect all power cords.

3. If the server is in a rack, at the back of the server, pull back the cable management arm to gain access to the rear of the server and the power supply.

4. Press and hold the release tab to the left. Grasp the handle and pull the power supply out of the server.
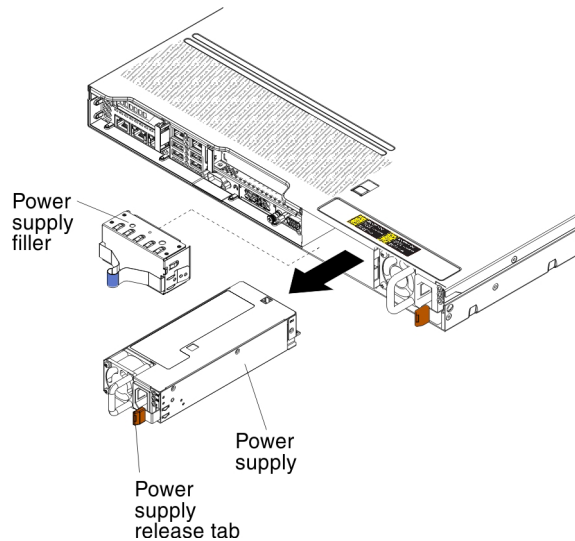
Figure 163. Power supply removal

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

Replacing a hot-swap dc power supply

The following notes describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- 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.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 -48 V dc or -60 V dc auto-sensing.
- Before you install a dc power supply in the server, you must remove all ac power supplies. Do not use both ac and dc power supplies in the same server. Install up to two dc power supplies or up to two ac power supplies, but not a combination.
- 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.
- It is the customer's responsibility to supply the necessary power cable.

  To reduce the risk of electric shock or energy hazards:
  - **Use a circuit breaker that is rated at 25 amps.**
  - **Use 2.5 mm^2 (12 AWG) at 90° C copper wire.**
  - **Torque the wiring-terminal screws to 0.50 ~ 0.60 newton-meters (4.43 ~ 5.31 inch-pounds).**

For more information, see Statement 34 on page 256.

- If the power source requires ring terminals, you must use a crimping tool to install the ring terminals to the power cord wires. The ring terminals must be UL approved and must accommodate the wire that is described in the above-mentioned note .

Statement 29:

CAUTION:
This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment.

This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment. If this connection is made, all of the following conditions must be met:

- This equipment shall be connected directly to the dc supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the dc supply system earthing electrode conductor is connected.
- This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same dc supply circuit and the earthing conductor, and also the point of earthing of the dc system. The dc system shall not be earthed elsewhere.
- The dc supply source shall be located within the same premises as this equipment.
- Switching or disconnecting devices shall not be in the earthed circuit conductor between the dc source and the point of connection of the earthing electrode conductor.

Statement 31

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 power source.
- Connect to properly wired power sources 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 ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless you are instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when you install, move, or open covers on this product or attached devices.

To Connect:	To Disconnect:
1. Turn OFF all power sources and equipment that is to be attached to this product.	1. Turn OFF all power sources and equipment that is to be attached to this product.
2. Attach signal cables to the product.	• For ac systems, remove all power cords from the chassis power receptacles or interrupt power at the ac power distribution unit.
3. Attach power cords to the product.	
• For ac systems, use appliance inlets.	
• For dc systems, ensure correct polarity of -48 V dc connections: RTN is + and -48 V dc is -. Earth ground should use a two-hole lug for safety.	• For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables.
4. Attach signal cables to other devices.	2. Remove the signal cables from the connectors.
5. Connect power cords to their sources.	
6. Turn ON all the power sources.	3. Remove all cables from the devices.

Statement 33

CAUTION:
This product does not provide a power-control button. Turning off blades or removing power modules and I/O modules does not turn off electrical current to the product. The product also might have more than one power cord. To remove all electrical current from the product, make sure that all power cords are disconnected from the power source.
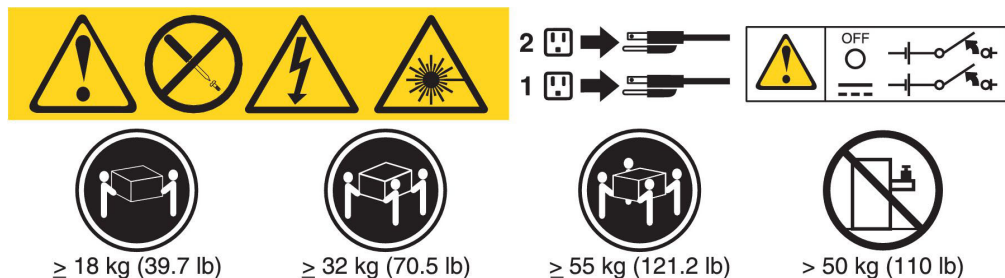
Statement 34

CAUTION:
To reduce the risk of electric shock or energy hazards:
- **This equipment must be installed by trained service personnel in a restricted-access location, as defined by the NEC and IEC 60950-1, First Edition, The Standard for Safety of Information Technology Equipment.**
- **Connect the equipment to a properly grounded safety extra low voltage (SELV) source. A SELV source is a secondary circuit that is designed so that normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).**
- **Incorporate a readily available approved and rated disconnect device in the field wiring.**
- **See the specifications in the product documentation for the required circuit-breaker rating for branch circuit overcurrent protection.**
- **Use copper wire conductors only. See the specifications in the product documentation for the required wire size.**
- **See the specifications in the product documentation for the required torque values for the wiring-terminal screws.**

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)   > 50 kg (110 lb)

Important: Be sure to read the multilingual safety instructions on the CD that comes with the server before you use the product.

To install a hot-swap dc power supply, complete the following steps:

Attention: Only trained service personnel other than IBM service technicians are authorized to install and remove the -48 volt dc power supply, and make the connections to and disconnections from the -48 volt dc power source. IBM service technicians are not certified or authorized to install or remove the -48 volt power cable. The customer is responsible for ensuring that only trained service personnel install or remove the -48 volt power cable.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.

3. Turn off the circuit breaker for the dc power source to which the new power supply will be connected. Disconnect the power cord from the dc power source.

4. Attach the dc power cable to the new power supply.

Figure 164. DC power supply rear view

5. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler from the power-supply bay.
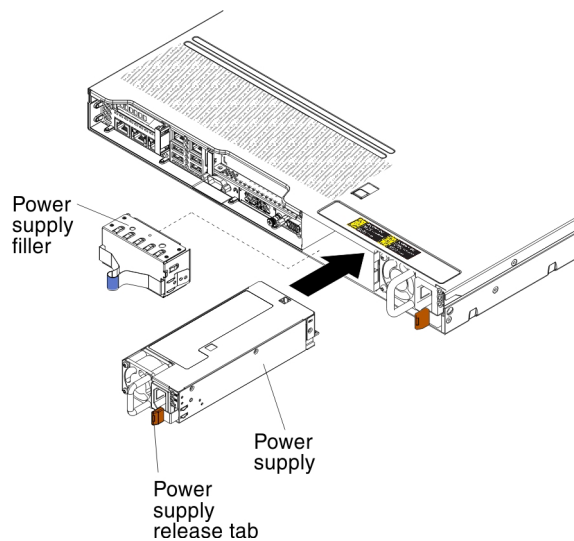
Figure 165. Power supply installation

6. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply connector.

7. Route the power cord through the handle and cable tie if any, so that it does not accidentally become unplugged.

8. Connect the other ends of the dc power cable to the dc power source. Cut the wires to the correct length, but do not cut them shorter than 150 mm (6 inch). If the power source requires ring terminals, you must use a crimping tool to install the ring terminals to the power cord wires. The ring terminals must be

UL approved and must accommodate the wires that are described on page 254. The minimum nominal thread diameter of a pillar or stud type of terminal must be 4 mm; for a screw type of terminal the diameter must be 5.0 mm.

9. Turn on the circuit breaker for the dc power source to which the new power supply is connected.

10. Make sure that the green power LEDs on the power supply are lit, indicating that the power supply is operating correctly.

11. If you are replacing a power supply with one of a different wattage in the server, apply the new power information label provided over the existing power information label on the server. Power supplies in the server must be with the same power rating or wattage to ensure that the server will operate correctly.
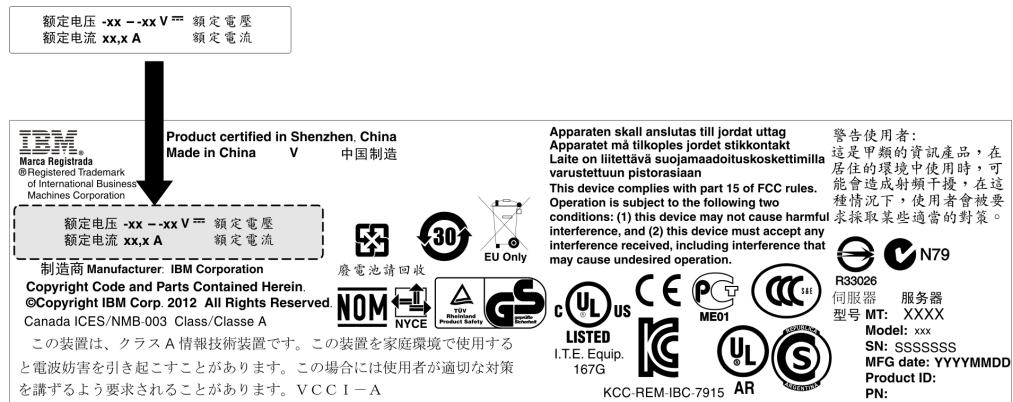
Figure 166. Power information label

12. 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.

Figure 167. Redundant power information label

Removing a hot-swap fan

Attention: To ensure proper server operation, replace a failed hot-swap fan within 30 seconds.

To remove a hot-swap-fan, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Remove the cover (see "Removing the cover" on page 36).
3. Press the handle while grasping the orange fan tabs on both ends of the existing fan and pulling it up out of the server.
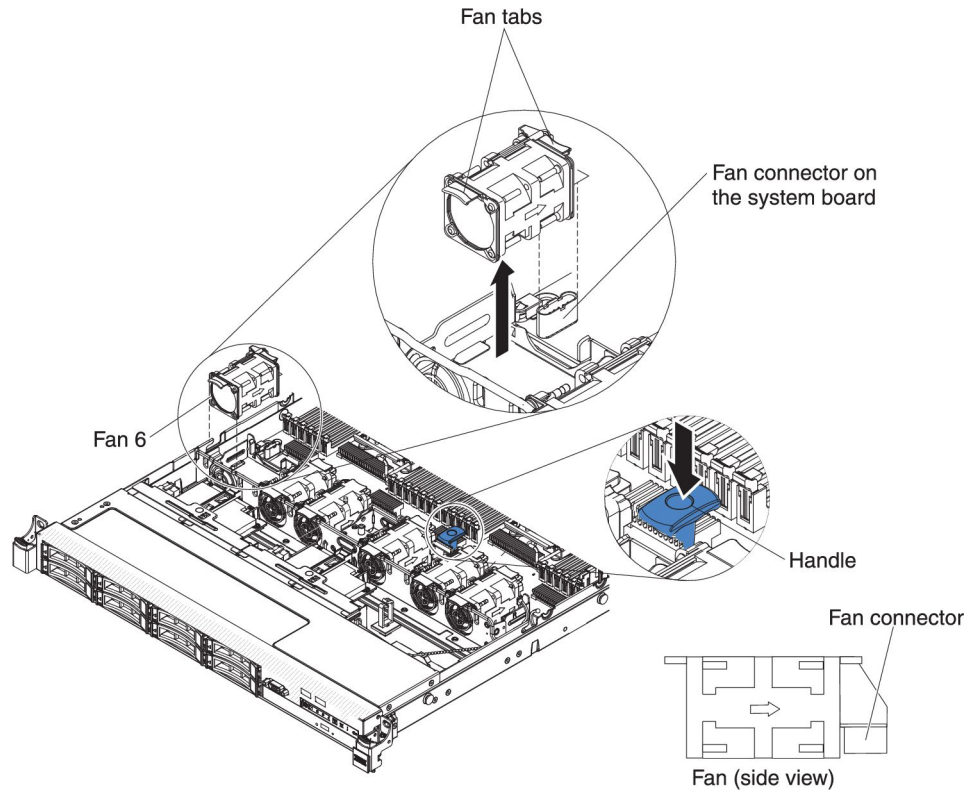
Figure 168. Fan removal

Attention: To ensure proper operation, replace a failed hot-swap fan within 30 seconds.

4. If you are instructed to return the fan, follow all of the packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a hot-swap fan

The server comes standard with four dual-motor hot-swap cooling fans. When there is one microprocessor installed, install fan 1, 2, 3, and 5 for proper cooling.

Attention: To ensure proper operation, replace a failed hot-swap fan within 30 seconds.

To replace a hot-swap fan, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Remove the cover (see "Removing the cover" on page 36).
3. Touch the static-protective package that contains the new fan to any unpainted metal surface on the server. Then, remove the new fan from the package.
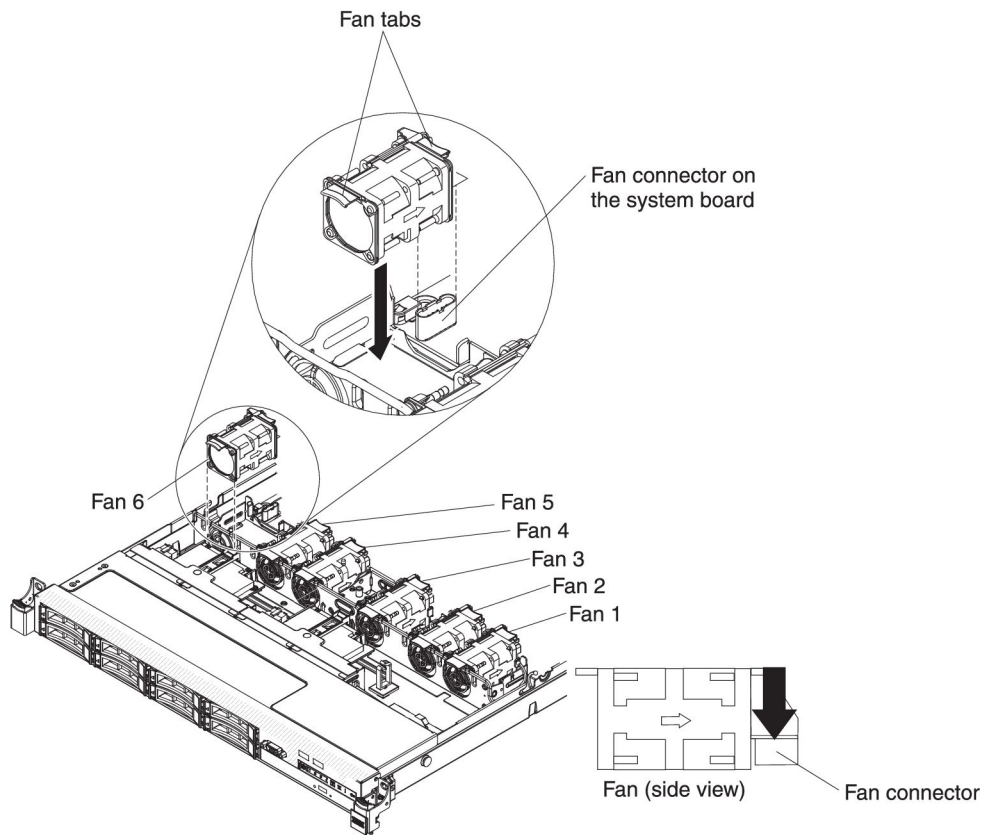
Figure 169. Fan installation

4. Orient the fan over the fan slot in the fan assembly bracket so that the fan connector aligns with the connector on the system board.
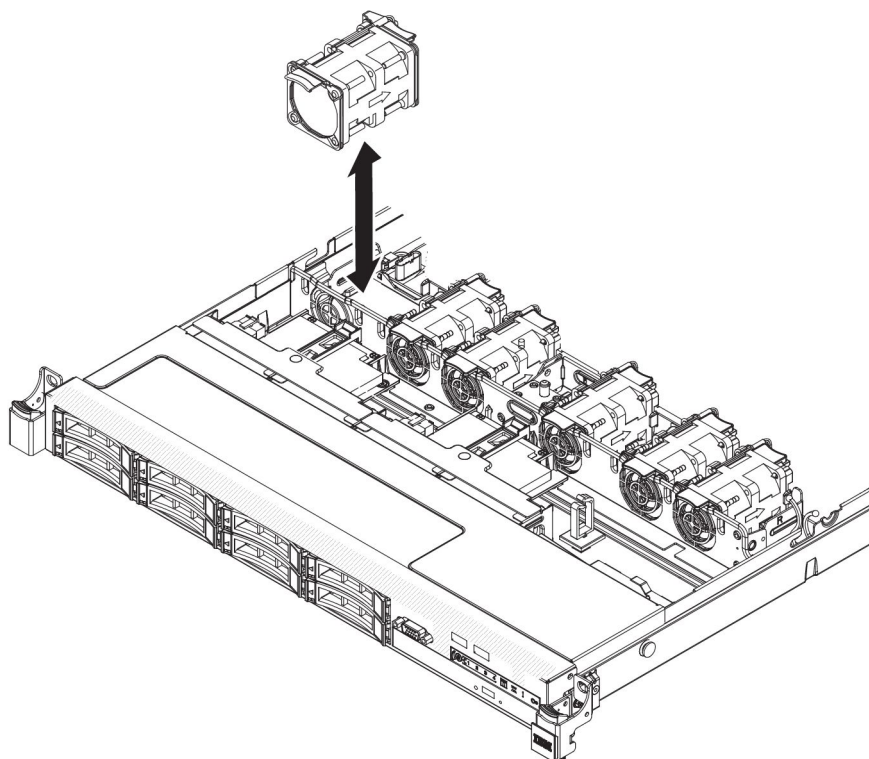
Figure 170. Fan installation

5. Insert the fan into the fan slot in the fan assembly bracket and press it down until it is seated correctly in the slot and the fan connector is seated correctly in the connector on the system board.

   Note: Make sure that the newly-installed fan aligns horizontally with other correctly-seated fans for proper installation.

6. Replace the cover (see "Replacing the cover" on page 195).

7. Slide the server into the rack.

Removing the hot-swap drive backplane

To remove the hot-swap hard disk drive backplane, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Pull the hard disk drives out of the server slightly to disengage them from the hard disk drive backplane (see "Removing hot-swap hard disk drives" on page 203).

5. Remove the hot-swap hard disk drive backplane. If you would like to remove the 3.5-inch drive backplane.

   a. Adjust the latch to the unlocked position.
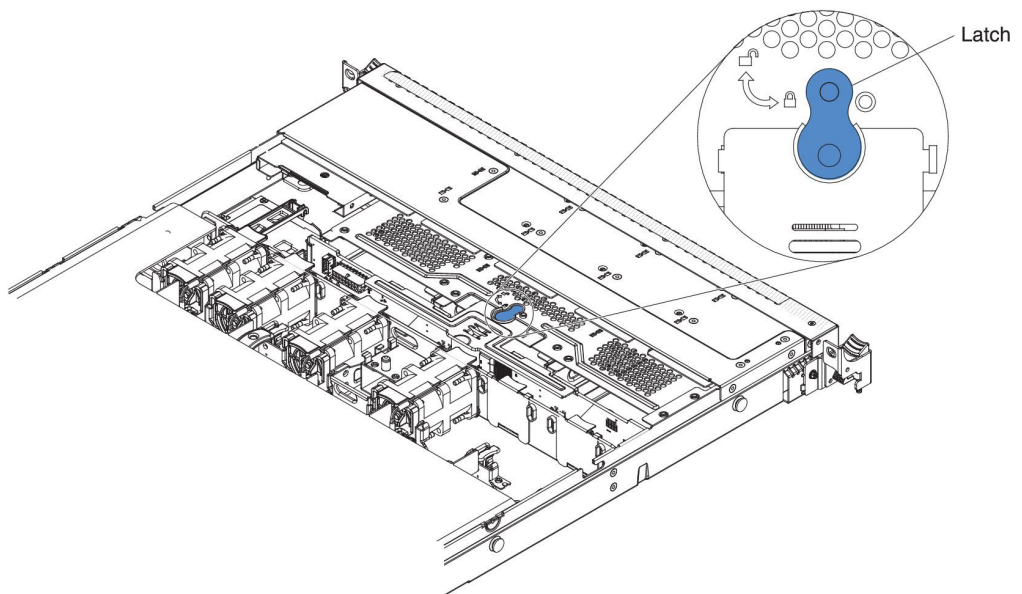
Figure 171. Latch adjustment

    b. Lift the hard disk drive backplane up to remove it from the server.
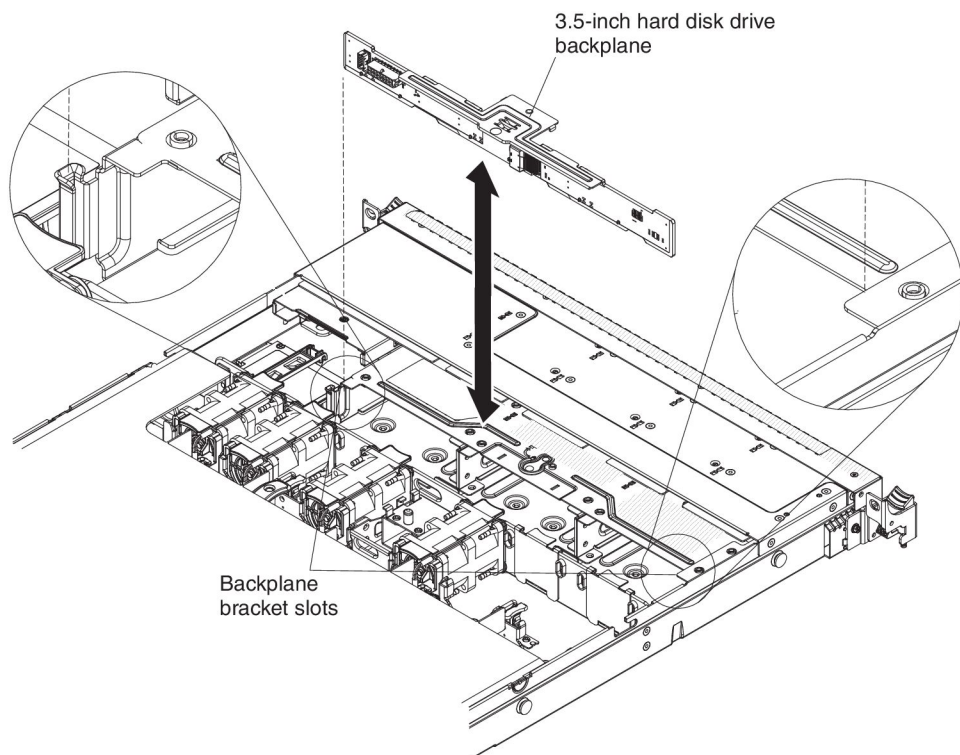
Figure 172. Backplane removal

If you would like to remove the 2.5-inch drive backplane.

    a. Lift the hard disk drive backplane up to remove it from the server.

2.5-inch hard disk drive backplane

Bracket slot

Bracket slot
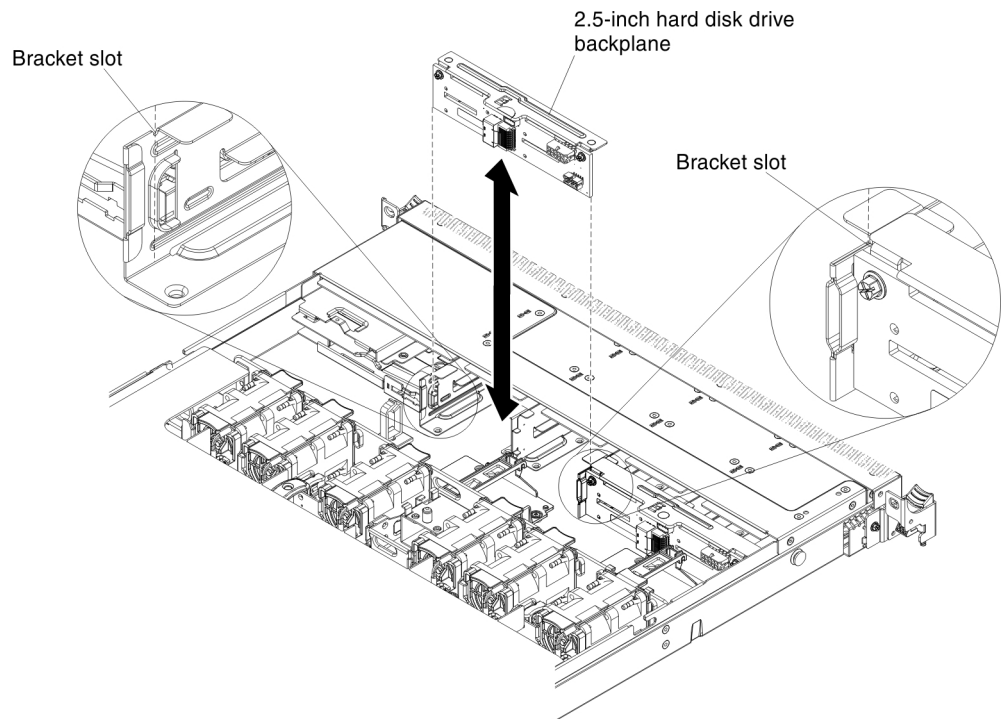
Figure 173. Backplane removal

6. Disconnect all cables from the hard disk drive backplane.
7. If you are instructed to return the hard disk drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the hot-swap drive backplane

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

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Reconnect the cables to the hard disk drive backplane.
3. Align the sides of the drive backplane with the slots on the backplane bracket.
4. Install the hard disk drive backplane.

   Note: You can reconnect the cables to the hard disk drive backplane before installing the backplane onto the brackets or you can connect the cables after you install the backplane, if that is easier for you.
   If you would like to install the 3.5-inch drive backplane.

   a. Insert the hard disk drive backplane into the slots on the backplane bracket and push the hard disk drive backplane down until the backplane is fully seated.
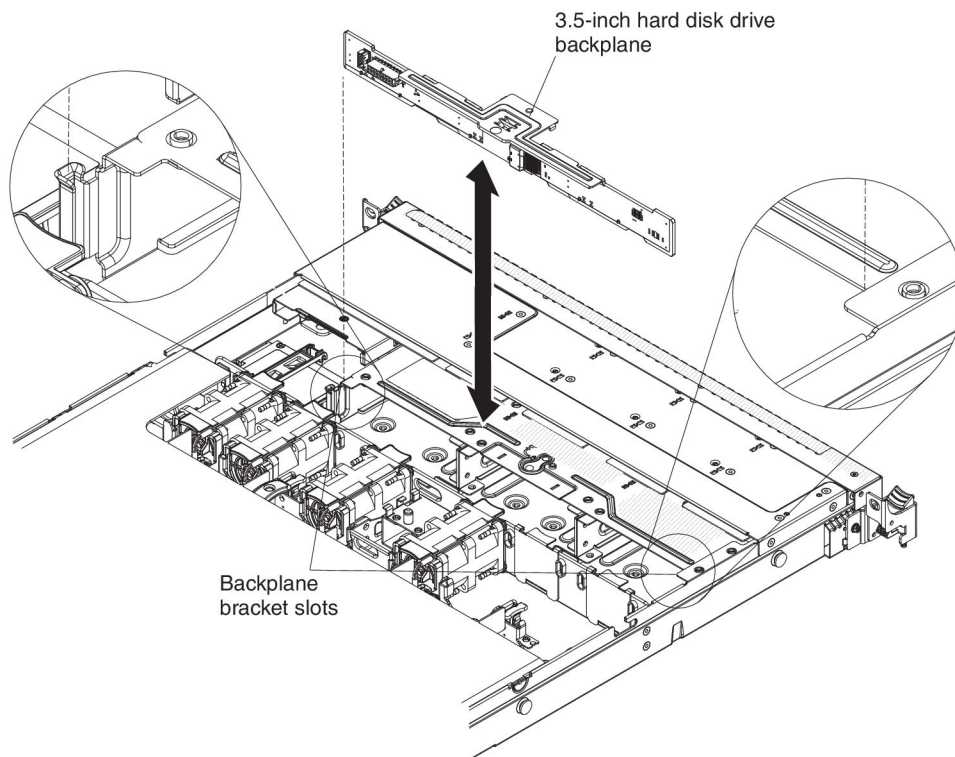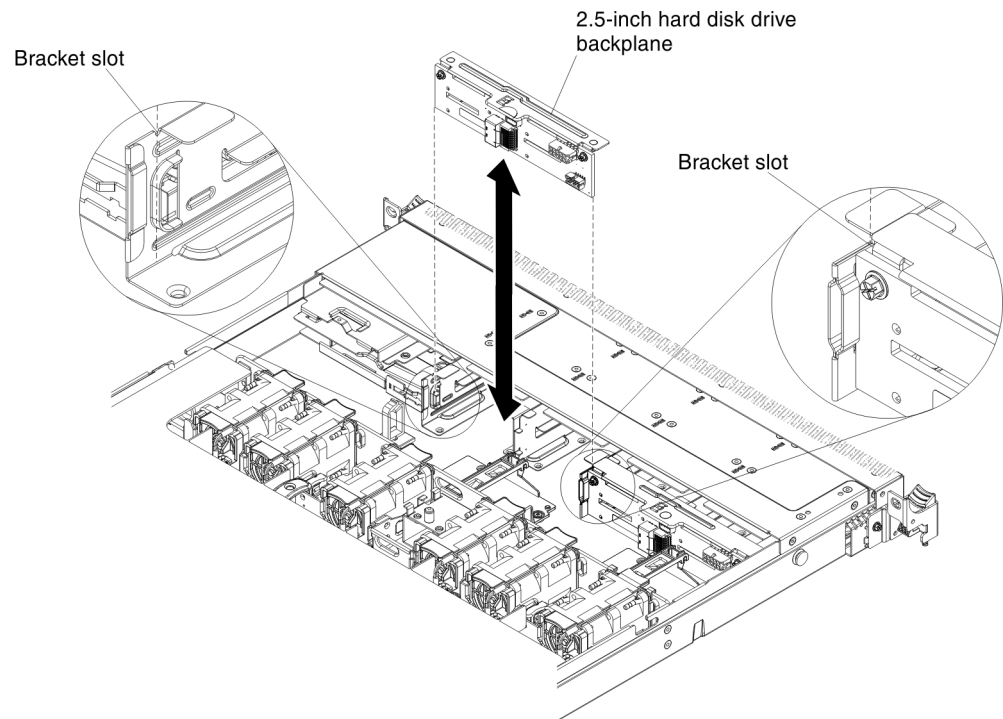
Figure 174. Backplane installation

   b. Adjust the latch to the locked position.
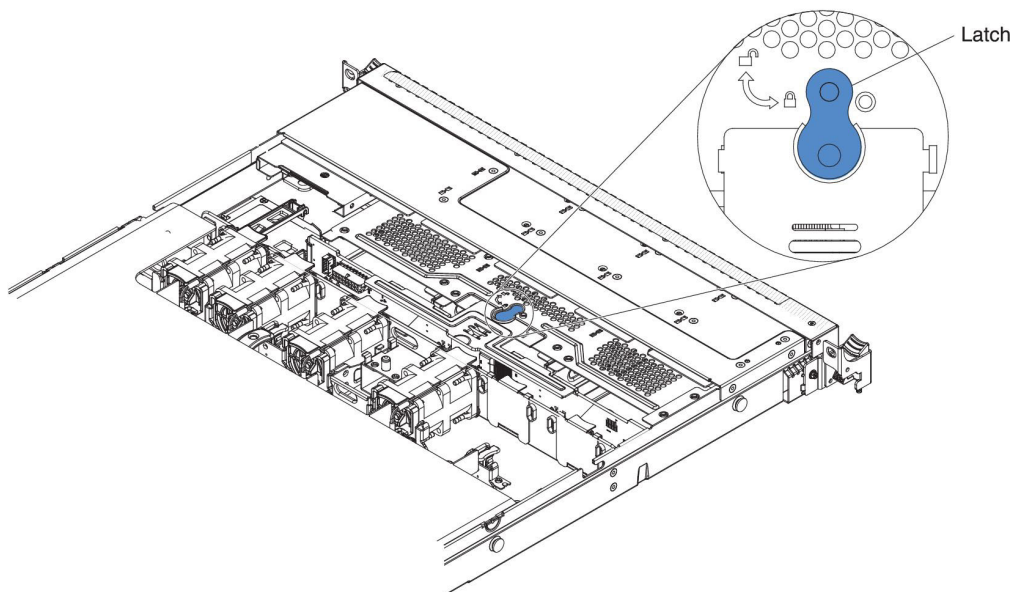
Figure 175. Latch adjustment

   If you would like to install the 2.5-inch drive backplane.

   a. Insert the hard disk drive backplane into the slots on the backplane
     bracket and push the hard disk drive backplane down until the backplane

is fully seated.

Figure 176. Backplane installation

5. Connect the signal, power and configuration cables to the system board. Route the signal cable from the drive backplane along the chassis and connect it to the SAS/SATA controller connectors. Then, route the power cable and the configuration cable from the drive backplane along the chassis and connect it to the SAS/SATA power connector and SAS/SATA configuration connector. See "Cabling backplane" on page 186 for more information.

6. Reinstall the hard disk drives (see "Replacing hot-swap hard disk drives" on page 204).

7. Install the cover (see "Replacing the cover" on page 195).

8. Slide the server into the rack.

9. Reconnect the power cords and any cables that you removed.

10. Turn on the peripheral devices and the server.

Removing the simple-swap drive backplate assembly

To remove the simple-swap hard disk drive backplate assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the filler panels from the drive bay.
5. Slide the blue release tab to the right with one finger while using another finger to grasp the black drive handle and pull the hard disk drives out of the server slightly to disengage them from the hard disk drive backplate (see "Removing simple-swap hard disk drives" on page 206).
6. Remove the simple-swap hard disk drive backplate assembly. If you would like to remove the 3.5-inch drive backplate assembly.
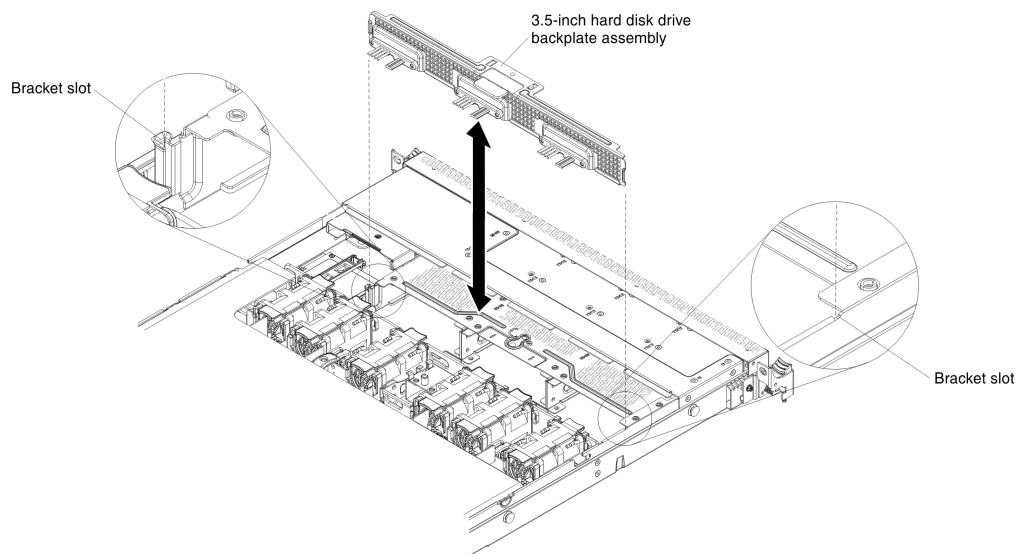
   a. Adjust the latch to the unlocked position on 3.5-inch server models.
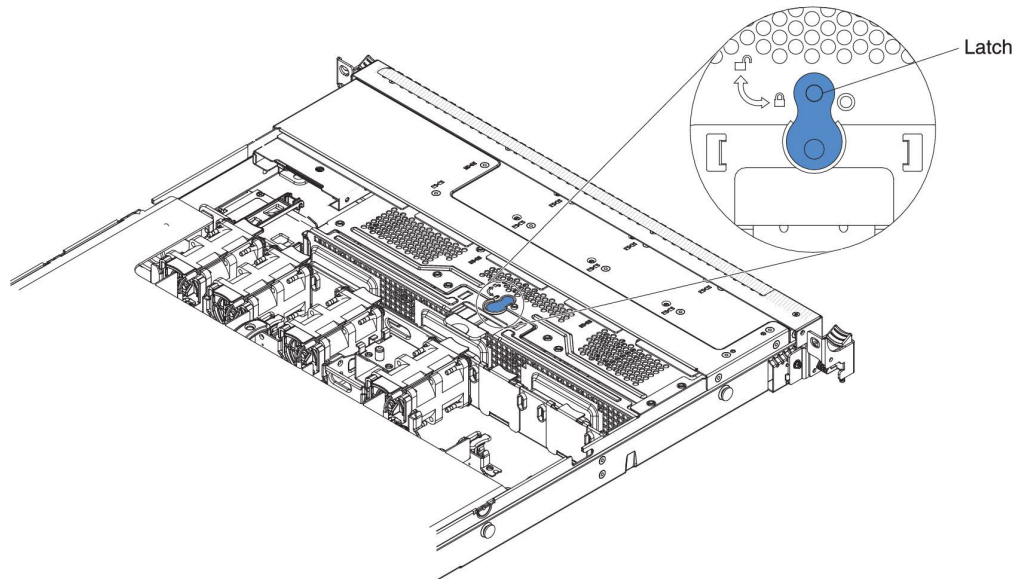
Figure 177. Latch adjustment

   b. Lift the drive backplate up to disengage the backplate assembly from the backplane bracket and remove it from the server.

3.5-inch hard disk drive
backplate assembly

Bracket slot

Bracket slot
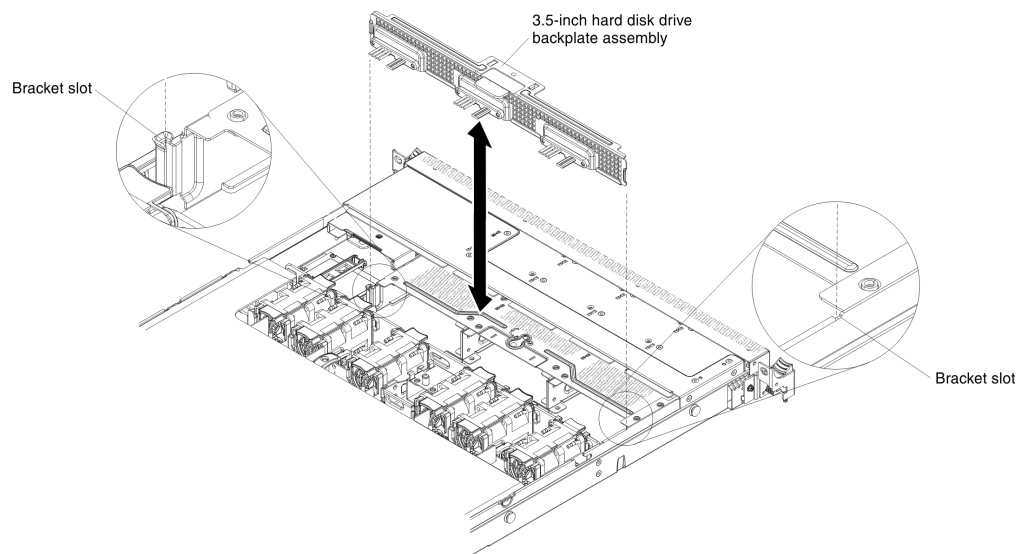
Figure 178. Backplate assembly removal

7. Disconnect the power and signal cables from the system board.

8. If you are instructed to return the hard disk drive backplate assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the simple-swap drive backplate assembly

To install the replacement simple-swap hard disk drive backplate assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Align the sides of the drive backplate assembly with the slots on the bracket.

3. Install the hard disk drive backplate assembly. If you would like to install the 3.5-inch drive backplate assembly.

   a. Insert the hard disk drive backplate into the slots on the backplate bracket and push the hard disk drive backplate assembly down until the backplate is seated firmly.

Figure 179. Backplate assembly installation

    b. Adjust the latch to the locked position on 3.5-inch server models.
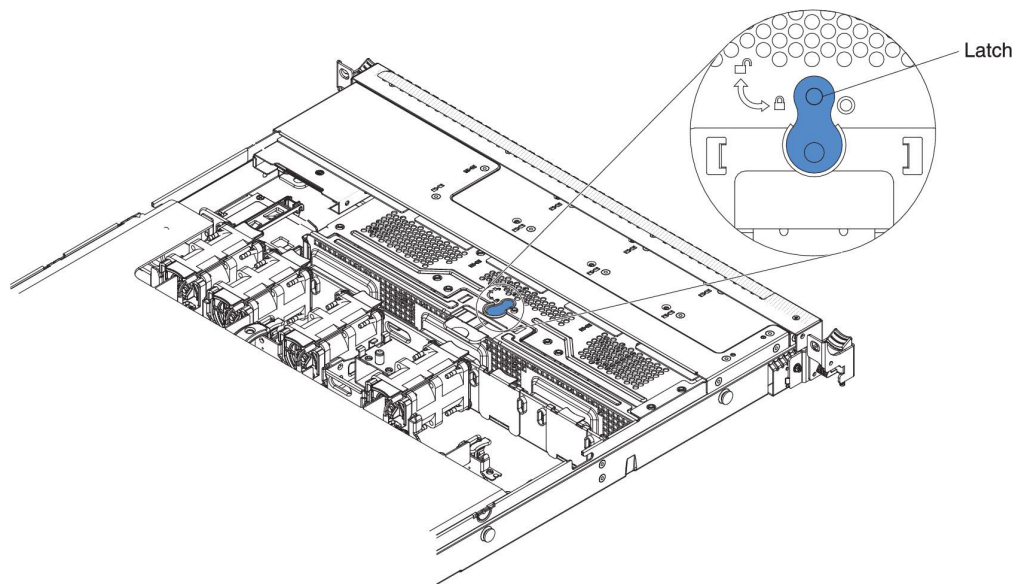

Figure 180. Latch adjustment

4. Connect the signal and power cables to the system board. Route the signal cable from the drive backplane along the chassis and connect it to the **SAS/SATA signal connector**. Then, route the power cable from the drive backplane assembly along the chassis and connect it to the **simple-swap SATA power connector**. See "Cabling backplane" on page 186 for more information.

5. Reinstall the hard disk drives and filler panels (see "Replacing simple-swap hard disk drives" on page 207).

6. Install the cover (see "Replacing the cover" on page 195).

7. Slide the server into the rack.

8. Reconnect the power cords and any cables that you removed.

9. Turn on the peripheral devices and the server.

Removing a USB embedded hypervisor flash device

To remove a USB hypervisor flash device, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

2. Turn off the server and peripheral devices and disconnect the power cords.

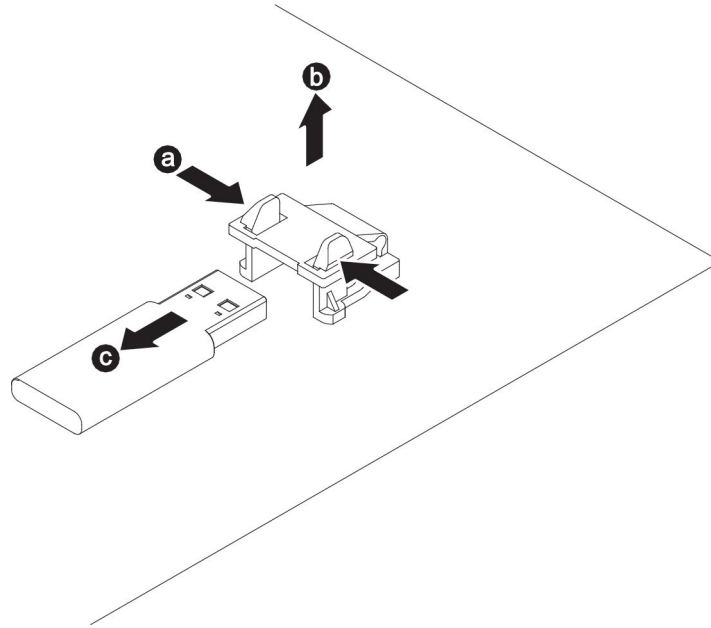3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the flash device:

Figure 181. USB hypervisor flash device removal

    a. Unlock the retention latch on the USB connector by squeezing the two retention clips toward each other.

    b. Open the retention latch.

    c. Grasp the flash device and pull to remove it from the connector.

5. 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.

Replacing a USB embedded hypervisor flash device

To install a USB hypervisor flash device, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Remove the cover (see "Removing the cover" on page 36).
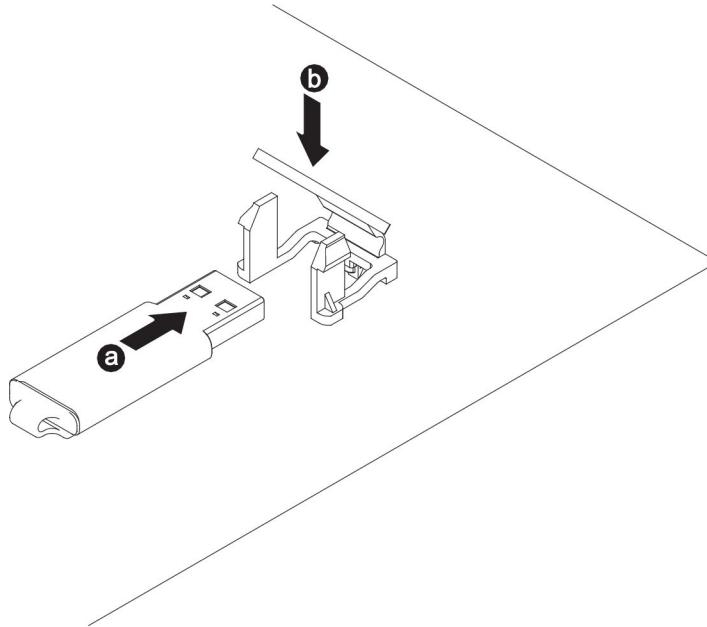4. Install the flash device:

Figure 182. USB hypervisor flash device installation

    a. Align the flash device with the connector on the system board and push it into the USB connector until it is firmly seated.

    b. Press down on the retention latch to lock the flash device into the USB connector.

5. Reconnect the power cords and any cables that you removed.
6. Replace the cover (see "Replacing the cover" on page 195).
7. Slide the server into the rack.
8. Turn on the peripheral devices and the server.

Removing the system battery

The following notes describe information that you must consider when replacing the battery.

- IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

  Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.

- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

- To order replacement batteries, call 1-800-IBM-SERV within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

  Note: After you replace the battery, you must reconfigure the server and reset the system date and time.

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.

To remove the system battery, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
4. If necessary, lift the PCI riser-card assembly 2 out of the way (see "Removing a PCI riser-card assembly" on page 226).
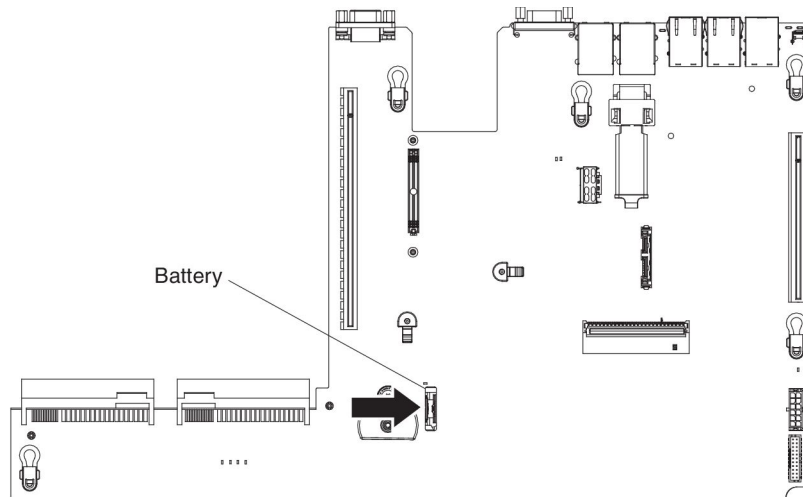5. Remove the system battery:

Figure 183. System battery removal

    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.

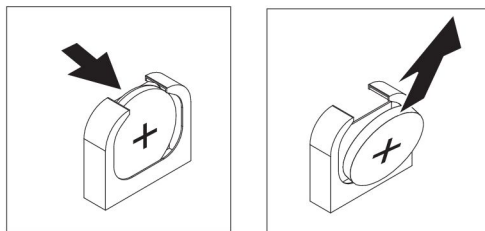   **Attention:**   Neither tilt nor push the battery by using excessive force.

Figure 184. System battery removal

    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.

6. Dispose of the battery as required by local ordinances or regulations. See the *IBM Environmental Notices and User's Guide* on the IBM *Documentation* CD for more information.

Replacing the system battery

The following notes describe information that you must consider when replacing the system battery in the server.

- When replacing the system battery, you must replace it 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 system-board 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**

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

To install the replacement system battery, complete the following steps:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
3. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
4. Remove the cover (see "Removing the cover" on page 36).
5. If necessary, lift the PCI riser-card assembly 2 out of the way (see "Removing a PCI riser-card assembly" on page 226).
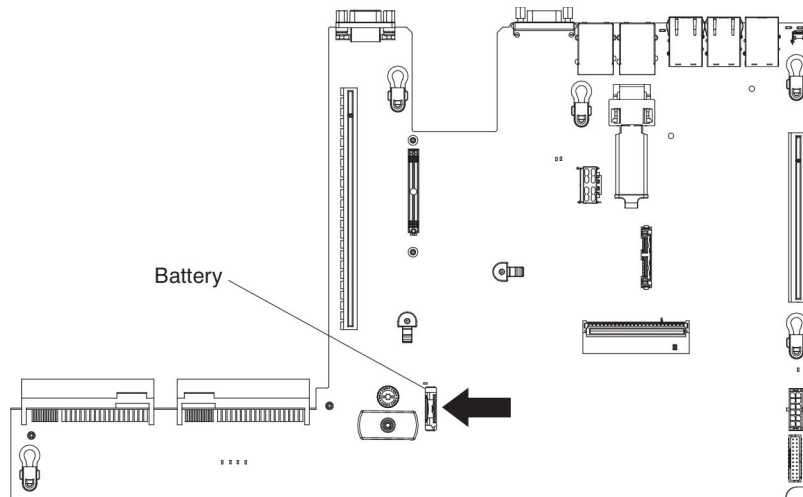6. Insert the new battery:

Figure 185. System battery installation

      a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
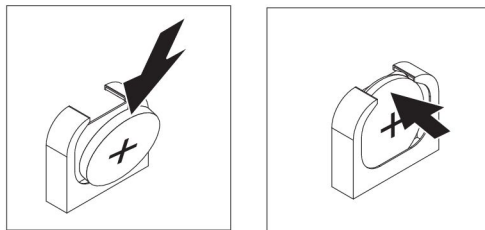

Figure 186. System battery installation

      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.

  7. Reinstall the PCI riser-card assembly 2 (see "Replacing a PCI riser-card assembly" on page 227), if necessary.

  8. Install the cover (see "Replacing the cover" on page 195).

  9. Slide the server into the rack.

10. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

11. 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 96 for details.

Removing the bezel

To remove the bezel, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the hard disk drives and filler panels from the hard disk drive bays (see "Removing hot-swap hard disk drives" on page 203 or "Removing simple-swap hard disk drives" on page 206).

5. Remove the screws from the bezel.

   Note: Use the T8 Torx screwdriver that comes with the new bezel to remove the bezel.
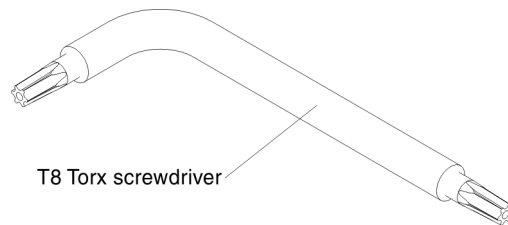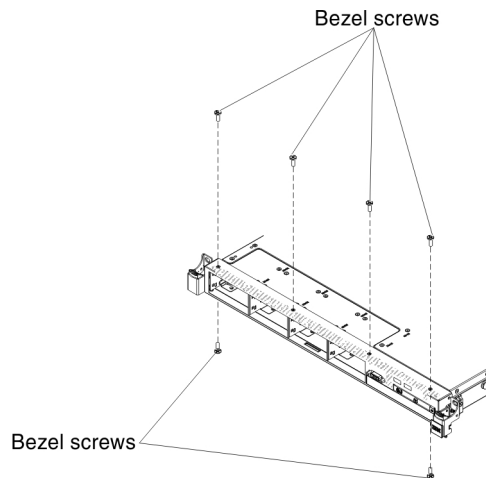

Figure 187. T8 Torx screwdriver

Figure 188. Bezel screws removal

6. Pull the top of the bezel out slightly; then, rotate it downward until the tabs on the bottom of the bezel disengages from the chassis and set it aside.
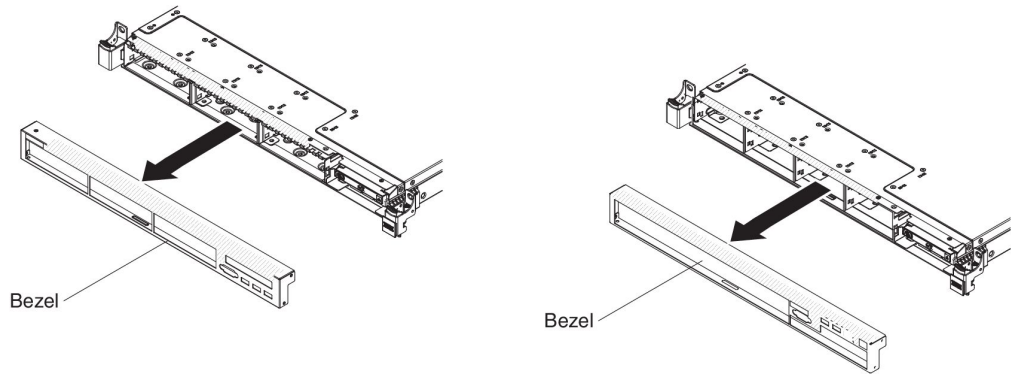
Figure 189. Bezel removal

Replacing the bezel

To install the bezel, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
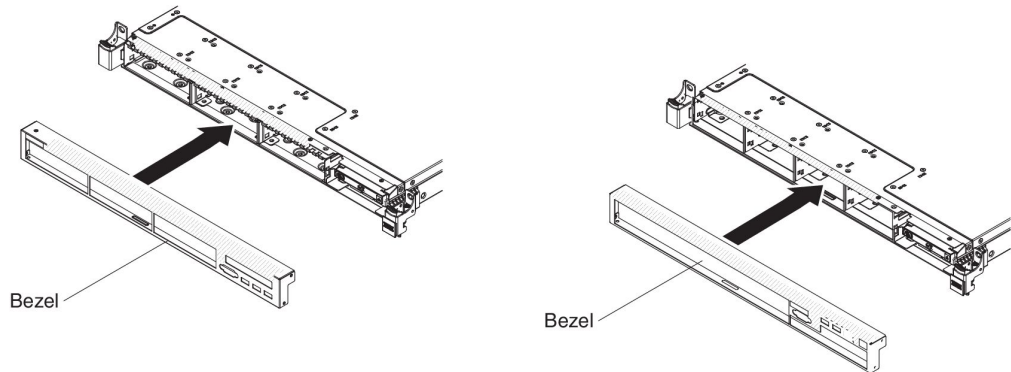4. Insert the tabs on the bottom of the bezel into the holes on the chassis.

Figure 190. Bezel installation

5. Rotate the bezel upward to the server and reinstall the screws.

   Note: Use the T8 Torx screwdriver that comes with the new bezel to install the bezel.
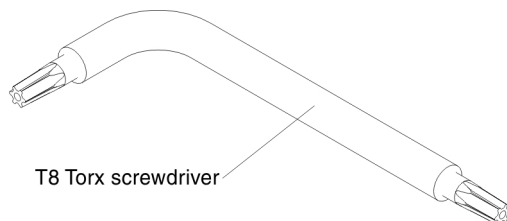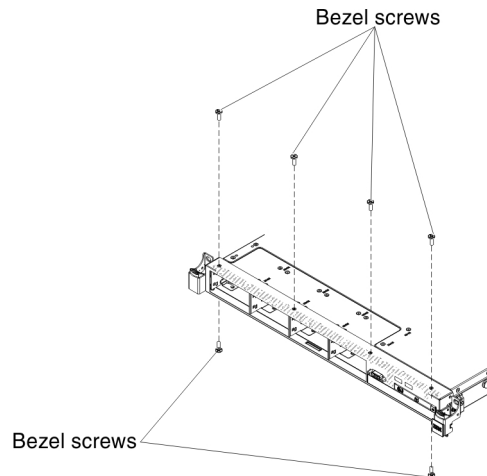

Figure 191. T8 Torx screwdriver

Figure 192. Bezel screws installation

6. Reinstall the hard disk drives and drive bay filler panels into the drive bays (see "Replacing hot-swap hard disk drives" on page 204 or "Replacing simple-swap hard disk drives" on page 207).

7. Install the cover (see "Replacing the cover" on page 195).

8. Reconnect the power cords and any cables that you removed.

9. Slide the server into the rack.

10. Turn on the peripheral devices and the server.

Removing the front USB connector assembly

To remove the front USB connector assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the hard disk drives and filler panels from the hard disk drive bays (see "Removing hot-swap hard disk drives" on page 203 or "Removing simple-swap hard disk drives" on page 206).

4. Remove the bezel (see "Removing the bezel" on page 275).

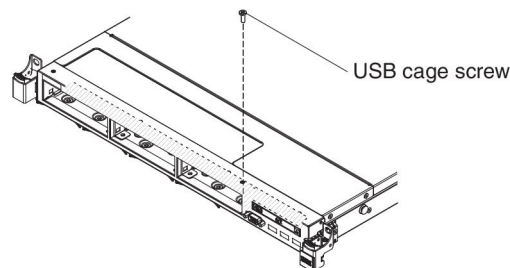5. Remove the USB cage screw from the chassis.

Figure 193. USB cage screw removal

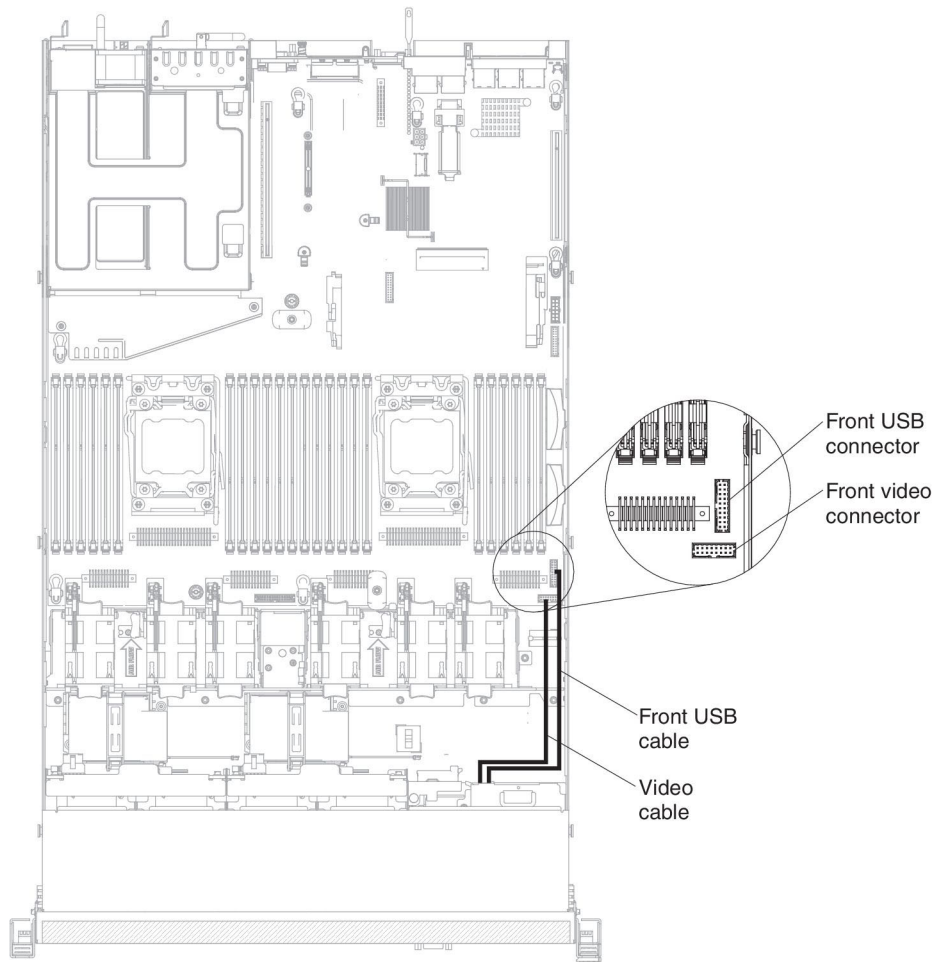6. Disconnect the cables from the front USB connector.

Figure 194. Front USB and video cables connection

7. Pull the front USB connector assembly out slightly; then, rotate it downward until the tabs on the bottom of the front USB connector assembly disengages from the chassis and set it aside.
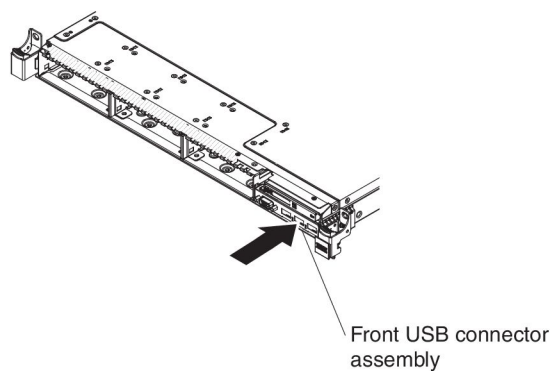

Figure 195. Front USB connector assembly removal

Replacing the front USB connector assembly

To install the front USB connector assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Insert the tabs on the bottom of the front USB connector assembly into the holes on the chassis.
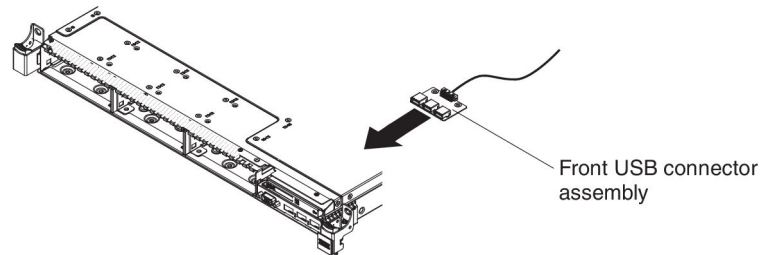

Figure 196. Front USB connector assembly installation

4. Rotate the front USB connector assembly upward to the server.

5. Reinstall the USB cage screw to the chassis.
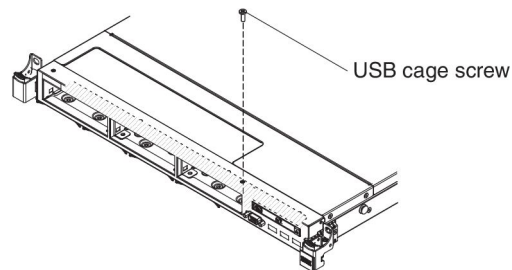
Figure 197. USB cage screw installation

6. Reconnect the front USB cable to the front USB connector on the system board.
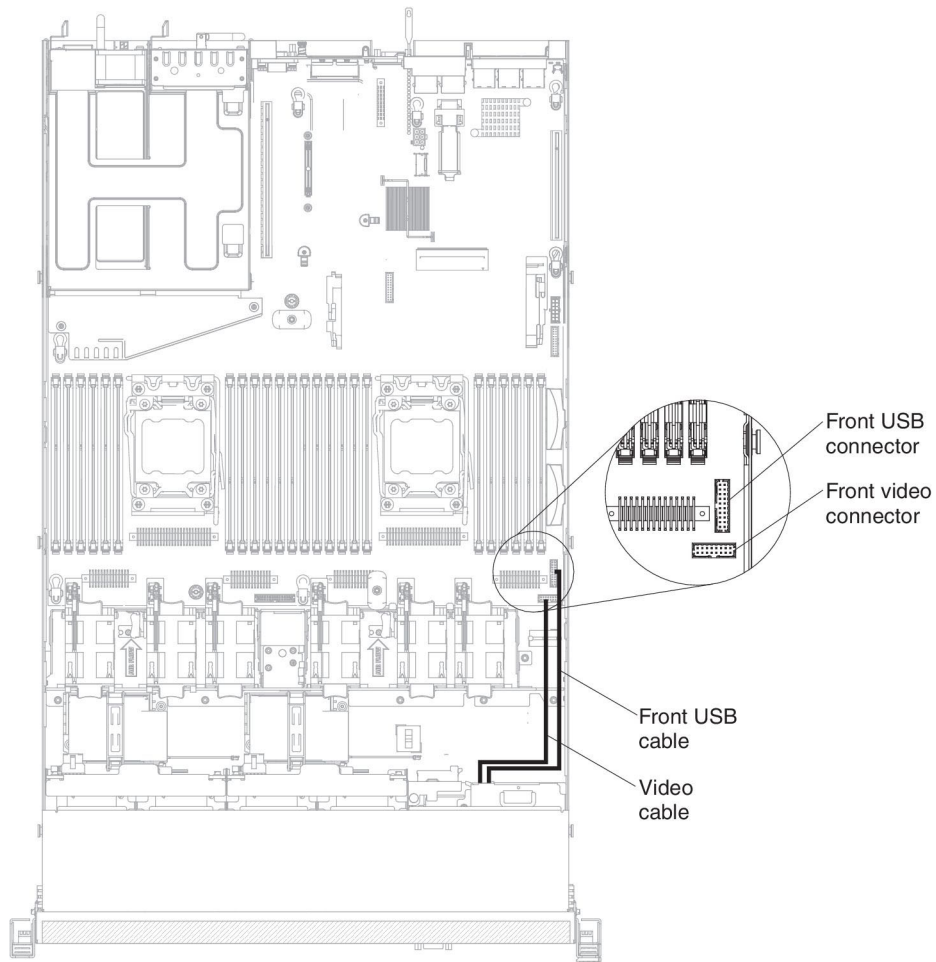
Figure 198. Front USB and video cables connection

7. Reinstall the bezel (see "Replacing the bezel" on page 276).
8. Reinstall the hard disk drives and drive bay filler panels into the drive bays (see "Replacing hot-swap hard disk drives" on page 204 or "Replacing simple-swap hard disk drives" on page 207).
9. Install the cover (see "Replacing the cover" on page 195).
10. Reconnect the power cords and any cables that you removed.
11. Slide the server into the rack.
12. Turn on the peripheral devices and the server.

Removing the front video connector assembly

To remove the front video connector assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

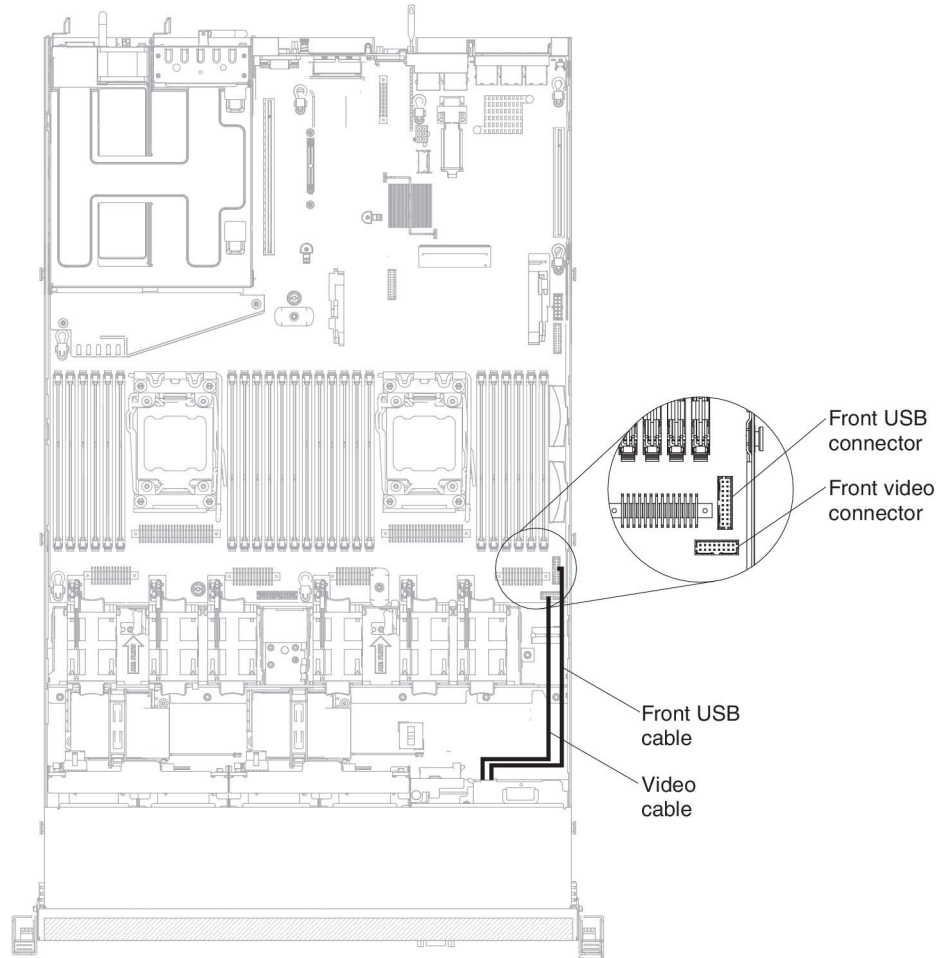3. Disconnect the cables from the front video connector.

Figure 199. Front USB and video cables connection

4. Remove the screws from the video connector assembly.

Video connector
screws
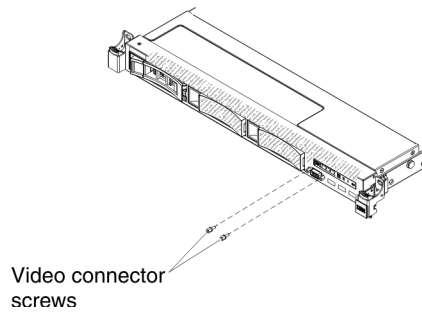
Figure 200. Video connector assembly screws removal

5. Pull the front video connector assembly out slightly until it disengages from the chassis and set it aside.

Front Video connector
assembly
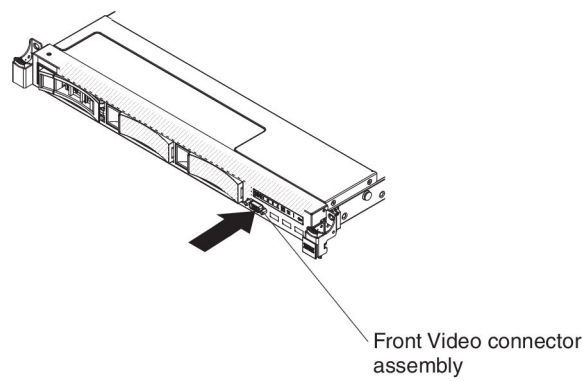
Figure 201. Front video connector assembly removal

Replacing the front video connector assembly

To install the front video connector assembly, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Insert the front video connector assembly into the holes on the chassis.

Front Video connector
assembly
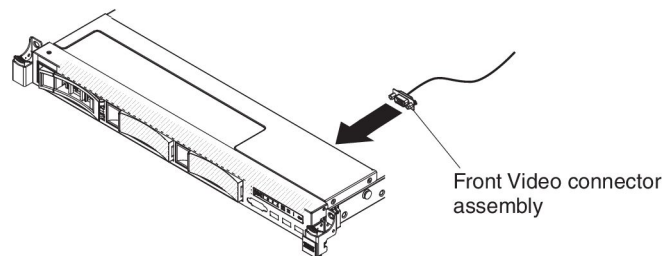
Figure 202. Front video connector assembly installation

4. Reinstall the video connector assembly screws.

Figure 203. Video connector assembly screws installation

5. Reconnect the front video cable to the front video connector on the system board.

Figure 204. Front USB and video cables connection

6. Install the cover (see "Replacing the cover" on page 195).
7. Reconnect the power cords and any cables that you removed.
8. Slide the server into the rack.
9. Turn on the peripheral devices and the server.

Removing the operator information panel assembly

To remove the operator information panel, complete the following steps.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
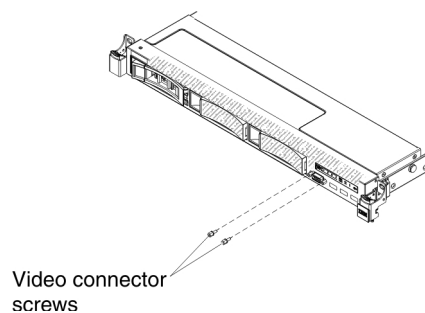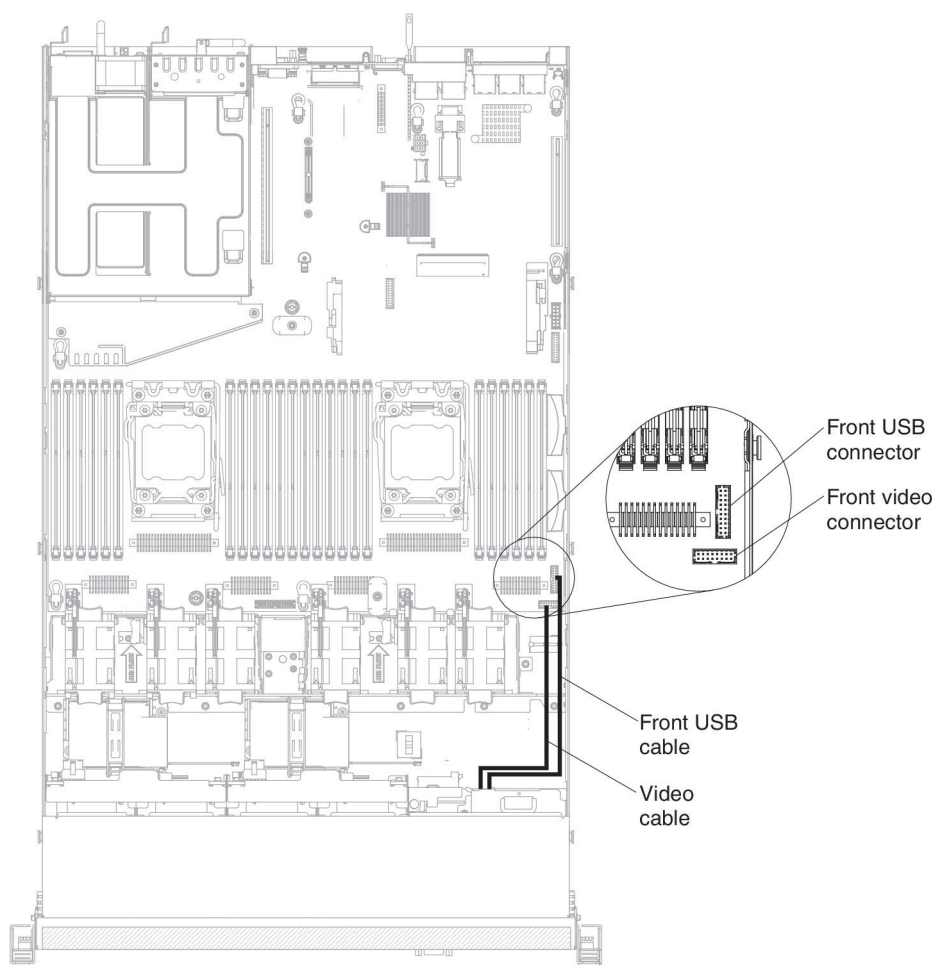3. Remove the cover (see "Removing the cover" on page 36).
4. Disconnect the cable from the back of the operator information panel assembly.
5. Pull up the blue points slightly on the rear of the panel toward the front of the server.

Operator information panel
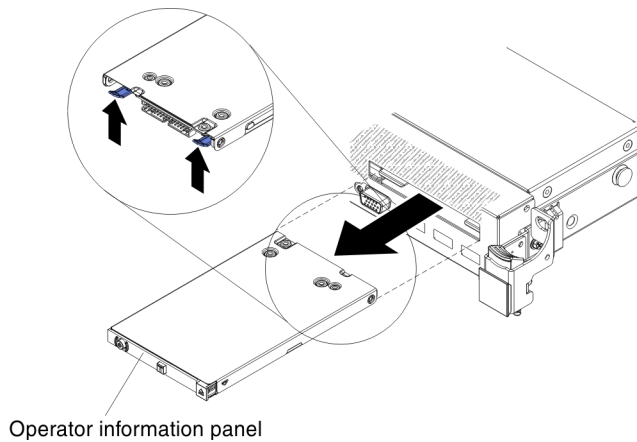
Figure 205. Operator information panel removal

6. From the front of the server, carefully pull the assembly out of the server while you move it slightly from side to side.
7. 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.

Replacing the operator information panel assembly

To install the operator information panel, complete the following steps.

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see "Removing the cover" on page 36).
4. From the front of the server, slide the operator information panel into the server until it clicks into place.

Operator information panel
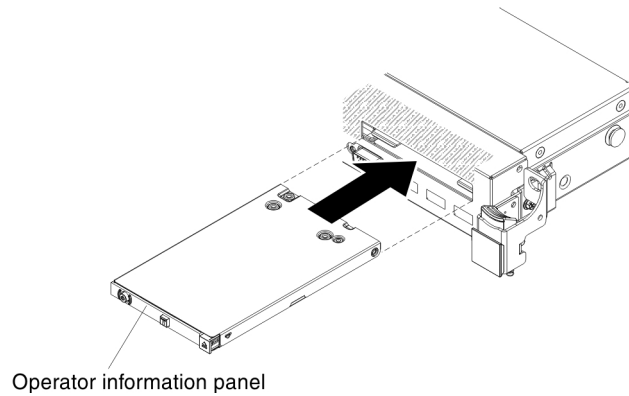
Figure 206. Operator information panel installation

5. Inside the server, connect the cable to the rear of the operator information panel assembly. The following illustration shows the cable routing for the operator information panel.
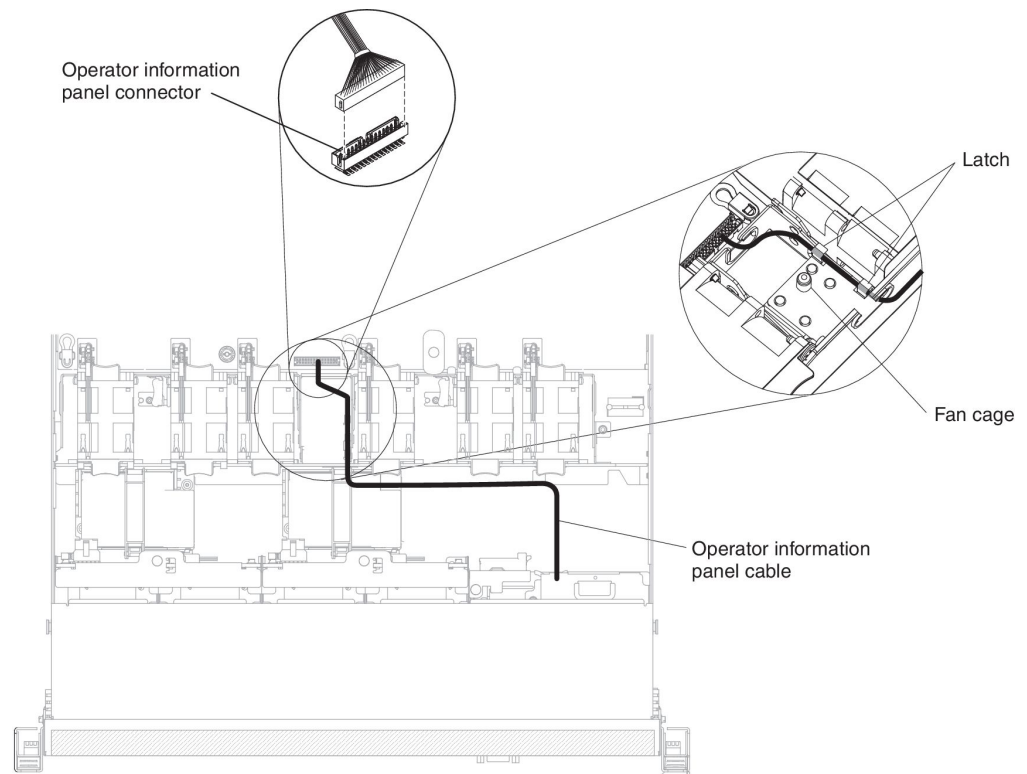
Figure 207. Operator information panel cable connection

The following notes describe additional information when you install the cable:

- To connect the operator information panel cable on the system board, press evenly on the cable. Pressing on one side of the cable might cause damage to the cable or connector.
- The operator information panel cable must pass through the chassis latch between fan 3 and fan 4 in order not to impede the fan cage.

6. Replace the cover (see "Replacing the cover" on page 195).
7. Slide the server into the rack.

8. Reconnect the power cords and any cables that you removed.
9. Turn on the peripheral devices and 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.

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

Removing a microprocessor and heat sink
Attention:
- 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 and heat sink, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Locate the microprocessor to be removed (see "System-board internal connectors" on page 28).
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.
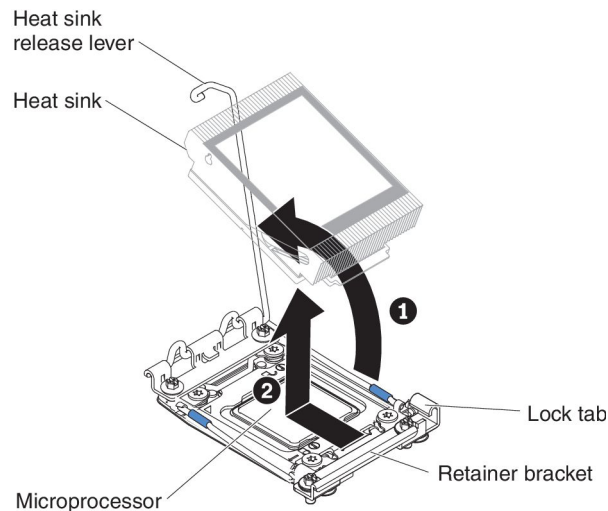
Figure 208. Heat sink removal

7. Open the microprocessor socket release levers and retainer.
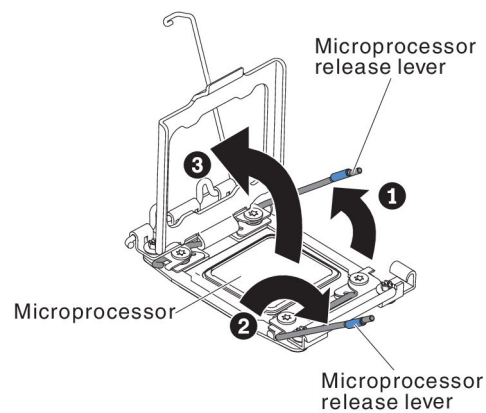
Figure 209. Microprocessor socket levers and retainer disengagement

    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.

    Attention: 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.
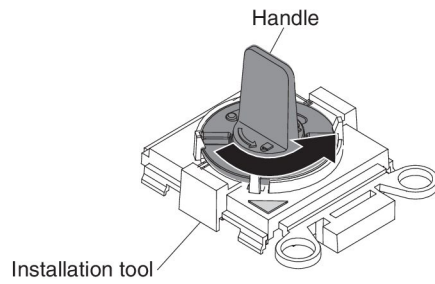
Figure 210. Installation tool handle adjustment

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.
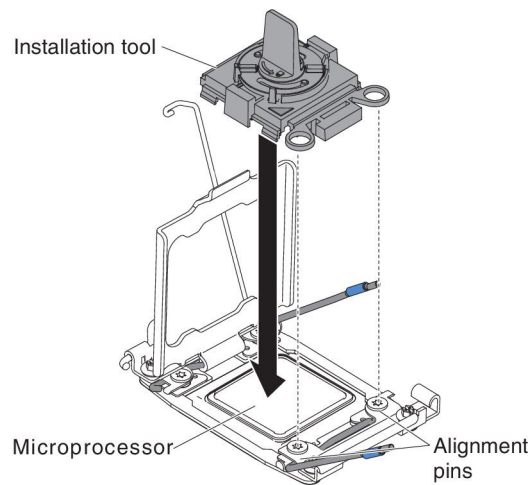
Figure 211. Microprocessor installation

c. Twist the handle on the installation tool clockwise.
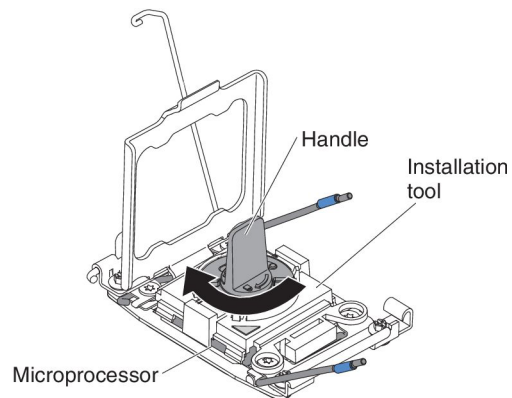
Figure 212. Installation tool handle adjustment

d. Lift the microprocessor out of the socket.
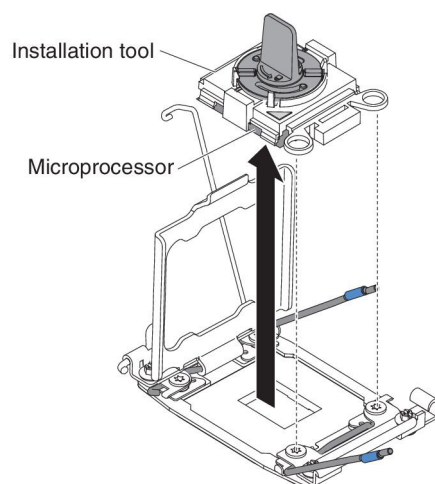
Figure 213. Installation tool removal

9. If you do not intend to install a microprocessor on the socket, install the socket cover that you removed in step 8 on page 293 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.

Replacing a microprocessor and heat sink

The following notes describe the type of microprocessor that the server supports and other information that you must consider when you install a microprocessor and heat sink:

- 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 up to two Intel Xeon™ E5-2600 series multi-core microprocessors, which are designed for the LGA 2011 socket. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported microprocessors.

- Do not mix microprocessors with different cores in the same server.

- The first microprocessor must always be installed in microprocessor socket 1 on the system board.

- When one microprocessor is installed, the air baffle must be installed to provide proper system cooling.

- Do not remove the first microprocessor from the system board when you install the second microprocessor.

- When you install the second microprocessor, you must also install additional memory, the fourth and sixth fans. See "Installing a memory module" on page 48 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.
- Both microprocessor voltage regulator modules are integrated on the system board.
- 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 your server, go to http://www.ibm.com/supportportal/.
- 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 86.

  Note: Removing the heat sink from the microprocessor destroys the even distribution of the thermal grease and requires replacing the thermal grease.
- To order an additional optional microprocessor, contact your IBM marketing representative or authorized reseller.

To replace a microprocessor and heat sink, complete the following steps:
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.

   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 36.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Rotate the heat sink retention module release lever to the open position.
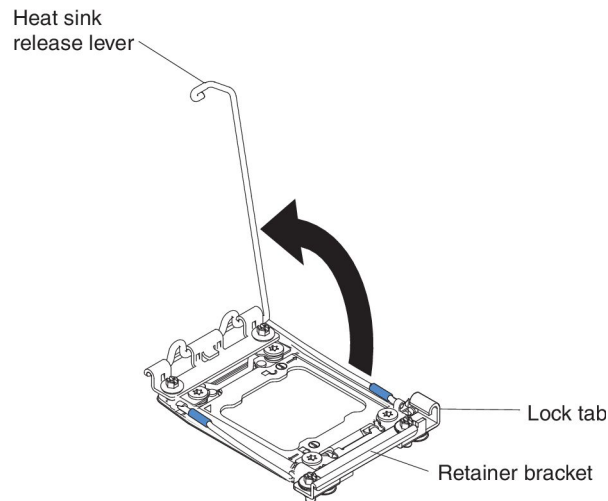
Figure 214. Heat-sink lever rotation

6. Open the microprocessor socket release levers and retainer:
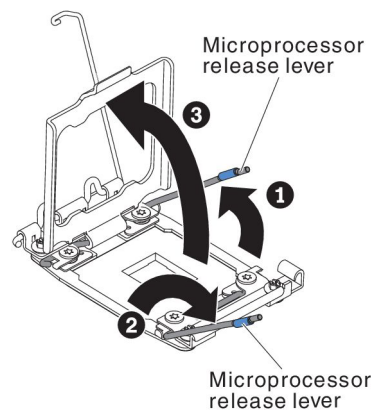
Figure 215. Microprocessor socket levers and retainer disengagement

   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.

7. 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.

Figure 216. Installation tool cover removal

> **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.
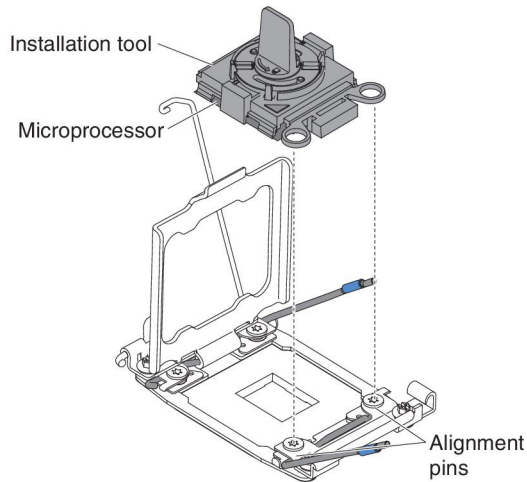
Figure 217. Installation tool alignment

   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.
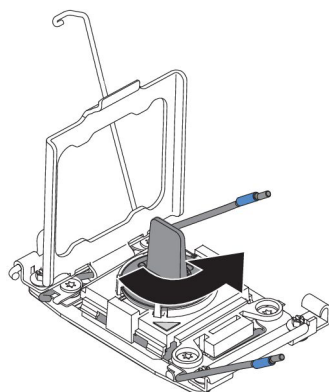
Figure 218. Installation tool handle adjustment

    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.

8. Remove the microprocessor socket cover, tape, or label from the surface of the microprocessor socket, if one is present. Store the socket cover in a safe place.
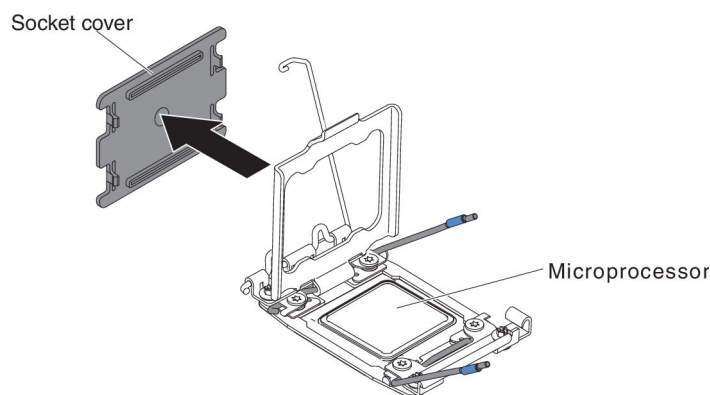
Figure 219. Socket cover removal

    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 36.

9. Close the microprocessor socket release levers and retainer:
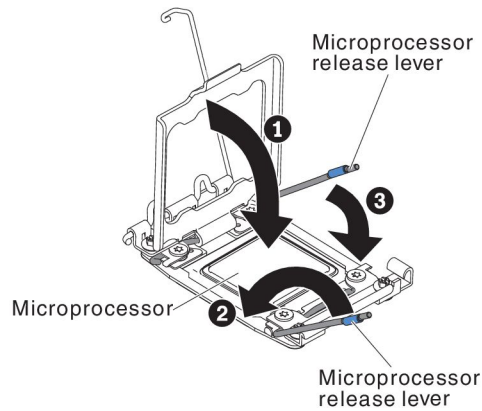
Figure 220. Microprocessor socket levers and retainer engagement

     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.

10. Install the 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 86 for more information.
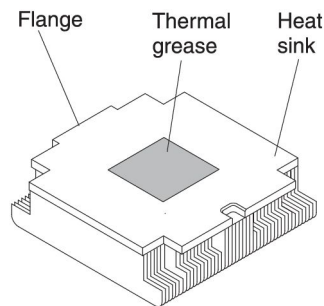
Figure 221. Thermal grease

     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.
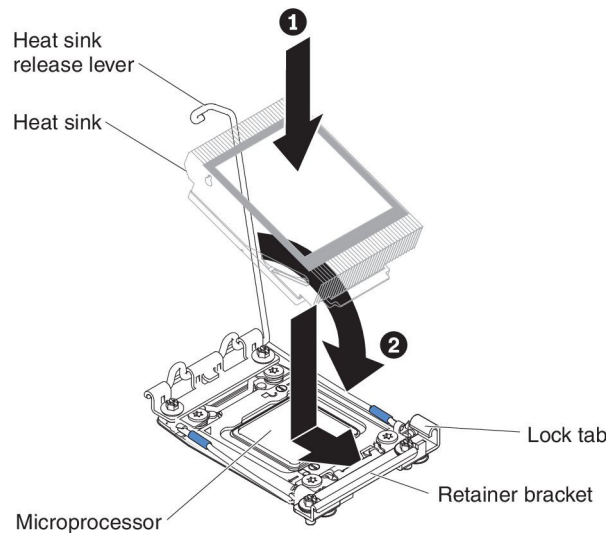
Figure 222. Heat sink installation

    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.

11. Reinstall the air baffle (see "Replacing the air baffle" on page 197).

12. Install the cover (see "Replacing the cover" on page 195).

13. Slide the server into the rack.

14. Reconnect the power cords and any cables that you removed.

15. Turn on the peripheral devices and 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 "Safety" on page vii.
- Read the "Installation guidelines" on page 33.
- Read "Handling static-sensitive devices" on page 36.

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 of the microprocessor; this is to ensure uniform distribution of the grease.

Figure 223. Thermal grease distribution

Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.

Figure 224. Syringe

6. Install the heat sink onto the microprocessor as described in 10 on page 294.

Removing the heat-sink retention module

To remove a heat-sink retention module, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.

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

3. Remove the cover (see "Removing the cover" on page 36).

4. Remove the air baffle (see "Removing the air baffle" on page 37).

5. Remove the heat sink (see "Removing a microprocessor and heat sink" on page 286).

   Attention: When you remove a microprocessor and heat sink, be sure to keep each heat sink with its microprocessor for reinstallation.

6. 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.
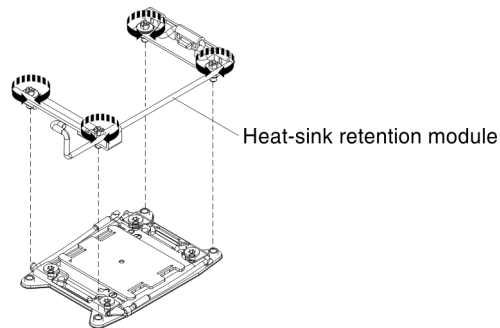
Figure 225. Heat-sink retention module removal

7. If you are instructed to return the heat-sink retention module, follow all the packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the heat-sink retention module

To install a heat-sink retention module, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 33.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables.
3. Remove the cover (see "Removing the cover" on page 36).
4. Remove the air baffle (see "Removing the air baffle" on page 37).
5. Align the retention module with the holes on the system board.
6. Use a screwdriver to reinstall the four screws.
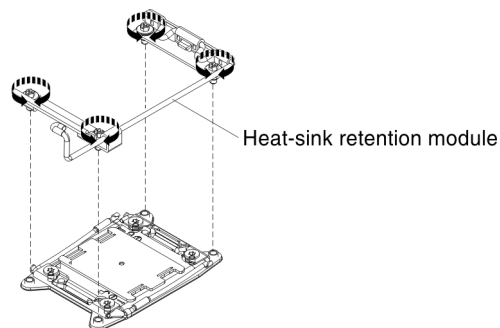
Figure 226. Heat-sink retention module installation

7. Reinstall the heat sink (see "Replacing a microprocessor and heat sink" on page 289).

   Attention: Make sure that you install each heat sink with its paired microprocessor.
8. Reinstall the air baffle (see "Replacing the air baffle" on page 197).
9. Install the cover (see "Replacing the cover" on page 195).
10. Slide the server into the rack.
11. Reconnect the power cords and any cables that you removed.
12. Turn on the peripheral devices and the server.

Removing the system board

Notes:

1. 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.

2. 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 and blue-screen capture features" on page 105.

3. 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. 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 remove the system board, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii, "Handling static-sensitive devices" on page 36, and "Installation guidelines" on page 33.

2. Turn off the server and any attached devices.

3. Turn off the peripheral devices and disconnect all power cords.

   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.

4. Pull the power supplies out of the rear of the server, just enough to disengage them from the server.

5. Remove the cover (see "Removing the cover" on page 36).

6. Remove the air baffle (see "Removing the air baffle" on page 37).

7. Remove all PCI riser-card assemblies and adapters (see "Removing a PCI riser-card assembly" on page 226 and "Removing an adapter" on page 230).

8. Remove the ServeRAID SAS/SATA controller (see "Removing a ServeRAID SAS/SATA controller" on page 234).

9. Remove the dual-port network adapter (see "Removing the dual-port network adapter" on page 241).

10. Remove the memory modules and set them aside on a static-protective surface for reinstallation (see "Removing a memory module" on page 219).

    Note: Make a note of the location of each DIMM as you remove it, so that you can later reinstall it in the same connector.

11. (Trained technician only) Remove all heat sinks and microprocessors, and set them aside on a static-protective surface for reinstallation (see "Removing a microprocessor and heat sink" on page 286).

    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.

12. Remove the system battery (see "Removing the system battery" on page 271).

13. Disconnect all cables from the system board. Make a list of each cable as you disconnect it; you can then use this as a checklist when you install the new system board (see "Internal cable routing and connectors" on page 185 for more information).

    Attention: Disengage all latches, release tabs or locks on cable connectors when you disconnect all cables from the system board. 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.

14. Remove the hot-swap fans (see "Removing a hot-swap fan" on page 259).

15. Rotate the fan assembly bracket up toward the front of the server.
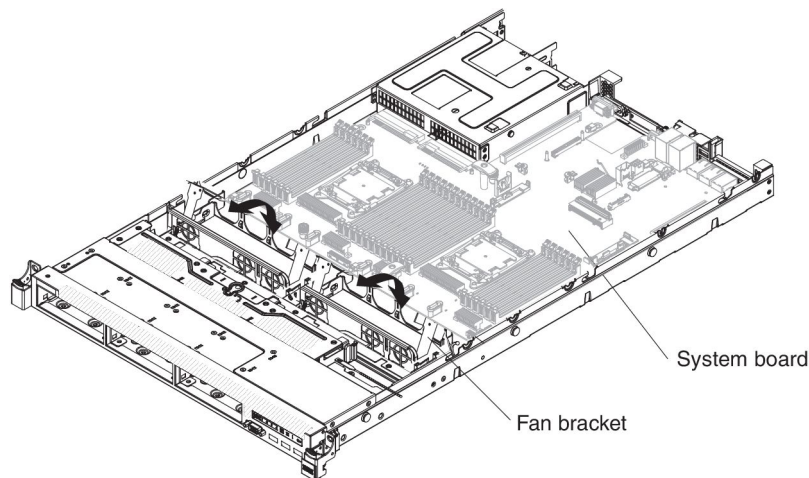
Figure 227. Fan assembly bracket rotation

16. Loosen the two thumbscrews (one is near PCI slot 2 and one is between fans 4 and 5).
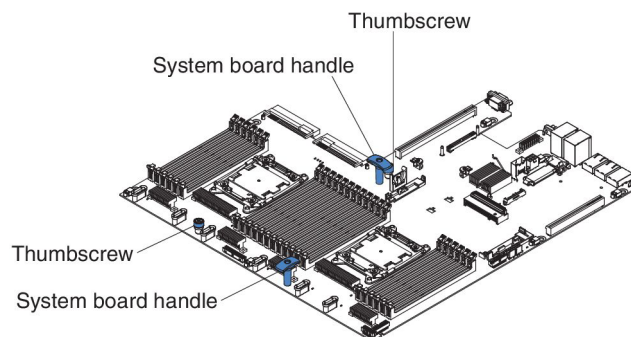
Figure 228. Thumbscrews disengagement

17. Grasp the system board handles and slide the system board toward the front of the server until it stops.
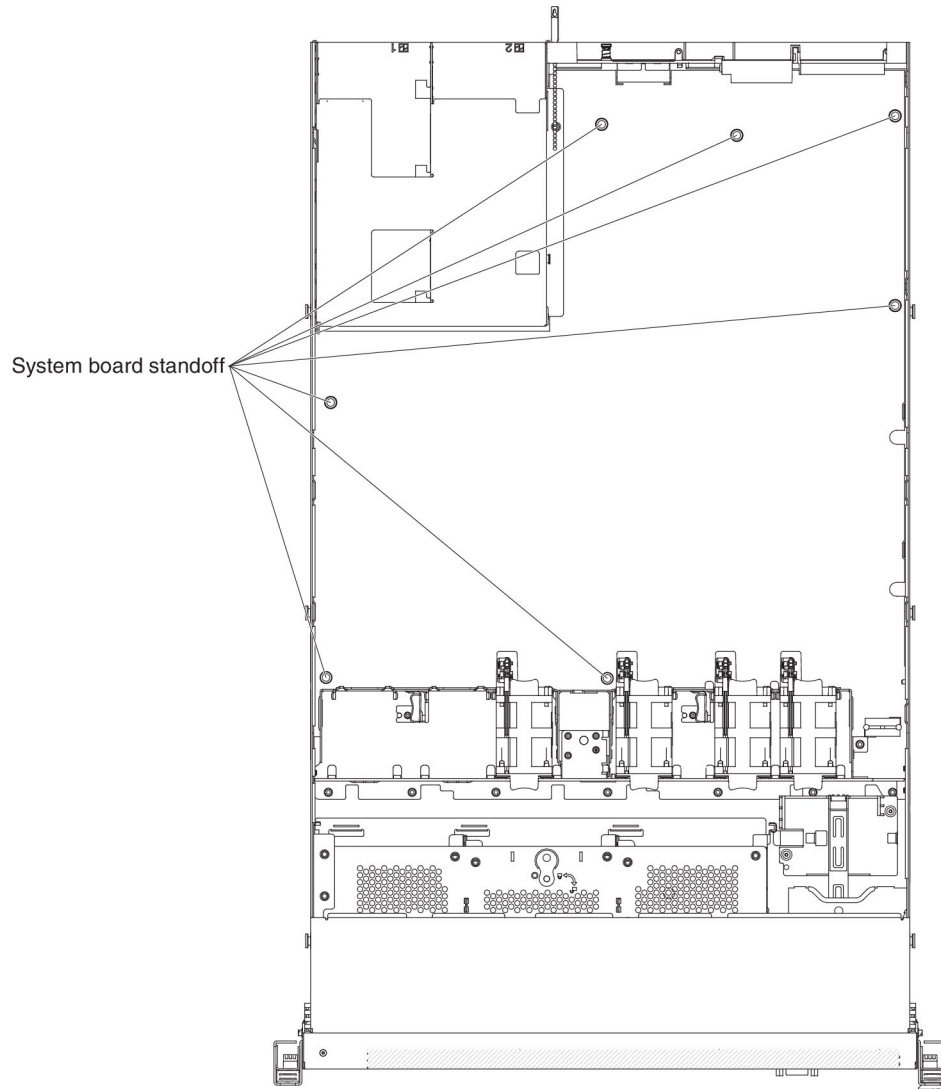
Figure 229. System-board standoffs

> **Note:** Make sure that the system board disengage from all system-board standoffs.

18. Grasp the system board handles and lift up the system board and carefully remove it from the server, being careful not to damage any surrounding components.
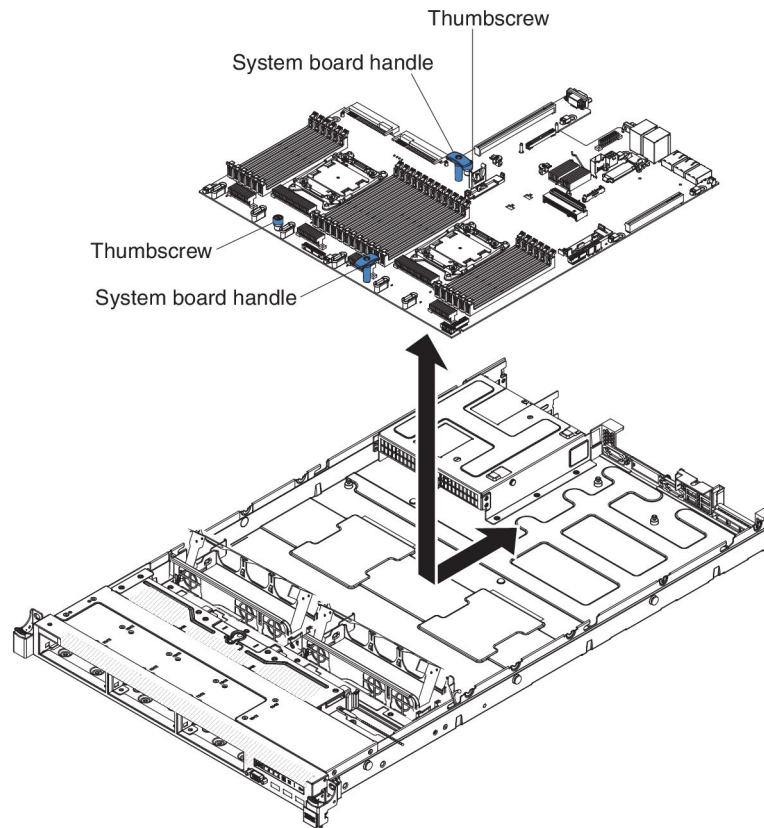
Figure 230. System board removal

19. Remove the socket 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.

20. 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 covers for the microprocessor sockets on the system board before returning the system board.

Replacing 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 91, "Updating the Universal Unique Identifier (UUID)" on page 111, and "Updating the DMI/SMBIOS data" on page 113 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 and blue-screen capture features" on page 105.

4. Reactivate any Features on Demand features. 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**.

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.

To install the system board, complete the following steps:

1. Read the safety information that begins on "Safety" on page vii, "Handling static-sensitive devices" on page 36, and "Installation guidelines" on page 33.

2. Grasp the system board handles to align the system board with the chassis; then, lower the system board into the chassis and slide the system board toward the rear of the server until the system board is seated firmly into the locator pins on the chassis.
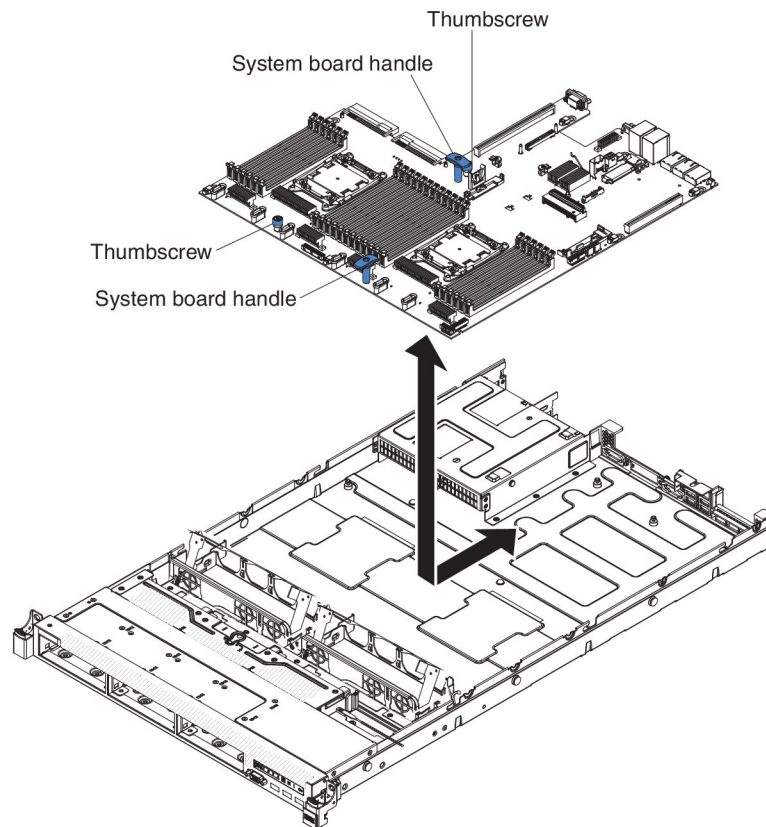
Figure 231. System board installation

Note: Make sure that all the system board standoffs engage the system board correctly.
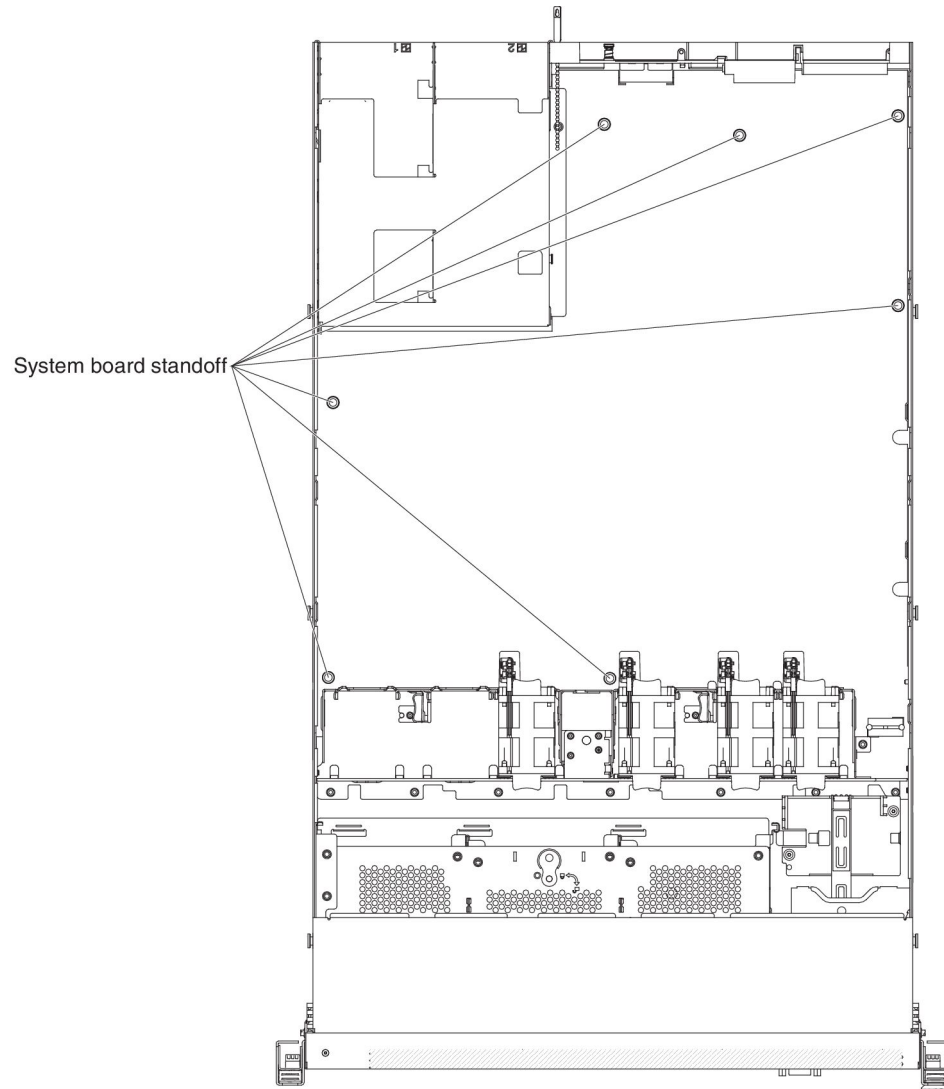
Figure 232. System-board standoffs

3. Fasten the two thumbscrews (one is near PCI slot 2 and one is between fans 4 and 5).
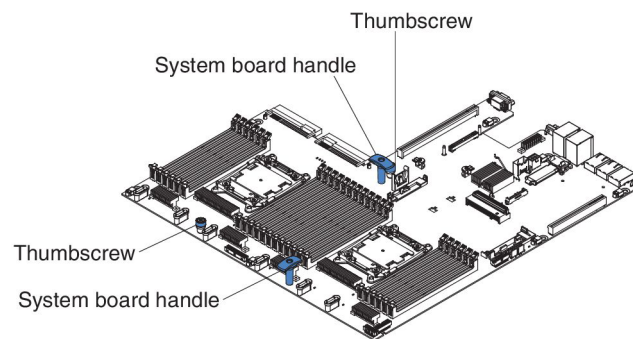
Figure 233. Thumbscrews engagement

4. Rotate the fan assembly bracket down toward the rear of the server.
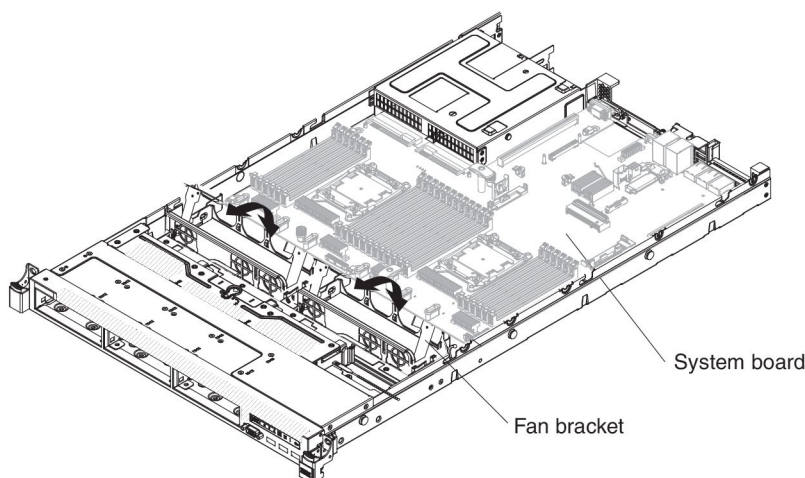
Figure 234. Fan assembly bracket rotation

5. Install the hot-swap fans (see "Replacing a hot-swap fan" on page 260).

6. Install the system battery (see "Replacing the system battery" on page 273).

7. (Trained technician only) Install the microprocessor and heat sink (see "Replacing a microprocessor and heat sink" on page 289).

8. Install the memory modules (see "Installing a memory module" on page 48).

9. Install the ServeRAID SAS/SATA controller (see "Replacing a ServeRAID SAS/SATA controller" on page 235).

10. Reconnect the cables to the system board that you disconnected in 13 on page 299.

11. Install the PCI riser-card assemblies and adapters, if any were installed (see "Replacing an adapter" on page 231 and "Replacing a PCI riser-card assembly" on page 227).

12. Install the air baffle (see "Replacing the air baffle" on page 197).

13. Install the cover (see "Replacing the cover" on page 195).

14. Push the power supplies back into the server.

15. Slide the server into the rack.

16. Reconnect the power cords and any cables that you removed.

17. Turn on the peripheral devices and the server.

18. 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 96 for more details.

19. Either update the server with the latest RAID firmware or restore the pre-existing firmware from a diskette or CD image.

20. Update the UUID (see "Updating the Universal Unique Identifier (UUID)" on page 111).

21. Update the DMI/SMBIOS (see "Updating the DMI/SMBIOS data" on page 113).

22. Reactivate any Features on Demand features.

Appendix A. DSA messages

As you run Dynamic System Analysis, text messages are displayed on the screen and are saved in the DSA log. A diagnostic text message indicates that a problem has been detected and provides the action you should take as a result of the text message.

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 28. 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. |
| • 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. |

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. 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 event log in the Firmware/VPD section for this component. 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.

Table 28. 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. • 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.					
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. 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 event log in the Firmware/VPD section for this component. 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 event log in the Firmware/VPD section for this component. 9. Run the test again. 10. If the failure remains, go to the IBM website for more troubleshooting information.
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. 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 event log in the Firmware/VPD section for this component. 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.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-801-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-802-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.**
•	**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.**

Message number	Component	Test	State	Description	Action
166-803-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-804-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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. |
| • 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. |

Message number	Component	Test	State	Description	Action
166-805-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-806-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-807-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-808-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: reservation canceled 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.**					
• **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.**					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-809-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-810-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-811-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-812-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C Test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-813-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-814-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-815-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-816-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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. |

Message number	Component	Test	State	Description	Action
166-817-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-818-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-819-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-820-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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 event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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. • 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.				
166-821-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-822-xxx	IMM	IMM I^{2}C Test	Aborted	IMM I^{2}C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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. |
|---|

Message number	Component	Test	State	Description	Action
166-823-xxx	IMM	IMM I²C Test	Aborted	IMM I²C test aborted: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.
166-824-xxx	IMM	IMM I²C Test	Aborted	IMM I²C test canceled: 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-901-xxx	IMM	IMM I^{2}C 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. Shut down the system and remove the power cords from the server. 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.

Table 28. 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.
•	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.

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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 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.

Table 28. 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. • 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.					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
166-903-xxx	IMM	IMM I²C Test	Failed	The IMM indicates a failure on 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 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.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-904-xxx	IMM	IMM I^{2}C Test	Failed	The IMM indicates a failure in the PCA9543 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 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.

Table 28. 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.					
• 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.					

Message number	Component	Test	State	Description	Action
166-905-xxx	IMM	IMM I^{2}C Test	Failed	The IMM indicates a failure in the PCA bus (Bus 4).	**Note:** Ignore the error if the hard disk drive backplane is not installed. 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information. 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.

Table 28. 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.
•	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.

Message number	Component	Test	State	Description	Action
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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information. 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.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
166-907-xxx	IMM	IMM I^{2}C 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information. 8. Reseat the optional network adapter. 9. Reseat the PCI riser-card assembly 1. 10. Reseat the PCI riser-card 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.

Table 28. 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.
•	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.

Message number	Component	Test	State	Description	Action
166-908-xxx	IMM	IMM I^{2}C Test	Failed	The IMM indicates a failure in the PCA9567 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. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information. 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.
201-801-xxx	Memory	Memory Test	Aborted	Test canceled: the system UEFI 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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. • 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.					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
201-802-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information.
201-803-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.
201-804-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
•	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.

Message number	Component	Test	State	Description	Action
201-805-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.
201-806-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.
201-807-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.					
• 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.					

Message number	Component	Test	State	Description	Action
201-808-xxx	Memory	Memory Test	Aborted	Test canceled: 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 event log in the Firmware/VPD section for this component. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information.
201-809-xxx	Memory	Memory Test	Aborted	Test canceled 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. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information.
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. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
201-901-xxx	Memory	Memory Test	Failed	Test failure: single-bit error, 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. 5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. Replace the failing DIMMs. 8. Re-enable all memory in the Setup utility. 9. Run the test again. 10. Replace the failing DIMM. 11. Re-enable all memory in the Setup utility. 12. Run the test again. 13. If the failure remains, go to the IBM website for more troubleshooting information.
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. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 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.

Table 28. 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.					
• 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.					
Message number	**Component**	**Test**	**State**	**Description**	**Action**
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 event log. If necessary, enable all memory in the Setup utility. 2. Make sure that the DSA code is at the latest level. 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.
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. 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.

Table 28. 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.**					
• **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.**					
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. 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 system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information.
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. 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.

Table 28. 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.
• 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.

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 DVD drive. 6. If the failure remains, go to the IBM website for more troubleshooting information.
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 DVD 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. Replace the DVD drive. 6. If the failure remains, go to the IBM website for more troubleshooting information.
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 DVD 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. Replace the DVD drive. 6. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.**
- **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.**

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 DVD 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. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information.
215-904-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Failed	A read error occurred.	1. Insert a CD/DVD into the DVD 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. Replace the DVD drive. 6. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.**	
• **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.**	

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 event log in the Firmware/VPD section for this component. 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 event log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information.
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 event log in the Firmware/VPD section for this component. 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 event log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.					
• 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.					

Message number	Component	Test	State	Description	Action
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 event log in the Firmware/VPD section for this component. 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 event log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information.
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 event log in the Firmware/VPD section for this component. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the Setup utility 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 event log to determine the physical location of the failing component. 5. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.
• 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.

Message number	Component	Test	State	Description	Action
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 event log in the Firmware/VPD section for this component. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the Setup utility 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 event log to determine the physical location of the failing component. 5. If the failure remains, go to the IBM website for more troubleshooting information.
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 event log in the Firmware/VPD section for this component. 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 event log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information.

Table 28. 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.**					
• **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.**					

Message number	Component	Test	State	Description	Action
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 event log in the Firmware/VPD section for this component. 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 event log to determine the physical location of the failing component. 5. If the failure remains, go to the IBM website for more troubleshooting information.
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 event log in the Firmware/VPD section for this component. 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 event log to determine the physical location of the failing component. 4. If the failure remains, go to the IBM website for more troubleshooting information.

Appendix B. 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.ibm.com/support/entry/portal/docdisplay?brand=5000008 &lndocid=MIGR-5086346.

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

Table 29. IMM 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				
80010701-0c01ffff	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.
80010901-0c01ffff	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.
80010b01-0c01ffff	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.
81010701-0c01ffff	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.
81010901-0c01ffff	Numeric sensor Ambient Temp going high (upper critical) has deasserted.	Info	An upper critical sensor going high has deasserted.	No action; information only.

Table 29. IMM 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.**				
81010b01-0c01ffff	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.
80010701-1401ffff 80010701-1402ffff	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.
80010901-1401ffff 80010901-1402ffff	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.
80010b01-1401ffff 80010b01-1402ffff	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.
80010701-1403ffff	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.
80010901-1403ffff	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.
80010b01-1403ffff	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 29. IMM 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.**				
80010701-1404ffff	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.
80010901-1404ffff	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.
80010b01-1404ffff	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.
80010701-1405ffff	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.
80010901-1405ffff	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.
80010b01-1405ffff	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.
80010701-1406ffff	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.

Table 29. IMM 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.**				
80010901-1406ffff	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.
80010b01-1406ffff	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.
80010701-2d01ffff	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.
80010901-2d01ffff	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.
80010b01-2d01ffff	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.
81010701-2d01ffff	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.
81010901-2d01ffff	Numeric sensor PCH Temp going high (upper critical) has deasserted.	Info	An upper critical sensor going high has deasserted.	No action; information only.
81010b01-2d01ffff	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.

Table 29. IMM 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.**				
80010701-2c01ffff	Sensor Mezz Card 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.
80010901-2c01ffff	Sensor Mezz Card 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.
80010b01-2c01ffff	Sensor Mezz Card 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.
80010204-1d01ffff 80010204-1d02ffff 80010204-1d03ffff 80010204-1d04ffff 80010204-1d05ffff 80010204-1d06ffff	Numeric sensor Fan n A 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, which is indicated by a lit LED near the fan connector on the system board. 2. Replace the failing fan. (n = fan number)
80010204-1d01ffff 80010204-1d02ffff 80010204-1d03ffff 80010204-1d04ffff 80010204-1d05ffff 80010204-1d06ffff	Numeric sensor Fan n B 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, which is indicated by a lit LED near the fan connector on the system board. 2. Replace the failing fan. (n = fan number)
800b010a-1e81ffff 800b010a-1e82ffff	Fan Zone n redundancy lost has asserted. (n = fan number)	Error	Redundancy lost has asserted.	1. Make sure that the connectors on fan n are not damaged. 2. Make sure that the fan n connectors on the system board are not damaged. 3. Make sure that the fans are correctly installed. 4. Reseat the fans. 5. Replace the fans. (n = fan number)

Table 29. IMM 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.				
800b050a-1e81ffff 800b050a-1e82ffff	Fan Zone *n* insufficient resources has asserted. (*n* = fan number)	Error	There is no redundancy and insufficient to continue operation.	1. Make sure that the connectors on fan *n* are not damaged. 2. Make sure that the fan *n* connectors on the system board are not damaged. 3. Make sure that the fans are correctly installed. 4. Reseat the fans. 5. Replace the fans. (*n* = fan number)
80070204-0a01ffff 80070204-0a02ffff	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*. (*n* = power supply number)
Power messages				
80010902-0701ffff	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.
80010202-0701ffff	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.
80010902-0701ffff	Numeric sensor Planar 5V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	(Trained technician only) Replace the system board.
80010202-0701ffff	Numeric sensor Planar 5V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained technician only) Replace the system board.
80010902-0701ffff	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. 3. (Trained technician only) Replace the system board. (*n* = power supply number)

Table 29. IMM 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.**				
80010202-0701ffff	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. 3. Follow actions for lit OVER SPEC LED. 4. (Trained technician only) Replace the system board. (*n* = power supply number)
80010002-0701ffff	Numeric sensor CMOS battery going low (lower non-critical) has asserted.	Warning	A lower critical sensor going low has asserted.	Replace the system battery.
80010202-0701ffff	Numeric sensor CMOS battery going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	Replace the system battery.
80030108-1301ffff	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. Replace the power supply with a higher rated power supply. 2. Reduce the total power consumption by removing the newly-added or unused options like drives or adapters.
800b0309-1301ffff	Nonredundant: 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. Non-redundant sufficient: power load will be handled by remaining power supply, though the system may throttle to avoid a power supply over-current condition. 2. Replace the power supply with a higher rated power supply.

Table 29. IMM 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.				
800b0509-1301ffff	Nonredundant: Insufficient Resources for Power Resource has asserted.	Error	A change to the insufficiency status of the power supply has happened.	1. Power load may be handled by remaining power supply. The system will attempt throttle to avoid a power supply over-current condition. But a system shutdown may happen anyway if the power load is too great. 2. Reduce the total power consumption by removing the newly-added or unused options like drives or adapters. 3. 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. 4. Replace the power supply with a higher rated power supply.
806f0008-0a01ffff 806f0008-0a02ffff	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.
806f0009-1301ffff	The Power Supply (Power Supply *n*) has been turned off. (*n* = power supply number)	Info	Power supply *n* has been turned off. (*n* = power supply number)	No action; information only.
806f0108-0a01ffff 806f0108-0a02ffff	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*. 3. If both the power-on LED and the power-supply error LED are not lit. (*n* = power supply number)
806f0109-1301ffff	Power Supply *n* has been Power Cycled. (*n* = power supply number)	Info	Power supply *n* has been power cycled. (*n* = power supply number)	No action; information only.

Table 29. IMM 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.**				
806f0308-0a01ffff 806f0308-0a02ffff	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 131 for more information. (*n* = power supply number)
80070208-0a01ffff 80070208-0a02ffff	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)
80070608-0a01ffff 80070608-0a02ffff	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)
80070608-0a01ffff 80070608-0a02ffff	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. 2. Check the OVER SPEC LED and Pwr Rail (1, 2, 3, 4, 5, and 6) error has been recorded in the IMM2 event log.
80070608-0a01ffff 80070608-0a02ffff	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)

Table 29. IMM 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.**				
80070608-0a01ffff 80070608-0a02ffff	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. Follow actions for OVER SPEC LED. 4. (Trained technician only) Replace the system board. (*n* = power supply number)
800b0008-1301ffff	Power Unit has been fully redundant.	Info	Power unit redundancy has been restored.	No action; information only.
800b0108-1301ffff	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 131.
806f0608-1301ffff	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.
80070603-0701ffff	Sensor Pwr Rail 1 Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See "Power problems" on page 155 for more information. 2. Turn off the server and disconnect it from power. 3. (Trained technician only) Replace the system board. 4. (Trained technician only) Replace the failing microprocessor.

Table 29. IMM 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.**				
80070603-0701ffff	Sensor Pwr Rail 2 Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See "Power problems" on page 155 for more information. 2. Turn off the server and disconnect it from power. 3. (Trained technician only) Remove the microprocessor from socket 2 and restart the server. 4. (Trained technician only) Reinstall the microprocessor in socket 2 and restart the server. 5. (Trained technician only) Replace the failing microprocessor. 6. (Trained technician only) Replace the system board.
80070603-0701ffff	Sensor Pwr Rail 3 Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See "Power problems" on page 155 for more information. 2. Turn off the server and disconnect it from power. 3. Remove the adapter from PCI riser-card assembly 1, PCI riser-card assembly 1, the ServeRAID SAS/SATA adapter, and the DIMMs in connectors 1 through 6. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained technician only) Replace the system board.

Table 29. IMM 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.**				
80070603-0701ffff	Sensor Pwr Rail 4 Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See "Power problems" on page 155 for more information. 2. Turn off the server and disconnect it from power. 3. Remove the optional PCI adapter power cable, fan 1, fan 2, the hard disk drives, and the DIMMs in connectors 7 through 12. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained technician only) Replace the system board.
80070603-0701ffff	Sensor Pwr Rail 5 Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See "Power problems" on page 155 for more information. 2. Turn off the server and disconnect it from power. 3. Remove optional DVD drive, fan 3, fan 4, the hard disk drives, and the DIMMs in connectors 13 through 18. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained technician only) Replace the system board.

Table 29. IMM 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.**				
80070603-0701ffff	Sensor Pwr Rail 6 Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See "Power problems" on page 155 for more information. 2. Turn off the server and disconnect it from power. 3. Remove the adapter from the PCI riser-card assembly 2, PCI riser-card assembly 2, the optional dual-port network adapter, fan 5, fan 6, and the DIMMs in connectors 19 through 24. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained technician only) Replace the system board.
Microprocessor messages				
80070201-0301ffff 80070201-0302ffff	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. 3. Make sure that the heat sink for microprocessor n is installed correctly. 4. (Trained technician only) Replace microprocessor n. (n = microprocessor number)

Table 29. IMM 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.**				
8007021b-0301ffff 8007021b-0302ffff	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. (Trained technician only) Remove microprocessor *n*. 2. Check if there is any damage or bending in microprocessor socket pins. (Trained technician only) Replace the system board, if any damage is found. 3. Check if microprocessor *n* is damaged. If any damage is found, (trained technician only) replace microprocessor *n*. (*n* = microprocessor number)
80070301-0301ffff 80070301-0302ffff	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. 3. Make sure that the heat sink for microprocessor *n* is installed correctly. 4. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)

Table 29. IMM 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.**				
806f0007-0301ffff 806f0007-0302ffff	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. 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)
806f0107-0301ffff 806f0107-0302ffff	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 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*. (*n* = microprocessor number)

Table 29. IMM 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.**				
806f0207-0301fffff 806f0207-0302fffff	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 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. 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)
806f0207-2584fffff	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*. (*n* = microprocessor number)

Table 29. IMM 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.**				
806f0212-2584ffff	Sensor CPU Fault Reboot has asserted.	Error	An undetermined system hardware failure has occurred.	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. Make sure that the heat sink for microprocessor *n* is installed correctly. 3. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)
806f0507-0301ffff 806f0507-0302ffff	The Processor CPU *n* Status has a Configuration Mismatch. (*n* = microprocessor number)	Error	A processor configuration mismatch has occurred.	1. Check the lit CPU LED. 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. 4. (Trained technician only) Reseat microprocessor *n*. 5. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)

Table 29. IMM 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.				
806f0507-2584ffff	The Processor All CPUs or One of the CPUs Status has a Configuration Mismatch.	Error	A processor configuration mismatch has occurred.	1. Check the lit CPU LED. 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. 4. (Trained technician only) Reseat microprocessor n. 5. (Trained technician only) Replace microprocessor n. (n = microprocessor number)
806f0607-0301ffff 806f0607-0302ffff	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. 2. Update the server firmware to the latest level. 3. (Trained technician only) Replace the incompatible microprocessor.
806f0607-2584ffff	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. 2. Update the server firmware to the latest level. 3. (Trained technician only) Replace the incompatible microprocessor.
806f0707-0301ffff 806f0707-0302ffff	The Processor CPU n has been detected. (n = microprocessor number)	Info	A processor has been detected.	No action; information only.
806f0807-0301ffff 806f0807-0302ffff	The Processor CPU n has been disabled. (n = microprocessor number)	Info	A processor has been disabled.	No action; information only.
806f0807-2584ffff	The Processor for All CPUs or One of the CPUs has been disabled.	Info	A processor has been disabled.	No action; information only.

Table 29. IMM 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.**				
806f0813-2584ffff	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. 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.
806f0a07-0301ffff 806f0a07-0302ffff	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)
Memory errors				

Table 29. IMM 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.**				
806f0813-2581ffff	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. 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. 6. (Trained technician only) Replace the system board.
806f010c-2001ffff 806f010c-2002ffff 806f010c-2003ffff 806f010c-2004ffff 806f010c-2005ffff 806f010c-2006ffff 806f010c-2007ffff 806f010c-2008ffff 806f010c-2009ffff 806f010c-200affff 806f010c-200bffff 806f010c-200cffff 806f010c-200dffff 806f010c-200effff 806f010c-200fffff 806f010c-2010ffff 806f010c-2011ffff 806f010c-2012ffff 806f010c-2013ffff 806f010c-2014ffff 806f010c-2015ffff 806f010c-2016ffff 806f010c-2017ffff 806f010c-2018ffff	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. 3. If the problem follows the DIMM, replace the failing 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. 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. 6. (Trained technician only) Replace the affected microprocessor.

Table 29. IMM 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-2581ffff	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. 3. If the problem follows the DIMM, replace the failing 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. 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. 6. (Trained technician only) Replace the affected microprocessor.

Table 29. IMM 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-2001ffff 806f030c-2002ffff 806f030c-2003ffff 806f030c-2004ffff 806f030c-2005ffff 806f030c-2006ffff 806f030c-2007ffff 806f030c-2008ffff 806f030c-2009ffff 806f030c-200affff 806f030c-200bffff 806f030c-200cffff 806f030c-200dffff 806f030c-200effff 806f030c-200fffff 806f030c-2010ffff 806f030c-2011ffff 806f030c-2012ffff 806f030c-2013ffff 806f030c-2014ffff 806f030c-2015ffff 806f030c-2016ffff 806f030c-2017ffff 806f030c-2018ffff	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. 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. 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. 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. 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. 8. (Trained technician only) Replace the system board.

Table 29. IMM 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-2001ffff 806f040c-2002ffff 806f040c-2003ffff 806f040c-2004ffff 806f040c-2005ffff 806f040c-2006ffff 806f040c-2007ffff 806f040c-2008ffff 806f040c-2009ffff 806f040c-200affff 806f040c-200bffff 806f040c-200cffff 806f040c-200dffff 806f040c-200effff 806f040c-200fffff 806f040c-2010ffff 806f040c-2011ffff 806f040c-2012ffff 806f040c-2013ffff 806f040c-2014ffff 806f040c-2015ffff 806f040c-2016ffff 806f040c-2017ffff 806f040c-2018ffff	Memory DIMM disabled for DIMM *n* Status. (*n* = DIMM number)	Info	DIMM disabled.	1. Make sure the DIMM is installed correctly. 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).
806f040c-2581ffff	Memory DIMM disabled for One of the DIMMs or All DIMMs.	Info	DIMM disabled.	1. Make sure the DIMM is installed correctly. 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 29. IMM 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-2001fffff 806f050c-2002fffff 806f050c-2003fffff 806f050c-2004fffff 806f050c-2005fffff 806f050c-2006fffff 806f050c-2007fffff 806f050c-2008fffff 806f050c-2009fffff 806f050c-200afffff 806f050c-200bfffff 806f050c-200cfffff 806f050c-200dfffff 806f050c-200efffff 806f050c-200ffffff 806f050c-2010fffff 806f050c-2011fffff 806f050c-2012fffff 806f050c-2013fffff 806f050c-2014fffff 806f050c-2015fffff 806f050c-2016fffff 806f050c-2017fffff 806f050c-2018fffff	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. 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. 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. 6. (Trained technician only) Replace the affected microprocessor.

Table 29. IMM 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-2581ffff	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. 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. 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. 6. (Trained technician only) Replace the affected microprocessor.

Table 29. IMM 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-2001ffff 806f070c-2002ffff 806f070c-2003ffff 806f070c-2004ffff 806f070c-2005ffff 806f070c-2006ffff 806f070c-2007ffff 806f070c-2008ffff 806f070c-2009ffff 806f070c-200affff 806f070c-200bffff 806f070c-200cffff 806f070c-200dffff 806f070c-200effff 806f070c-200fffff 806f070c-2010ffff 806f070c-2011ffff 806f070c-2012ffff 806f070c-2013ffff 806f070c-2014ffff 806f070c-2015ffff 806f070c-2016ffff 806f070c-2017ffff 806f070c-2018ffff	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-2581ffff	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-2001ffff 806f090c-2002ffff 806f090c-2003ffff 806f090c-2004ffff 806f090c-2005ffff 806f090c-2006ffff 806f090c-2007ffff 806f090c-2008ffff 806f090c-2009ffff 806f090c-200affff 806f090c-200bffff 806f090c-200cffff 806f090c-200dffff 806f090c-200effff 806f090c-200fffff 806f090c-2010ffff 806f090c-2011ffff 806f090c-2012ffff 806f090c-2013ffff 806f090c-2014ffff 806f090c-2015ffff 806f090c-2016ffff 806f090c-2017ffff 806f090c-2018ffff	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 29. IMM 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-2001ffff 806f0a0c-2002ffff 806f0a0c-2003ffff 806f0a0c-2004ffff 806f0a0c-2005ffff 806f0a0c-2006ffff 806f0a0c-2007ffff 806f0a0c-2008ffff 806f0a0c-2009ffff 806f0a0c-200affff 806f0a0c-200bffff 806f0a0c-200cffff 806f0a0c-200dffff 806f0a0c-200effff 806f0a0c-200fffff 806f0a0c-2010ffff 806f0a0c-2011ffff 806f0a0c-2012ffff 806f0a0c-2013ffff 806f0a0c-2014ffff 806f0a0c-2015ffff 806f0a0c-2016ffff 806f0a0c-2017ffff 806f0a0c-2018ffff	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-2581ffff	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 channel mode in the Setup utility.
800b030c-2581ffff	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 channel mode in the Setup utility.
800b050c-2581ffff	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 channel mode in the Setup utility.
Recovery messages				

Table 29. IMM 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-0400ffff 816f000d-0401ffff 816f000d-0402ffff 816f000d-0403ffff 816f000d-0404ffff 816f000d-0405ffff 816f000d-0406ffff 816f000d-0407ffff	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.

806f010d-0400ffff
806f010d-0401ffff
806f010d-0402ffff
806f010d-0403ffff
806f010d-0404ffff
806f010d-0405ffff
806f010d-0406ffff
806f010d-0407ffff
	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)

806f020d-0400ffff 806f020d-0401ffff 806f020d-0402ffff 806f020d-0403ffff 806f020d-0404ffff 806f020d-0405ffff 806f020d-0406ffff 806f020d-0407ffff	The Drive *n* Status has a predictive failure. (*n* = hard disk drive number)	Error	A predictive failure has been detected for drive *n*. (*n* = hard disk drive number)	Replace the hard disk drive *n*. (*n* = hard disk drive number)
806f050d-0400ffff 806f050d-0401ffff 806f050d-0402ffff 806f050d-0403ffff 806f050d-0404ffff 806f050d-0405ffff 806f050d-0406ffff 806f050d-0407ffff	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 29. IMM 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-0400ffff 806f060d-0401ffff 806f060d-0402ffff 806f060d-0403ffff 806f060d-0404ffff 806f060d-0405ffff 806f060d-0406ffff 806f060d-0407ffff	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.
806f070d-0400ffff 806f070d-0401ffff 806f070d-0402ffff 806f070d-0403ffff 806f070d-0404ffff 806f070d-0405ffff 806f070d-0406ffff 806f070d-0407ffff	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.
806f0021-3001ffff	The fault has been detected for internal ServeRAID.	Error	A internal ServeRAID fault has been detected.	1. Check the PCI LED on the light path diagnostics panel. 2. Reseat the ServeRAID adapter. 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. (Trained technicians only) Replace the system board.
PCI messages				

Table 29. IMM 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.**				
806f0021-3001ffff	PCI fault has been detected for PCI *n*. (*n* = PCI slot number)	Error	A PCI fault has been detected.	1. Check the PCI LED on the light path diagnostics panel. 2. Reseat the affected adapters and riser 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 both adapters. 5. Replace the riser cards. 6. (Trained technicians only) Replace the system board.
806f0021-2582ffff	PCI fault has been detected for One of PCI Error.	Error	A PCI fault has been detected.	1. Check the PCI LED on the light path diagnostics panel. 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.

Table 29. IMM 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.				
806f0021-2582ffff	PCI fault has been detected for All PCI Error.	Error	A PCI fault has been detected.	1. Check the PCI LED on the light path diagnostics panel. 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.
806f0413-2582ffff	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 on the light path diagnostics panel. 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.

Table 29. IMM 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.				
806f0513-2582ffff	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 on the light path diagnostics panel. 2. Reseat the affected adapters and riser 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 riser cards.
806f0813-2582ffff	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 on the light path diagnostics panel. 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.
806f0125-1001ffff 806f0125-1002ffff	The entity of PCI riser has been detected absent for PCI *n*. (*n* = PCI slot number)	Info	The entity of PCI riser *n* has been detected absent. (*n* = PCI slot number)	No action; information only.

Table 29. IMM 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.**				
80010701-1001ffff 80010701-1002ffff	Sensor PCI riser *n* Temp going high (upper non-critical) has asserted. (*n* = PCI slot 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.
80010901-1001ffff 80010901-1002ffff	Sensor PCI riser *n* Temp going high (upper critical) has asserted. (*n* = PCI slot 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.
80010b01-1001ffff 80010b01-1002ffff	Sensor PCI riser *n* Temp going high (upper non-recoverable) has asserted. (*n* = PCI slot 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.
806f0125-2c01ffff	The entity of Mezz Card has been detected absent.	Info	The entity of dual-port network adapter has been detected absent.	1. Reseat the dual-port network adapter. 2. Replace the dual-port network adapter.
806f0021-3001ffff	Mezz Card Error has been detected.	Error	A dual-port network adapter fault has been detected.	1. Check the dual-port network adapter error LED. 2. Reseat the dual-port network adapter. 3. Update the firmware (UEFI and IMM) and the dual-port network adapter driver to the latest level. 4. Replace the dual-port network adapter. 5. (Trained technicians only) Replace the system board.
Firmware and software messages				

Table 29. IMM 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.**				
806f000f-220101ff	The System %1 encountered a POST Error.(%1 = CIM_ComputerSystem. ElementName)	Error	There is no memory detected. (Sensor = Firmware Error)	1. Make sure the server meets the minimum configuration to start. 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.
806f000f-220102ff	The System %1 encountered a POST Error.(%1 = CIM_ComputerSystem. ElementName)	Error	There is insufficient memory to continue operation. (Sensor = Firmware Error)	1. Make sure the server meets the minimum configuration to start. 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.
806f000f-220103ff	System encountered firmware error - unrecoverable boot device failure.	Error	A system firmware error unrecoverable boot device failure has occurred.	This is a UEFI detected event. The UEFI diagnostic code for this event can be found in the logged IMM message text. Please refer to the UEFI diagnostic code in the "UEFI diagnostic code" section of the Information Center for the appropriate user response.
806f000f-220104ff	System has encountered a motherboard failure.	Error	A fatal motherboard failure in the system has been detected.	This is a UEFI detected event. The UEFI diagnostic code for this event can be found in the logged IMM message text. Please refer to the UEFI diagnostic code in the "UEFI diagnostic code" section of the Information Center for the appropriate user response.

Table 29. IMM 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.**				
806f000f-220107ff	System encountered firmware error - unrecoverable keyboard failure.	Error	A system firmware error unrecoverable keyboard failure has occurred.	This is a UEFI detected event. The UEFI diagnostic code for this event can be found in the logged IMM message text. Please refer to the UEFI diagnostic code in the "UEFI diagnostic code" section of the Information Center for the appropriate user response.
806f000f-22010aff	System encountered firmware error - no video device detected.	Error	A system firmware error no video device has been detected.	This is a UEFI detected event. The UEFI diagnostic code for this event can be found in the logged IMM message text. Please refer to the UEFI diagnostic code in the "UEFI diagnostic code" section of the Information Center for the appropriate user response.

806f000f-22010bff	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.
				 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.
				 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.

816f000f-22010bff	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.

Table 29. IMM 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.				
806f000f-22010cff	CPU voltage mismatch detected on ABR Status: Firmware Error.	Error	A CPU voltage mismatch with the socket voltage has been detected.	This is a UEFI detected event. The UEFI diagnostic code for this event can be found in the logged IMM message text. Please refer to the UEFI diagnostic code in the "UEFI diagnostic code" section of the Information Center for the appropriate user response.
806f000f-2201ffff	The system encountered a POST Error.	Error	A post error has been detected.	No action; information only.
806f010f-2201ffff	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. 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 29. IMM 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-2101ffff	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.
				 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.
				 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 only) replace the system board.

General messages				
80030012-2301ffff	Sensor OS RealTime Mod has asserted.	Info	Indicate whether the system management firmware is working in the state to support the realtime OS.	No action; information only.
80070202-0701ffff	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.

Table 29. IMM 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.**				
8007020f-2582ffff	Sensor No PCI I/O Space has transitioned to critical from a less severe state.	Error	A sensor has transitioned to critical from less severe.	Complete the following steps to solve PCI I/O resource errors: 1. Understand the I/O resource requirements in a basic system. 2. Identify the I/O resource requirements for desired add-on adapters. For examples, PCI-X or PCIe adapters. 3. Disable on-board devices (which request I/O) you can do without. 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.
806f011b-0701ffff	The Front USB connector has encountered a configuration error.	Error	The system had detected an internal connection error.	Reseat the front USB cable on the system board.
806f011b-0701ffff	The Front Video connector has encountered a configuration error.	Error	The system had detected an internal connection error.	Reseat the front video cable on the system board.
806f0125-0c01ffff	Front panel entity has been detected Absent.	Info	A front panel entity has been detected absent.	No action; information only.
806f0013-1701ffff	A front panel NMI has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	An operator information panel NMI/diagnostic interrupt has occurred.	If the NMI button has not been pressed, complete the following steps: 1. Make sure that the NMI button is not pressed. 2. Replace the operator information panel cable. 3. Replace the operator information panel.
806f0313-1701ffff	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).
81030012-2301ffff	OS RealTime Mod state has deasserted.	Info	OS RealTime Mod state has deasserted.	No action; information only.

Table 29. IMM 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.**				
80070219-0701ffff	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.
806f020f-2201ffff	The System %1 encountered a POST Progress. (%1 = CIM_ComputerSystem. ElementName)	Info	A POST progress has been detected. (Sensor = Progress)	No action; information only.
806f0312-2201ffff	Entry to aux log has asserted.	Info	Entry to aux log has been detected.	No action; information only.
8007010f-2201ffff	TXT ACM Module has transitioned from normal to non-critical state.	Warning	TXT ACM Module has transitioned from normal to non-critical state.	1. If enabling TXT is not required, disable TXT from the Setup Utility. 2. If enabling TXT is required, verify that the TPM is enabled and activated from the Setup Utility. 3. If the problem remains, contact your service representative.
80070114-2201ffff	TPM Phy Pres Set has transitioned from normal to non-critical state.	Warning	TPM Phy Pres Set has been transitioned from normal to non-critical.	1. The System TPM physical presence jumper (JP6) is in pins 2 and 3. 2. Set the System TPM physical presence jumper (JP6) back to the default position (pins 1 and 2).
80080128-2101ffff	Low security jumper presence has asserted.	Info	The low security jumper has been detected.	No action; information only.
8008010f-2101ffff	Physical presence jumper presence has asserted.	Info	The physical presence jumper has been detected.	No action; information only.
80030006-2101ffff	Sig Verify Fail has deasserted.	Info	The sig verify fail has deasserted.	No action; information only.

Table 29. IMM 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.**				
806f0028-2101ffff	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.
80070101-0c01ffff	Sensor Ambient Status has transitioned to non-critical from a less severe state.	Warning	A sensor has changed to non-critical state from a less severe state.	1. Check the microprocessor installed is Intel E5-2690. 2. Reduce the ambient temperature under 27°C.
81070101-0c01ffff	Sensor Ambient Status transitioned to non-critical deasserted.	Info	A sensor changed to non-critical state deasserted.	No action; information only.
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 29. IMM 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_DNSProtocol Endpoint.Hostname; %2 = user ID)	Info	A user has modified the host name of the IMM.	No action; information only.
40000009-00000000	IP address of network interface modified from %1 to %2 by user %3.(%1 = CIM_IPProtocolEndpoint. IPv4Address; %2 = CIM_StaticIPAssignment SettingData.IPAddress; %3 = user ID)	Info	A user has modified the IP address of the IMM.	No action; information only.

Table 29. IMM 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.**				
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.
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.

Table 29. IMM 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.**				
40000010-00000000	Security: Userid: '%1' had %2 login failures from WEB client at IP address %3.(%1 = user ID; %2 = Maximum SuccessiveLoginFailures (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.
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.

Table 29. IMM 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.**				
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_IPProtocol Endpoint.IPv4Address; %4 = CIM_IPProtocol Endpoint.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.
40000017-00000000	ENET[0] IP-Cfg:HstName=%1, IP@%2, NetMsk=%3, GW@=%4.(%1 = CIM_DNSProtocol Endpoint.Hostname; %2 = CIM_StaticIPSetting Data.IPv4Address; %3 = CIM_StaticIPSetting Data.SubnetMask; %4 = CIM_StaticIPSetting Data.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_Configuration Data.ConfigurationName; %2 = user ID)	Info	A user has restored the IMM configuration by importing a configuration file.	No action; information only.

Table 29. IMM 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.**				
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.
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.

Table 29. IMM 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.**				
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.
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.

Table 29. IMM 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.**				
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.
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.

Table 29. IMM 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.**				
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.
4000002a-00000000	[arg1] firmware mismatch internal to system [arg2]. Please attempt to flash the [arg3] firmware.	Error	A specific type of firmware mismatch has been detected.	Reflash the IMM firmware to the latest version.
4000002b-00000000	Domain name set to [arg1].	Info	Domain name set by user.	No action; information only.
4000002c-00000000	Domain Source changed to [arg1] by user [arg2].	Info	Domain source changed by user.	No action; information only.
4000002d-00000000	DDNS setting changed to [arg1] by user [arg2].	Info	DDNS setting changed by user.	No action; information only.
4000002e-00000000	DDNS registration successful. The domain name is [arg1].	Info	The DDNS registration was successful.	No action; information only.
4000002f-00000000	IPv6 enabled by user [arg1].	Info	The specified user has enabled IPv6 support on the Integrated Management Module.	No action; information only.
40000030-00000000	IPv6 disabled by user [arg1].	Info	IPv6 protocol is disabled by user.	No action; information only.
40000031-00000000	IPv6 static IP configuration enabled by user [arg1].	Info	IPv6 static address assignment method is enabled by user.	No action; information only.
40000032-00000000	IPv6 DHCP enabled by user [arg1].	Info	IPv6 DHCP assignment method is enabled by user.	No action; information only.
40000033-00000000	IPv6 stateless auto-configuration enabled by user [arg1].	Info	IPv6 stateless auto-assignment method is enabled by user.	No action; information only.

Table 29. IMM 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.**				
40000034-00000000	IPv6 static IP configuration disabled by user [arg1].	Info	IPv6 static assignment method is disabled by user.	No action; information only.
40000035-00000000	IPv6 DHCP disabled by user [arg1].	Info	IPv6 DHCP assignment method is disabled by user.	No action; information only.
40000036-00000000	IPv6 stateless auto-configuration disabled by user [arg1].	Info	IPv6 statless auto-assignment method is disabled by user.	No action; information only.
40000037-00000000	ENET[[arg1]] IPv6-LinkLocal:HstName=[arg2], IP@=[arg3] ,Pref=[arg4].	Info	IPv6 Link Local address is active.	No action; information only.
40000038-00000000	ENET[[arg1]] IPv6-Static:HstName=[arg2], IP@=[arg3],Pref=[arg4], GW@=[arg5].	Info	IPv6 Static address is active.	No action; information only.
40000039-00000000	ENET[[arg1]] DHCPv6-HSTN=[arg2], DN=[arg3], IP@=[arg4], Pref=[arg5].	Info	IPv6 DHCP-assigned address is active.	No action; information only.
4000003a-00000000	IPv6 static address of network interface modified from [arg1] to [arg2] by user [arg3].	Info	A user modifies the IPv6 static address of a Management Controller.	No action; information only.
4000003b-00000000	DHCPv6 failure, no IP address assigned.	Warning	S DHCP6 server fails to assign an IP address to a Management Controller.	No action; information only.
4000003c-00000000	Platform Watchdog Timer expired for [arg1].	Error	An implementation has detected an OS Loader Watchdog Timer Expired.	No action; information only.
4000003d-00000000	Telnet port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the telnet port number.	No action; information only.
4000003e-00000000	SSH port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the SSH port number.	No action; information only.

Table 29. IMM 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.**				
4000003f-00000000	Web-HTTP port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the Web HTTP port number.	No action; information only.
40000040-00000000	Web-HTTPS port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the Web HTTPS port number.	No action; information only.
40000041-00000000	CIM/XML HTTP port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the CIM HTTP port number.	No action; information only.
40000042-00000000	CIM/XML HTTPS port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the CIM HTTPS port number.	No action; information only.
40000043-00000000	SNMP Agent port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the SNMP Agent port number.	No action; information only.
40000044-00000000	SNMP Traps port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the SNMP Traps port number.	No action; information only.
40000045-00000000	Syslog port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the Syslog receiver port number.	No action; information only.
40000046-00000000	Remote Presence port number changed from [arg1] to [arg2] by user [arg3].	Info	A user has modified the Remote Presence port number.	No action; information only.
40000047-00000000	LED [arg1] state changed to [arg2] by [arg3].	Info	A user has modified the state of an LED.	No action; information only.
40000048-00000000	Inventory data changed for device [arg1], new device data hash=[arg2], new master data hash=[arg3].	Info	Something has caused the physical inventory to change.	No action; information only.
40000049-00000000	SNMP [arg1] enabled by user [arg2].	Info	A user enabled SNMPv1 or SNMPv3 or Traps.	No action; information only.
4000004a-00000000	SNMP [arg1] disabled by user [arg2] .	Info	A user disabled SNMPv1 or SNMPv3 or Traps.	No action; information only.

Table 29. IMM 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.**				
4000004b-00000000	SNMPv1 [arg1] set by user [arg2]: Name=[arg3], AccessType=[arg4], Address=[arg5].	Info	A user changed the SNMP community string.	No action; information only.
4000004c-00000000	LDAP Server configuration set by user [arg1]: SelectionMethod=[arg2], DomainName=[arg3], Server1=[arg4], Server2=[arg5], Server3=[arg6], Server4=[arg7].	Info	A user changed the LDAP server configuration.	No action; information only.
4000004d-00000000	LDAP set by user [arg1]: RootDN=[arg2], UIDSearchAttribute=[arg3], BindingMethod=[arg4], EnhancedRBS=[arg5], TargetName=[arg6], GroupFilter=[arg7], GroupAttribute=[arg8], LoginAttribute=[arg9].	Info	A user configured an LDAP Miscellaneous setting.	No action; information only.
4000004e-00000000	Serial Redirection set by user [arg1]: Mode=[arg2], BaudRate=[arg3], StopBits=[arg4], Parity=[arg5], SessionTerminateSequence=[arg6].	Info	A user configured the Serial Port mode.	No action; information only.
4000004f-00000000	Date and Time set by user [arg1]: Date=[arg2], Time-[arg3], DST Auto-adjust=[arg4], Timezone=[arg5].	Info	A user configured the Date and Time settings.	No action; information only.
40000050-00000000	Server General Settings set by user [arg1]: Name=[arg2], Contact=[arg3], Location=[arg4], Room=[arg5], RackID=[arg6], Rack U-position=[arg7].	Info	A user configured the Location setting.	No action; information only.
40000051-00000000	Server Power Off Delay set to [arg1] by user [arg2].	Info	A user configured the Server Power Off Delay.	No action; information only.
40000052-00000000	Server [arg1] scheduled for [arg2] at [arg3] by user [arg4].	Info	A user configured a Server Power action at a specific time.	No action; information only.

Table 29. IMM 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.**				
40000053-00000000	Server [arg1] scheduled for every [arg2] at [arg3] by user [arg4].	Info	A user configured a recurring Server Power Action.	No action; information only.
40000054-00000000	Server [arg1] [arg2] cleared by user [arg3].	Info	A user cleared a Server Power Action.	No action; information only.
40000055-00000000	Synchronize time setting by user [arg1]: Mode=[arg2], NTPServerHost=[arg3]:[arg4], NTPUpdateFrequency=[arg5].	Info	A user configured the Date and Time synchronize settings	No action; information only.
40000056-00000000	SMTP Server set by user [arg1] to [arg2]:[arg3].	Info	A user configured the SMTP server.	No action; information only.
40000057-00000000	Telnet [arg1] by user [arg2].	Info	A user enables or disables Telnet services.	No action; information only.
40000058-00000000	DNS servers set by user [arg1]: UseAdditionalServers=[arg2], PreferredDNStype=[arg3], IPv4Server1=[arg4], IPv4Server2=[arg5], IPv4Server3=[arg6], IPv6Server1=[arg7], IPv6Server2=[arg8], IPv6Server3=[arg9].	Info	A user configures the DNS servers.	No action; information only.
40000059-00000000	LAN over USB [arg1] by user [arg2].	Info	A user configured USB-LAN.	No action; information only.
4000005a-00000000	LAN over USB Port Forwarding set by user [arg1]: ExternalPort=[arg2], USB-LAN port=[arg3].	Info	A user configured USB-LAN port forwarding.	No action; information only.
4000005b-00000000	Secure Web services (HTTPS) [arg1] by user [arg2].	Info	A user enables or disables Secure web services.	No action; information only.
4000005c-00000000	Secure CIM/XML(HTTPS) [arg1] by user [arg2].	Info	A user enables or disables Secure CIM/XML services.	No action; information only.
4000005d-00000000	Secure LDAP [arg1] by user [arg2].	Info	A user enables or disables Secure LDAP services.	No action; information only.
4000005e-00000000	SSH [arg1] by user [arg2].	Info	A user enables or disables SSH services.	No action; information only.

Table 29. IMM 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.**				
4000005f-00000000	Server timeouts set by user [arg1]: EnableOSWatchdog=[arg2], OSWatchdogTimout=[arg3], EnableLoaderWatchdog=[arg4], LoaderTimeout=[arg5].	Info	A user configures Server Timeouts.	No action; information only.
40000060-00000000	License key for [arg1] added by user [arg2].	Info	A user installs License Key.	No action; information only.
40000061-00000000	License key for [arg1] removed by user [arg2].	Info	A user removes a License Key.	No action; information only.
40000062-00000000	Global Login General Settings set by user [arg1]: AuthenticationMethod=[arg2], LockoutPeriod=[arg3], SessionTimeout=[arg4].	Info	A user changes the Global Login General Settings.	No action; information only.
40000063-00000000	Global Login Account Security set by user [arg1]: PasswordRequired=[arg2], PasswordExpirationPeriod=[arg3], MinimumPasswordReuseCycle=[arg4], MinimumPasswordLength=[arg5], MinimumPasswordChangeInterval=[arg6], MaxmumLoginFailures=[arg7], LockoutAfterMaxFailures=[arg8], MinimumDifferentCharacters=[arg9], DefaultIDExpired=[arg10], ChangePasswordFirstAccess=[arg11].	Info	A user changes the Global Login Account Security Settings to Legacy.	No action; information only.
40000064-00000000	User [arg1] created.	Info	A user account was created.	No action; information only.
40000065-00000000	User [arg1] removed.	Info	A user account was deleted.	No action; information only.
40000066-00000000	User [arg1] password modified.	Info	A user account was changed.	No action; information only.
40000067-00000000	User [arg1] role set to [arg2].	Info	A user account role assigned.	No action; information only.
40000068-00000000	User [arg1] custom privileges set: [arg2].	Info	User account priveleges assigned.	No action; information only.
40000069-00000000	User [arg1] for SNMPv3 set: AuthenticationProtocol=[arg2], PrivacyProtocol=[arg3], AccessType=[arg4], HostforTraps=[arg5].	Info	User account SNMPv3 settings changed.	No action; information only.
4000006a-00000000	SSH Client key added for user [arg1].	Info	User locally defined an SSH Client key.	No action; information only.

Table 29. IMM 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.**				
4000006b-00000000	SSH Client key imported for user [arg1] from [arg2].	Info	User imported an SSH Client key.	No action; information only.
4000006c-00000000	SSH Client key removed from user [arg1].	Info	User removed an SSH Client key.	No action; information only.
4000006d-00000000	Management Controller [arg1]: Configuration saved to a file by user [arg2].	Info	A user saves a Management Controller configuration to a file.	No action; information only.
4000006e-00000000	Alert Configuration Global Event Notification set by user [arg1]: RetryLimit=[arg2], RetryInterval=[arg3], EntryInterval=[arg4].	Info	A user changes the Global Event Notification settings.	No action; information only.
4000006f-00000000	Alert Recipient Number [arg1] updated: Name=[arg2], DeliveryMethod=[arg3], Address=[arg4], IncludeLog=[arg5], Enabled=[arg6], EnabledAlerts=[arg7], AllowedFilters=[arg8].	Info	A user adds or updates an Alert Recipient.	No action; information only.
40000070-00000000	SNMP Traps enabled by user [arg1]: EnabledAlerts=[arg2], AllowedFilters=[arg3].	Info	A user enabled the SNMP Traps configuration.	No action; information only.
40000071-00000000	The power cap value changed from [arg1] watts to [arg2] watts by user [arg3].	Info	Power Cap values changed by user.	No action; information only.
40000072-00000000	The minimum power cap value changed from [arg1] watts to [arg2] watts.	Info	Minimum Power Cap value changed.	No action; information only.
40000073-00000000	The maximum power cap value changed from [arg1] watts to [arg2] watts.	Info	Maximum Power Cap value changed	No action; information only.
40000074-00000000	The soft minimum power cap value changed from [arg1] watts to [arg2] watts.	Info	Soft Minimum Power Cap value changed.	No action; information only.

Table 29. IMM 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.**				
40000075-00000000	The measured power value exceeded the power cap value.	Warning	Power exceeded cap.	No action; information only.
40000076-00000000	The new minimum power cap value exceeded the power cap value.	Warning	Minimum Power Cap exceeds Power Cap.	No action; information only.
40000077-00000000	Power capping was activated by user [arg1].	Info	Power capping activated by user.	No action; information only.
40000078-00000000	Power capping was deactivated by user [arg1].	Info	Power capping deactivated by user.	No action; information only.
40000079-00000000	Static Power Savings mode has been turned on by user [arg1].	Info	Static Power Savings mode turned on by user.	No action; information only.
4000007a-00000000	Static Power Savings mode has been turned off by user [arg1].	Info	Static Power Savings mode turned off by user.	No action; information only.
4000007b-00000000	Dynamic Power Savings mode has been turned on by user [arg1].	Info	Dynamic Power Savings mode turned on by user.	No action; information only.
4000007c-00000000	Dynamic Power Savings mode has been turned off by user [arg1].	Info	Dynamic Power Savings mode turned off by user.	No action; information only.
4000007d-00000000	Power cap and external throttling occurred.	Info	Power cap and external throttling occurred.	No action; information only.
4000007e-00000000	External throttling occurred.	Info	External throttling occurred.	No action; information only.
4000007f-00000000	Power cap throttling occurred.	Info	Power cap throttling occurred.	No action; information only.
40000080-00000000	Remote Control session started by user [arg1] in [arg2] mode.	Info	Remote Control session started	No action; information only.
40000081-00000000	PXE boot requested by user [arg1].	Info	PXE boot requested.	No action; information only.
40000082-00000000	The measured power value has returned below the power cap value.	Info	Power exceeded cap recovered.	No action; information only.
40000083-00000000	The new minimum power cap value has returned below the power cap value.	Info	Minimum Power Cap exceeds Power Cap recovered	No action; information only.

Table 29. IMM 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.**				
40000084-00000000	IMM2 firmware mismatch between nodes [arg1] and [arg2]. Please attempt to flash the IMM2 firmware to the same level on all nodes.	Info	A mismatch of IMM2 firmware has been detected between nodes.	No action; information only.
40000085-00000000	FPGA firmware mismatch between nodes [arg1] and [arg2]. Please attempt to flash the FPGA firmware to the same level on all nodes.	Error	A mismatch of FPGA firmware has been detected between nodes.	Attempt to flash the FPGA firmware to the same level on all nodes.
40000086-00000000	Test Call Home Generated by user [arg1].	Info	Test Call Home generated by user.	No action; information only.
40000087-00000000	Manual Call Home by user [arg1]: [arg2].	Info	Manual Call Home by user.	No action; information only.
40000088-00000000	Management Controller [arg1]: Configuration restoration from a file by user [arg2] completed.	Info	This message is for the use case where a user restores a Management Controller configuration from a file and it completes.	No action; information only.
40000089-00000000	Management Controller [arg1]: Configuration restoration from a file by user [arg2] failed to complete.	Info	This message is for the use case where a user restores a Management Controller configuration from a file and the restoration fails to complete.	No action; information only.
4000008a-00000000	Management Controller [arg1]: Configuration restoration from a file by user [arg2] failed to start.	Info	This message is for the use case where a user restores a Management Controller configuration from a file and the restoration fails to start.	No action; information only.
4000008b-00000000	One or more of the Storage Management IP addresses has changed.	Info	This message is for the use case where an IP address for the Storage Management has changed.	No action; information only.

Table 29. IMM 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.**				
4000008c-00000000	Security: Userid: [arg1] had [arg2] login failures from a CIM client at IP address [arg3].	Warning	A user has exceeded the maximum allowed number of unsuccessful login attempts from a CIM client and has been prevented from logging in for the lockout period.	Complete the following steps until the problem is solved: 1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
4000008d-00000000	Remote access attempt failed. Invalid userid or password received. Userid is [arg1] from a CIM client at IP address [arg2].	Info	A user has attempted to log in from a CIM client by using an invalid login ID or password.	Make sure that the correct login ID and password are being used.

Appendix C. UEFI/POST diagnostic codes

The following table describes the POST/UEFI diagnostic codes 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/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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 3. (Trained technician only) Replace the system board.
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. (Trained technician only) Replace the microprocessor.
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)

- **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.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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
I.18008	[I.18008] Currently, there is no additional information for this event.	Processors have mismatched Internal DDR3 Frequency.	1. Make sure that the microprocessor is on the ServerProven website. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
I.18009	[I.18009] A core speed mismatch has been detected for one or more processor packages.	Processors have mismatched Core Speed.	1. Make sure that the microprocessor is on the ServerProven website. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.

- **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.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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.

- **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.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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 2. Check the IBM support website for a firmware update and update the server firmware to the latest level. 3. (Trained technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.
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. 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. 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.

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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.Make sure that the DIMMs have been installed in the correct sequence.
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.
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. 3. If the error still occurs on the same DIMM, replace the affected DIMM. 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. 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. 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. 8. (Trained technician only) Replace the system board.

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• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.			
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Diagnostic code	Message	Description	Action
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. 2. Make sure that the DIMMs are installed in the proper sequence.
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. 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. 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. 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. 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. 8. (Trained technician only) Replace the system board.

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Diagnostic code	Message	Description	Action
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 channel mode.
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.
I.580A4	[I.580A4] Memory population change detected.	DIMM Population Change Detected.	Information only. Memory has been added, moved, or changed.
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.
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.
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. Check the IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Replace the CMOS battery. 3. (Trained technician only) Replace the system board.
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 IBM support website for an applicable retain tip or firmware update that applies to this memory error. 2. Replace the following components one at a time in the order shown, restarting the server each time: • Adapter. • (Trained technician only) System board.

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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.
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.
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 riser-card LEDs. 2. Reseat all affected adapters and riser cards. 3. Update the PCI adapter firmware. 4. Replace the affected adapters and riser cards. 5. (Trained technician only) Replace the system board.
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 riser-card LEDs. 2. Reseat all affected adapters and riser cards. 3. Update the PCI adapter firmware. 4. Replace the affected adapters and riser cards. 5. (Trained technician only) Replace the system board.
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. Run the Setup utility. Select **Startup Options** from the menu and modify the boot sequence to change the load order of the optional-device ROM code. 2. Informational message that some devices might not be initialized. 3. See retain tip H197144 http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=migr-5084743 for more information.

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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 riser-card LEDs. 2. Reseat all affected adapters and riser cards. 3. Move the affected adapter to a different slot. 4. Update the PCI adapter firmware. 5. Replace the affected adapters and riser cards.
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. 3. (Trained technician only) replace the system board.
S.3028002	[S.3028002] Boot permission timeout detected.	Boot Permission Negotiation Timeout.	1. Check the IMM error messages 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. 3. (Trained technician only) replace the system board.
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.
I.3048005	[I.3048005] UEFI has booted from the backup flash bank.	Booting Backup UEFI Image.	Information only. Set the UEFI boot backup jumper (JP2) in the backup position (pins 2 and 3) to allow the server to boot from the backup UEFI.
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. Run the Setup utility. Select **Load Default Settings** and save the settings. 2. Recover the server firmware.
S.30050007	[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.

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Diagnostic code	Message	Description	Action
W.305000A	[W.305000A] An invalid date and time have been detected.	RTC Date and Time Incorrect.	1. Run the Setup utility. Select **Load Default Settings**, and save the settings. 2. Reseat the battery. 3. Replace the battery.
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. Undo any recent system changes, such as new settings or newly installed devices. 2. Make sure that the server is attached to a reliable power source. 3. Remove all hardware that is not listed on the ServerProven website. 4. Update the firmware to the latest level. 5. Make sure that the operating system is not corrupted. 6. Run the Setup utility, save the configuration, and then restart the server. 7. (Trained technician only) If the problem remains, replace the system board.
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.
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.

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Diagnostic code	Message	Description	Action
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.
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.
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.
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.
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.
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. 3. (Trained technician only) Replace the system board.
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. 2. Update the IMM firmware to the latest level.

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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. 2. Update the IMM firmware to the latest level.
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.
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. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware.
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.
I.3818003	[I.3818003] The CRTM flash driver could not lock the secure flash region.	CRTM Could not lock secure flash region.	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware.
S.3818004	[S.3818004] The CRTM flash driver could not successfully flash the staging area. A failure occurred.	CRTM Update Failed.	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware.
W.3818005	[W.3818005] The CRTM flash driver could not successfully flash the staging area. The update was aborted.	CRTM Update Aborted.	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware.
S.3818007	[S.3818007] The firmware image capsules for both flash banks could not be verified.	CRTM image capsule could not be verified.	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. Recover the server firmware.
W.381800D	[W.381800D] TPM physical presence is in asserted state.	TPM physical presence is in asserted state.	1. Complete any administrative tasks requiring the TPM physical presence switch to the "ON" position. 2. Restore the physical presence switch to the "OFF" position and restart the system. 3. (Trained technician only) Replace the system board.

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Diagnostic code	Message	Description	Action
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.

Appendix D. 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.

If you believe that you require IBM to perform warranty service on your IBM product, the IBM service technicians will be able to assist you more efficiently if you prepare before you call.

- 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/.

Getting help and information from the World Wide Web

Up-to-date information about IBM products and support is available on 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/. IBM System x information is at http://www.ibm.com/systems/x/. IBM BladeCenter information is at http://www.ibm.com/systems/bladecenter/. IBM IntelliStation information is at http://www.ibm.com/systems/intellistation/.

How to send DSA 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/
- **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/

Creating a personalized support web page

You can create a personalized support web page by identifying IBM products that are of interest to you.

To create a personalized support web page, go to http://www.ibm.com/support/ mynotifications/. 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 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

Use this information to contact 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
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Taipei, Taiwan
Telephone: 0800-016-888

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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.

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Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as "total bytes written" (TBW). A

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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 device 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 device 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 device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 30. 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

Table 30. Limits for particulates and gases (continued)

Contaminant	Limits
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.	

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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.

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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.

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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 might 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

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Responsible manufacturer:

> International Business Machines Corp.
> New Orchard Road
> Armonk, New York 10504
> 914-499-1900

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> Technical Regulations, Department M372
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> 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

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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.

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Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
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Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

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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.

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Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

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Index

Numerics

A

B

C

D

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