IBM

System x3650 M4
Type 7915

Installation and Service Guide

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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 459, "Notices" on page 463, the
> *Warranty Information* document, and the *Safety Information* and *Environmental Notices and User Guide*
> documents on the IBM *Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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ᠬᠡᠷᠡᠭᠯᠡᠬᠦ ᠠᠴᠠ ᠡᠮᠦᠨᠡ ᠠᠶᠤᠯ ᠦᠭᠡᠢ ᠠᠵᠢᠯᠯᠠᠭᠠᠨ ᠤ ᠮᠡᠳᠡᠭᠡᠯᠡᠯ
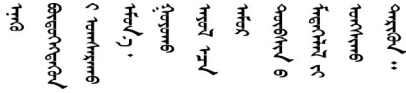
Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

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་རྫས་འདི་བདེ་སྐྱོད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་ཚོད་སྟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىدىنى ئوقۇپ چىقىڭ.

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

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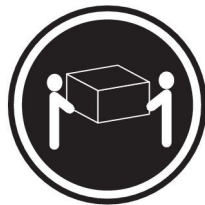
| ≥ 18 kg (39.7 lb) | ≥ 32 kg (70.5 lb) | ≥ 55 kg (121.2 lb) |

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.
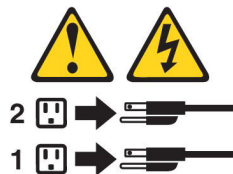
Statement 6

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 x3650 M4 server

This *Installation and Service Guide* contains information and instructions for setting up your System x3650 M4 Type 7915 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 x3650 M4 Type 7915 server is a 2-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 e-mail 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/.

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

The server comes with either six 3.5-inch SATA or eight 2.5-inch SAS hot-swap hard disk drive bays. Most models contain a ServeRAID SAS controller and the 2.5-inch models are capable of expansion to sixteen 2.5-inch SAS hot-swap hard disk drive bays.

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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.

1

The following illustration shows a server with 3.5-inch SAS/SATA hot-swap hard disk drive bays.

SAS hard disk drive bays
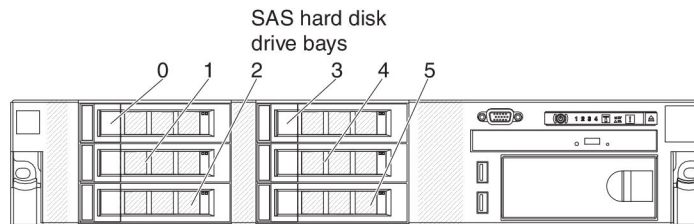
Figure 1. 3.5-inch hot-swap model front view

The following illustration shows a server with six 3.5-inch SATA simple-swap hard disk drive bays.

SATA hard disk drive bays
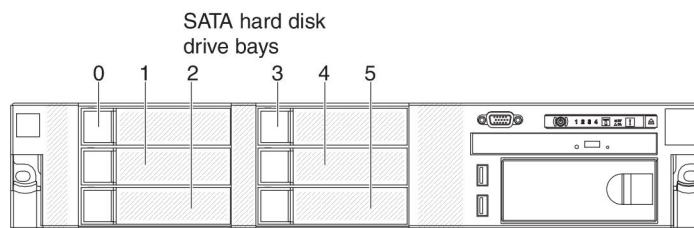
Figure 2. 3.5-inch simple-swap model front view

The following illustration shows a server with eight 2.5-inch SAS hard disk drive bays.

SAS hard disk drive bays
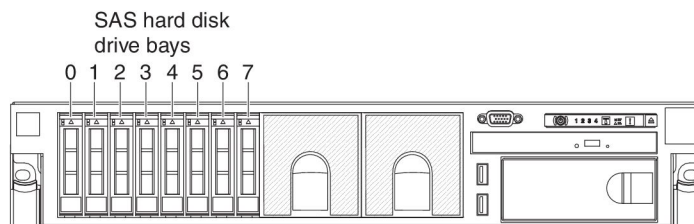
Figure 3. 2.5-inch model front view

You can purchase an optional kit to install the tape drive.

SAS hard disk drive bays
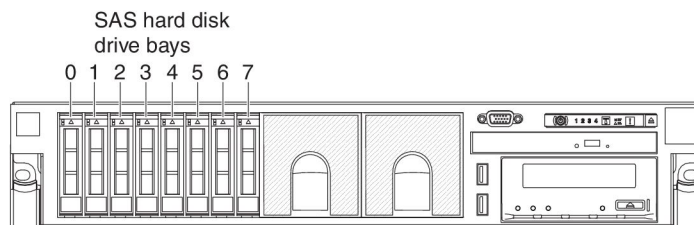
Figure 4. Tape drive model front view

You can purchase an optional kit to install the eight additional 2.5-inch SAS hard disk drive bays.
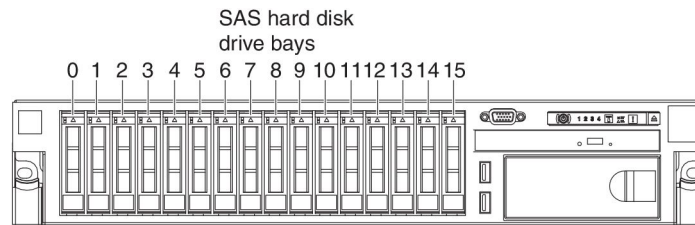
Figure 5. 16-drive-capable model front view

The SAS ID for each bay is printed on the server front, above each bay.

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 x3650 M4 server
Machine type	7915
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.
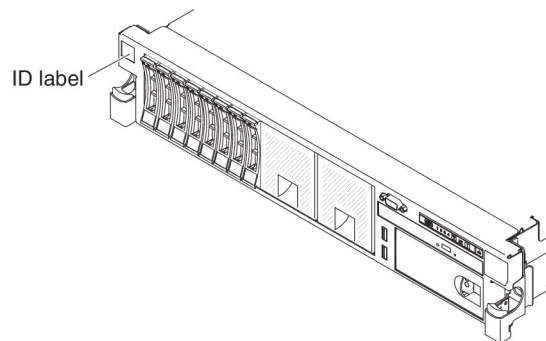
Figure 6. ID label

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/systems/info/x86servers/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 hardware and software requirements of the IBM *Documentation* CD.

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):	Integrated functions:	SATA optical drives (optional):

• 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/.
 	
 Memory (depending on the model):
 • Minimum: 2 GB
 • Maximum: 768 GB
   – 64 GB using unbuffered DIMMs (UDIMMs)
   – 384 GB using registered DIMMs (RDIMMs)
   – 768 GB using HyperCloud DIMMs (HCDIMMs)
   – 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
   – 16 GB and 32 GB HyperCloud DIMMs (HCDIMM)
   – 32 GB load reduction DIMM
	• 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) 2.0 ports (two front and four rear of the chassis, one internal used for USB tape drive, and one internal used for Hypervisor USB key)
	 • 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 Daughter Card is installed)
	 • One System Management RJ-45 on the rear to connect to a systems management network. This system management connector is dedicated to the IMM2 functions.
	 • One serial port
	 • Two VGA adapters
	 • Light path diagnostics panel
	
	 Hard disk drive expansion bays (depending on the model):
	 • 1.8-inch models: Supports up to thirty-two 1.8-inch hot-swap solid-state drivers.
	
	 • 2.5-inch models:
	   – Supports up to sixteen 2.5-inch simple-swap SAS/SATA or hot-swap SAS/SATA hard disk drive bays.
	   – Supports up to eight 2.5-inch simple-swap SAS/SATA or hot-swap SAS/SATA hard disk drive bays with an option to add up to sixteen 1.8-inch hot-swap solid-state drives.
	
	 • 3.5-inch models:
	   – Supports up to six 3.5-inch simple-swap SATA or hot-swap SAS/SATA hard disk drive bays.
		• DVD-ROM
		
		 • Multi-burner
		
		 Tape drive (optional):
		 • Tape drive bay
		
		 RAID controllers (depending on the model):
		 • One on-board 8 ports SAS ServeRAID M5110e that provides RAID levels 0, 1, and 10
		
		 • A ServeRAID M5110e SAS/SATA adapter that provides RAID 0, 1, and 10.
		
		   Optional upgrade:
		   – RAID 5/50 (Zero Cache)
		   – 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
		
		 Video controller (integrated into IMM2):
		 • Matrox G200eR2
		   Note: The maximum video resolution is 1600 x 1200 at 75 Hz.
		   – SVGA compatible video controller
		   – DDR3 528 MHz SDRAM video memory controller
		   – Avocent Digital Video Compression
		   – 16 MB of video memory (not expandable)
		
		 Size (2U):
		 • Height: 86.5 mm (3.406 in.)
		 • Depth: EIA flange to rear - 714 mm (28.110 in.), Overall - 746 mm (29.370 in.)
		 • Width: With top cover - 445 mm (17.520 in.), With front bezel - 482.0 mm (18.976 in.)
		 • Weight: approximately 25 kg (55 lb) to 30 kg (65 lb) depending upon configuration

Table 1. Server features and specifications (continued)

PCI expansion slots:	Electrical input:	Hot-swap fans:
PCI riser-card assembly 1 • Type 1 – Slot 1: PCI Express 3.0 x8 (full-height, full-length) – Slot 2: PCI Express 3.0 x8 (full-height, half-length) – Slot 3: PCI Express 3.0 x8 (full-height, half-length) • Type 2 – Slot 1: PCI Express 3.0 x16 (full-height, full-length) – Slot 2: PCI Express 3.0 x8 (full-height, half-length) – Slot 3 (not available) • Type 3 – Slot 1: PCI-X (full-height, full-length) – Slot 2: PCI-X (full-height, half-length) – Slot 3: PCI Express 3.0 x16 (full-height, half-length) • Type 4 – Slot 1 (not available) – Slot 2: PCI Express 3.0 x16 (full-height, half-length) – Slot 3: PCI Express 3.0 x8 (full-height, half-length) **PCI riser-card assembly 2** • Type 1 – Slot 4: PCI Express 3.0 x8 (full-height, full-length) – Slot 5: PCI Express 3.0 x8 (full-height, full-length) – Slot 6: PCI Express 3.0 x8 (full-height, half-length) • Type 2 – Slot 4: PCI Express 3.0 x16 (full-height, full-length) – Slot 5: PCI Express 3.0 x8 (full-height, full-length) – Slot 6 (not available) • Type 3 – Slot 4: PCI-X (full-height, full-length) – Slot 5: PCI-X (full-height, full-length) – Slot 6: PCI Express 3.0 x16 (full-height, half-length) • Type 4 – Slot 4 (not available) – Slot 5: PCI Express 3.0 x16 (full-height, full-length) – Slot 6: PCI Express 3.0 x8 (full-height, half-length)	• 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: 1.022 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.	• One microprocessor: 3 dual-motor hot-swap fans • Two microprocessors: 4 dual-motor hot-swap fans **Power supply:** • Up to two hot-swap power supplies for redundancy support – 550-watt ac – 750-watt ac – 900-watt ac – 750-watt dc **Note:** Power supplies in the server must be with the same power rating or wattage. **Acoustical noise emissions:** • Sound power, idling: 6.3 bels maximum • Sound power, operating: 7.0 bels maximum **Heat output:** Approximate heat output: • Minimum configuration: 419.68 Btu per hour (AC 123 watts) • Maximum configuration: 3480.24 Btu per hour (AC 1020 watts)

Table 1. Server features and specifications (continued)

Environment:	Environment:	Environment:

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.
• Humidity:
  – Non-condensing: -12°C dew point (10.4°F)
  – Relative humidity: 8% to 85%
• Maximum dew point: 24°C (75°F)
• Maximum rate of temperature change:
  – Tape drives: 5°C/hr (41°F/hr)
  – Hard disk drives: 20°C/hr (68°F/hr)
	Server on: (continued)
	
	• Maximum altitude: 3,050 m (10,000 ft), 5°C to 28°C (41°F to 82°F)
	
	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:
	  - Intel E5-2690 with heat sink (part number 94Y6696) and standard PCIe: Temperature: 5°C to 35°C (41°F to 95°F); Altitude: 0 to sea level
	  - Intel E5-2690 with heat sink (part number 94Y6696) and one GPU (Quadro 2000/4000/6000): Temperature: 5°C to 30°C (41°F to 86°F); Altitude: 0 to sea level
	  - Intel E5-2690 with heat sink (part number 94Y7603) and two GPUs (Quadro 2000/4000/6000): Temperature: 5°C to 25°C (41°F to 77°F); Altitude: 0 to sea level
	  - Intel E5-2634 with heat sink (part number 94Y6696): Temperature: 5°C to 35°C (41°F to 95°F); Altitude: 0 to 914.4 m (3,000 ft)
	  - Intel E5-2637 with heat sink (part number 94Y6618): Temperature: 5°C to 35°C (41°F to 95°F); Altitude: 0 to 914.4 m (3,000 ft)
		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 140.0°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 140.0°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 465.

Table 2. Power supply configurations

	550-watt	750-watt		900-watt	
Video adapters	Not supported	Not supported	Quadro 600/K600/2000/K2000/4000/6000/	Not supported	Quadro 600/K600/2000/K2000/4000/6000
Microprocessor	Support up to 115-watt		Support up to 115-watt		
The maximum of 2.5-inch HDDs	16	16	8	16	16
The maximum of DIMMs	8[1]	24[1]	16[1]	24	24[1]
The maximum of PCI adapters	2	4	2	6	2

Table notes:

1. Quad-rank RDIMM, LRDIMM and HCDIMM are not supported.

2. If you install two Quadro 4000 video adapters, you must install two power supplies (750-watt or 900-watt).

3. No limitation on CPU/HDDs/DIMMs/PCIe adapters support when you install 900-watt power supplies with no video adapter on the order.

4. Power supplies in the server must be with the same power rating or wattage.

5. 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.

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://pic.dhe.ibm.com/infocenter/director/ pubs/index.jsp?topic=%2Fcom.ibm.director.main.helps.doc%2Ffqm0_main.htmlor see http://www.ibm.com/systems/management/director/downloads.html.

- **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 184.

- **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 136.

- **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.htmland "IBM Systems Director" on page 15.

- **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 146 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 151.

- **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 168 and "Light path diagnostics LEDs" on page 171.

- **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 287 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, 750-watt, or 900-watt hot-swap power supplies and four 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, 750-watt, or 900-watt hot-swap power supply and three fans.

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

  Note: You cannot mix different wattages of 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 150.

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 7915)
- 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.
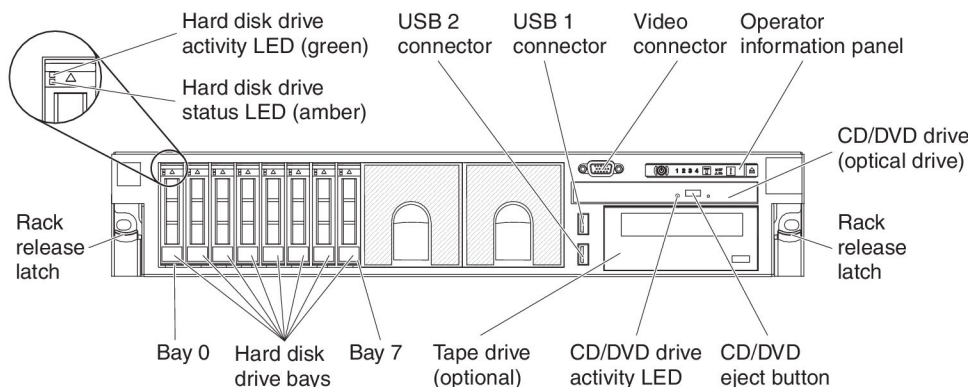
Figure 7. 2.5-inch front view

3.5-inch hard disk drive server model.
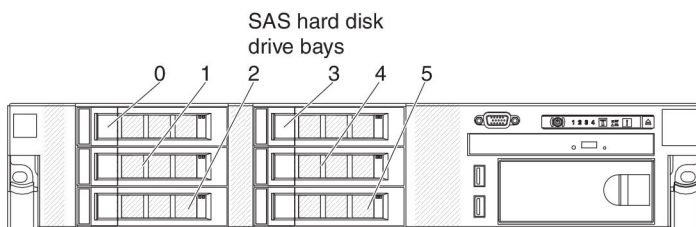
Figure 8. 3.5-inch hard disk drive front view

- **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."
- **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 illustration shows the controls and LEDs on the advanced operator information panel and the operator information panel depending on your server model.
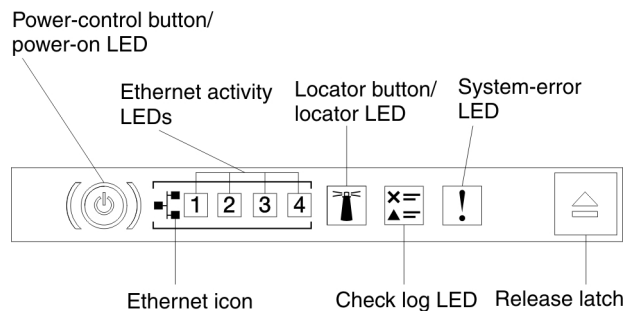
Figure 9. Advanced operator information panel
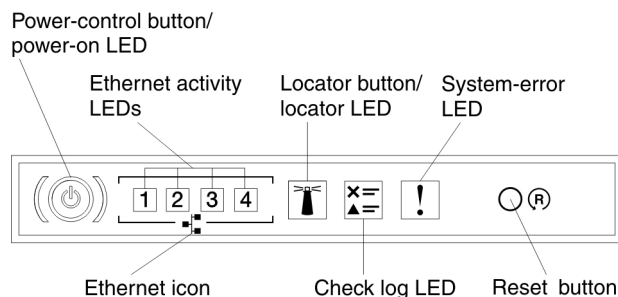
Figure 10. Operator information panel

- **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 180 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 do not 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 171.

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.
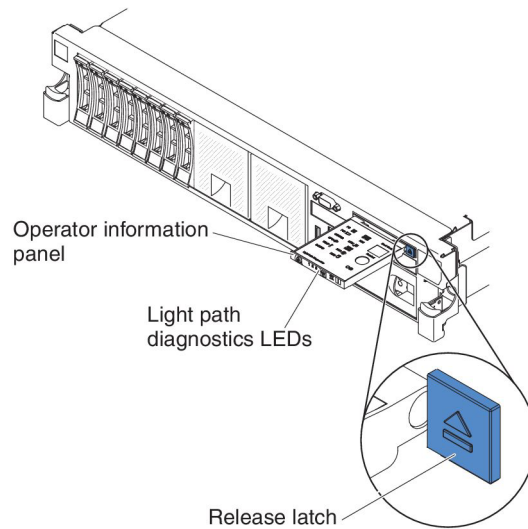
Figure 11. Light path diagnostics panel exposure

The following illustration shows the LEDs and controls on the light path diagnostics panel.
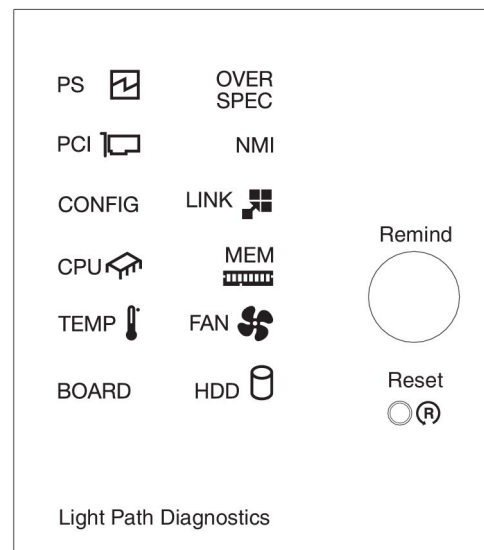
Figure 12. Light path diagnostics panel

- **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.

Ethernet1
(shared system
management ethernet) Ethernet2 Ethernet3 Ethernet4

10G ethernet
(with optional
10G ethernet card) Power supply 2

System-management
(ethernet)(dedicated) Video Serial USB3 USB4 USB5 USB6 NMI
button Power supply 1
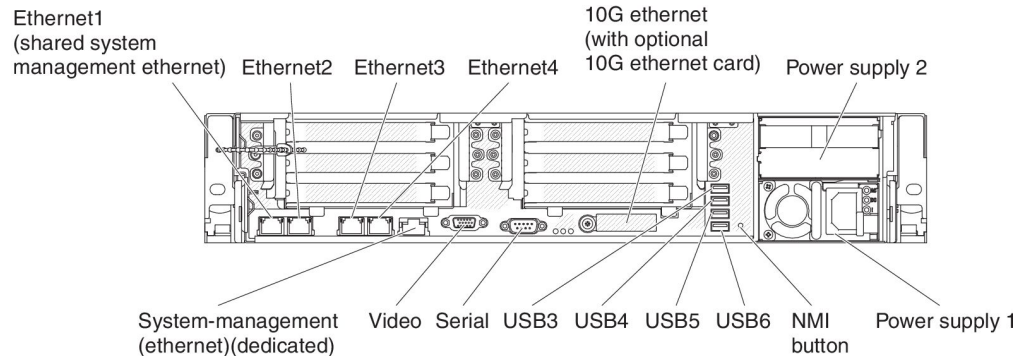
- **NMI button:** Press this button to force a nonmaskable interrupt to the microprocessor. It allows you to blue screen the server and take a memory dump (use this button only when directed by the IBM service support). You might have to use a pen or the end of a straightened paper clip to press the button. The NMI button is in the lower left-hand corner on the rear of the server.
- **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. See Using the Setup utility in the *Problem Determination and Service Guide* for more information.
- **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. See Using the Setup utility for more information.

The following illustration shows the LEDs on the rear of the server.

Ethernet link LED   Ethernet activity LED   AC power LED (green)   DC power LED (green)   Power-supply error LED (amber)   Power-on LED (green)   System-error LED (amber)   Locator LED (blue)
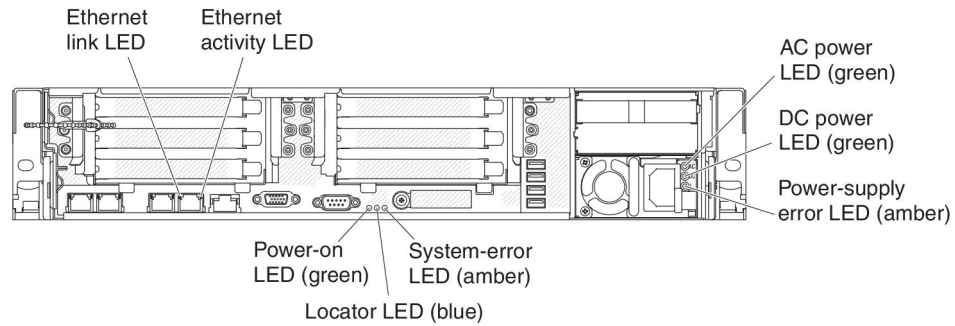
The following illustration shows the LEDs on a dc power supply.

Power input LED   Power output LED   Power error LED   -48V return   Ground   -48V
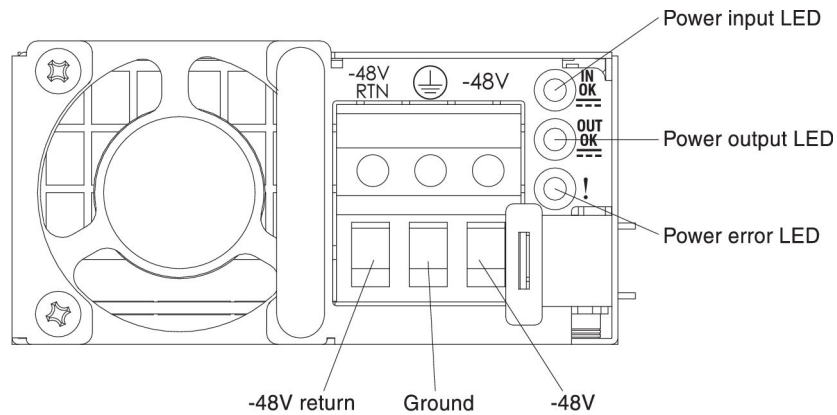
- **Ethernet activity LEDs:** When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.
- **Ethernet link LEDs:** When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 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 176.
- **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 176.
- **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 177.
- **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 177.

- **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

Use this information to turn 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

Use this information to turn 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.
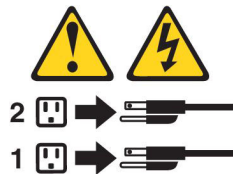
The server can be turned off in any of the following ways:
- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will turn off automatically.
- You can press the power-control button to start 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 133. 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 185 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

Instructions for IBM Business Partners on verifying the newly installed devices by running the Dynamic System Analysis (DSA) stress test.

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 183.
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/app/upload_hw
- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

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.
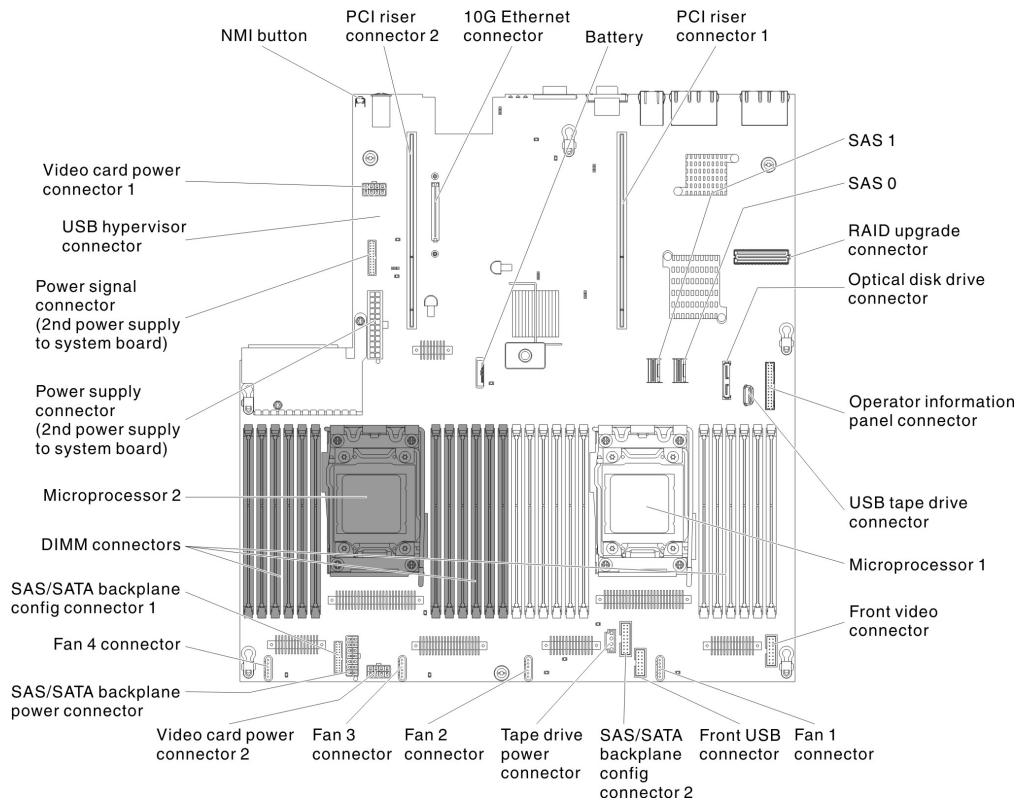
Figure 14. System-board internal connectors

System-board external connectors

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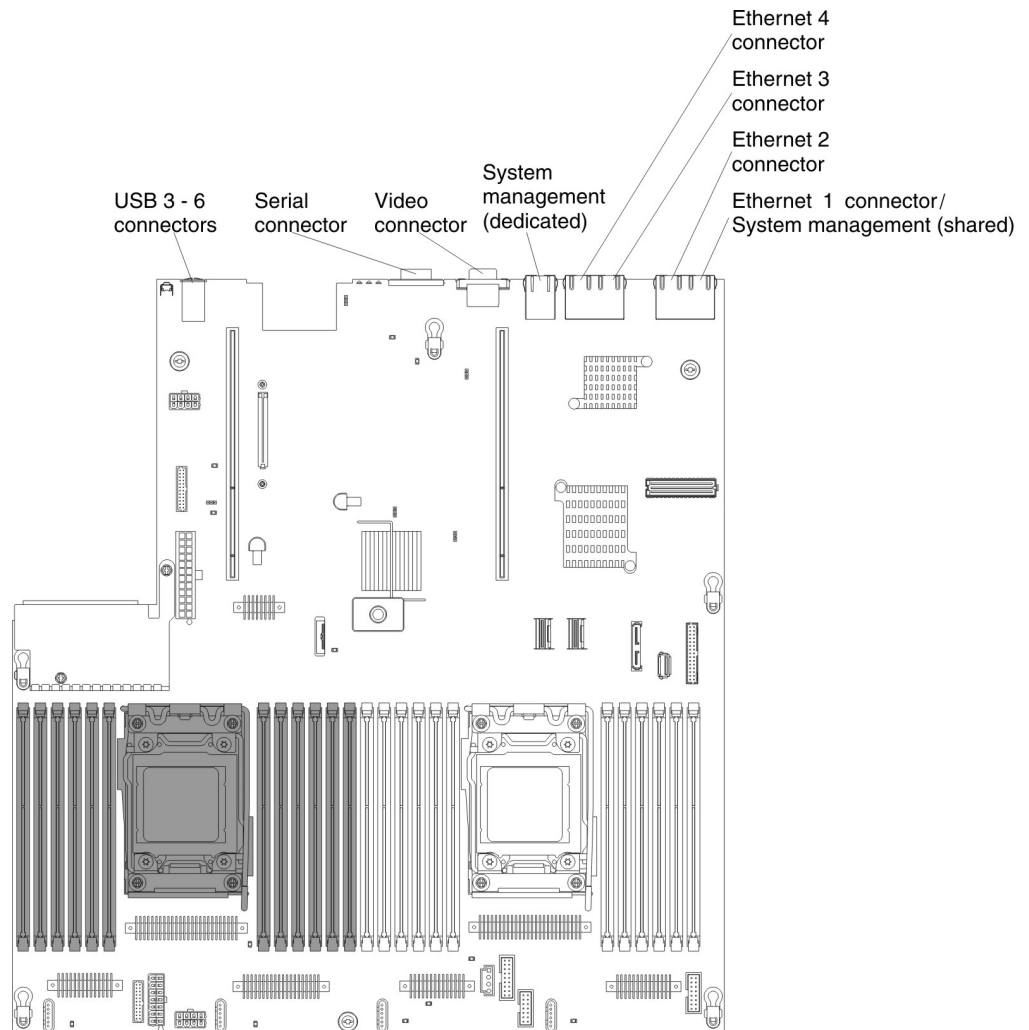
Figure 15. System-board external connectors

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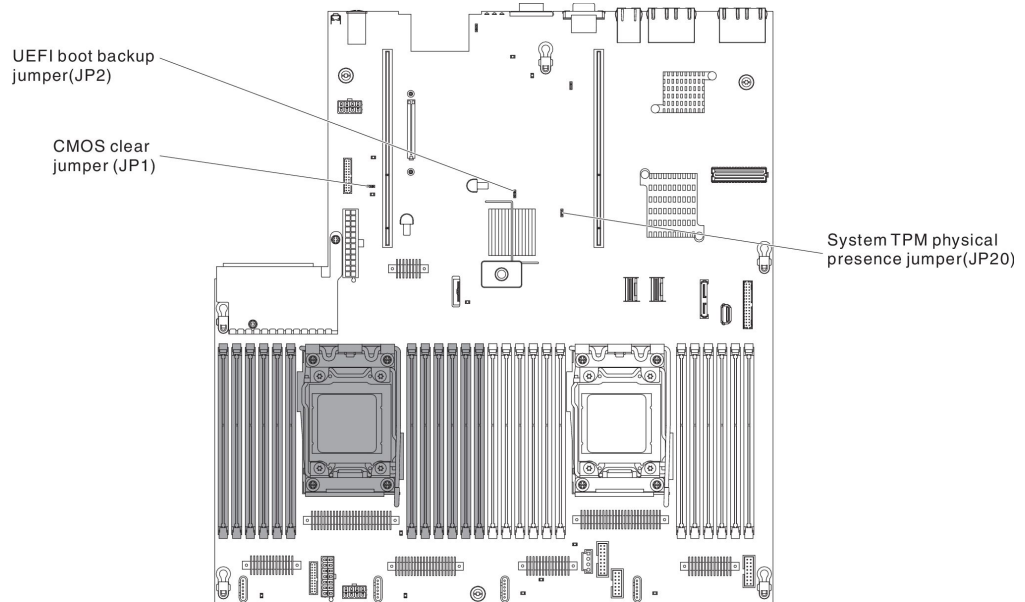
Figure 16. System-board switches, jumpers, and buttons

The following table describes the jumpers on the system board.

Table 3. 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.
JP20	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 4. 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 143 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 34, "Handling static-sensitive devices" on page 37, 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 5. 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.
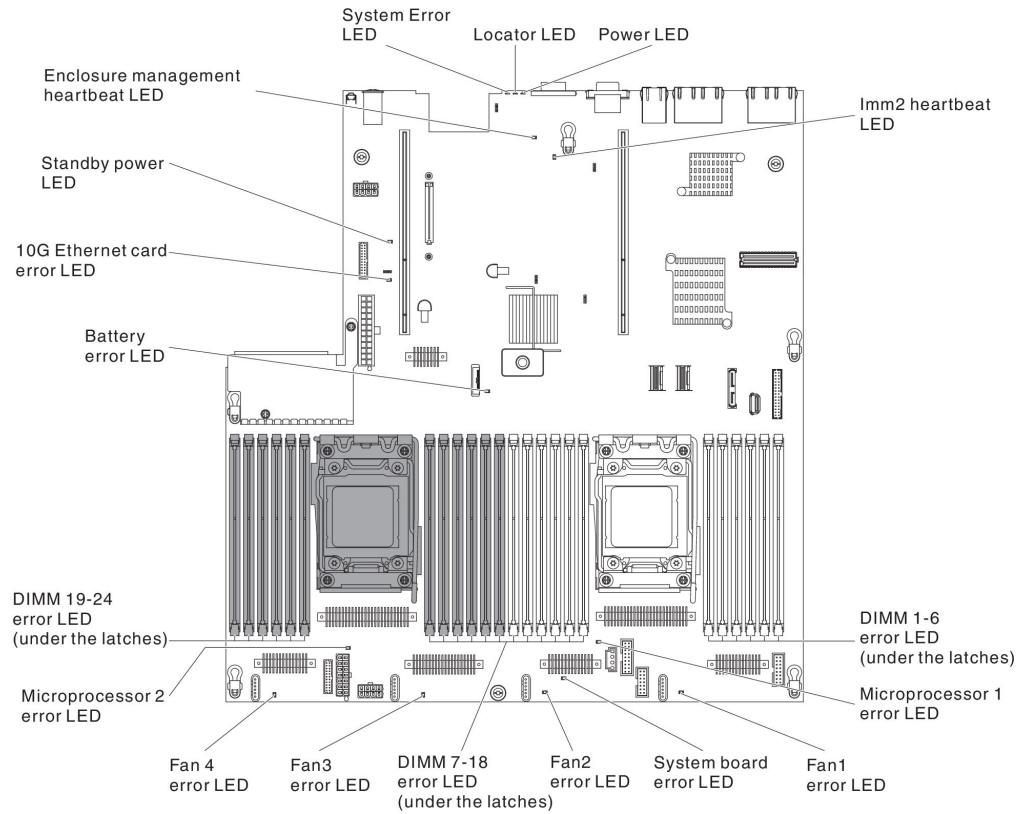
Figure 17. System-board LEDs

System-board optional-device connectors

The following illustration shows the connectors on the system board for the optional devices.

Optional
10G Ethernet
card connector

Optional PCI
riser connector 2

Optional PCI
riser connector 1

Optical drive
connector

Microprocessor 2

Microprocessor 1

USB tape
connector

DIMM 19-24

DIMM 1-6

Fan 4
connector

DIMM 7-18
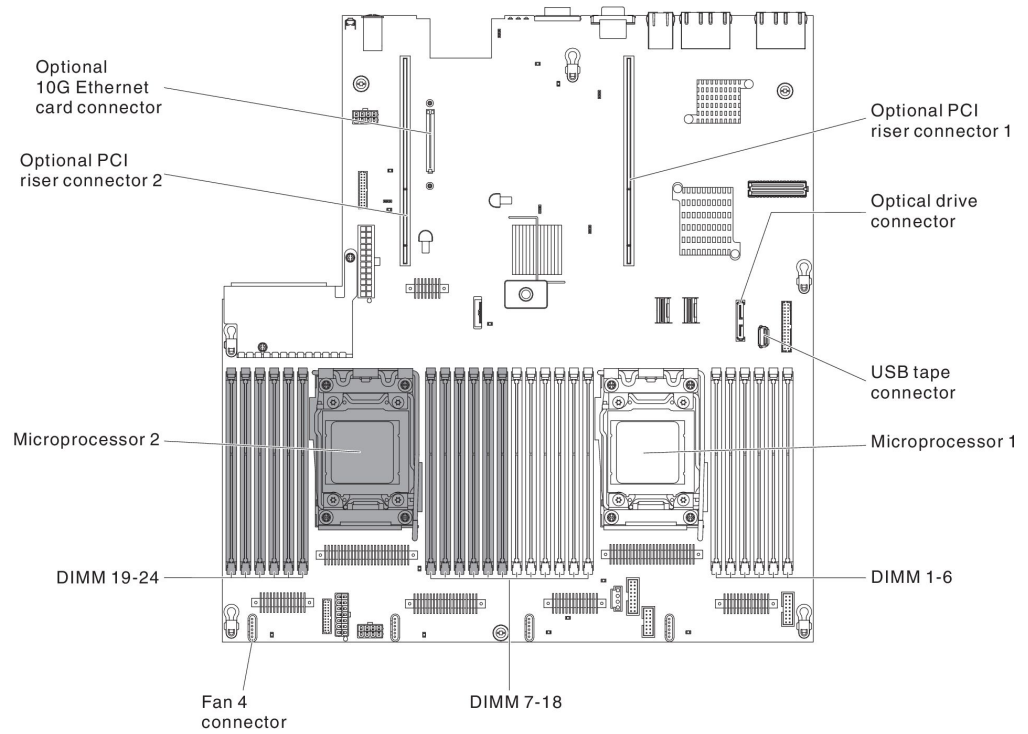
Figure 18. System-board optional-device connectors

PCI riser-card adapter connectors

The following illustration shows the connectors on the PCI riser card for
user-installable PCI adapters.

PCI
riser-card
assembly
(in short position)

Adapter
connectors

Adapter

Full-length
adapter
bracket

PCI
riser-card
assembly
(in long position)

Adapter
connectors

Adapter

Full-length
adapter
bracket
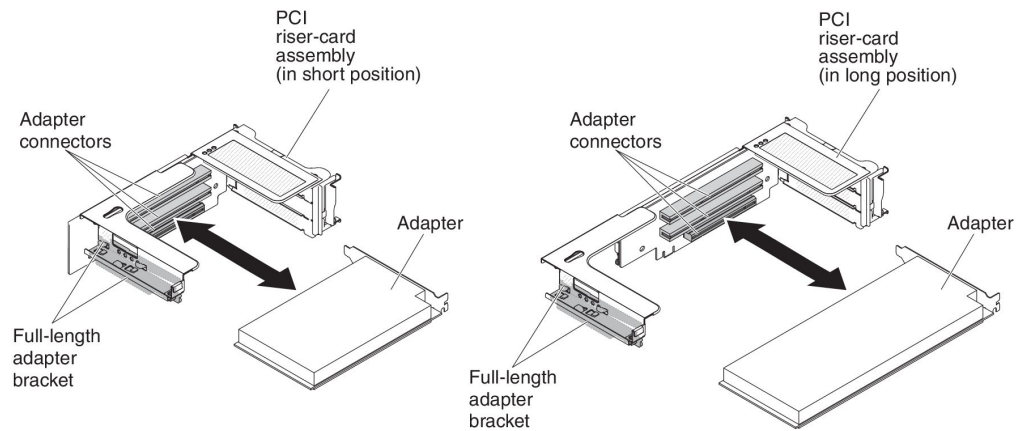
Figure 19. PCI riser-card adapter connectors

PCI riser-card assembly LEDs

The following illustration shows the light-emitting diodes (LEDs) on the PCI riser-card assembly.

Note: Error LEDs remain lit only while the server is connected to power.
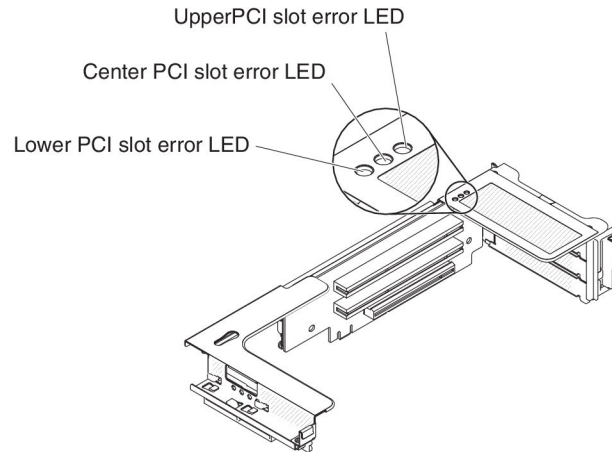
Figure 20. PCI riser-card assembly LEDs

Installation guidelines

Use the installation guidelines to install the System x3650 M4 Type 7915.

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 36, and "Handling static-sensitive devices" on page 37. 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 185 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.
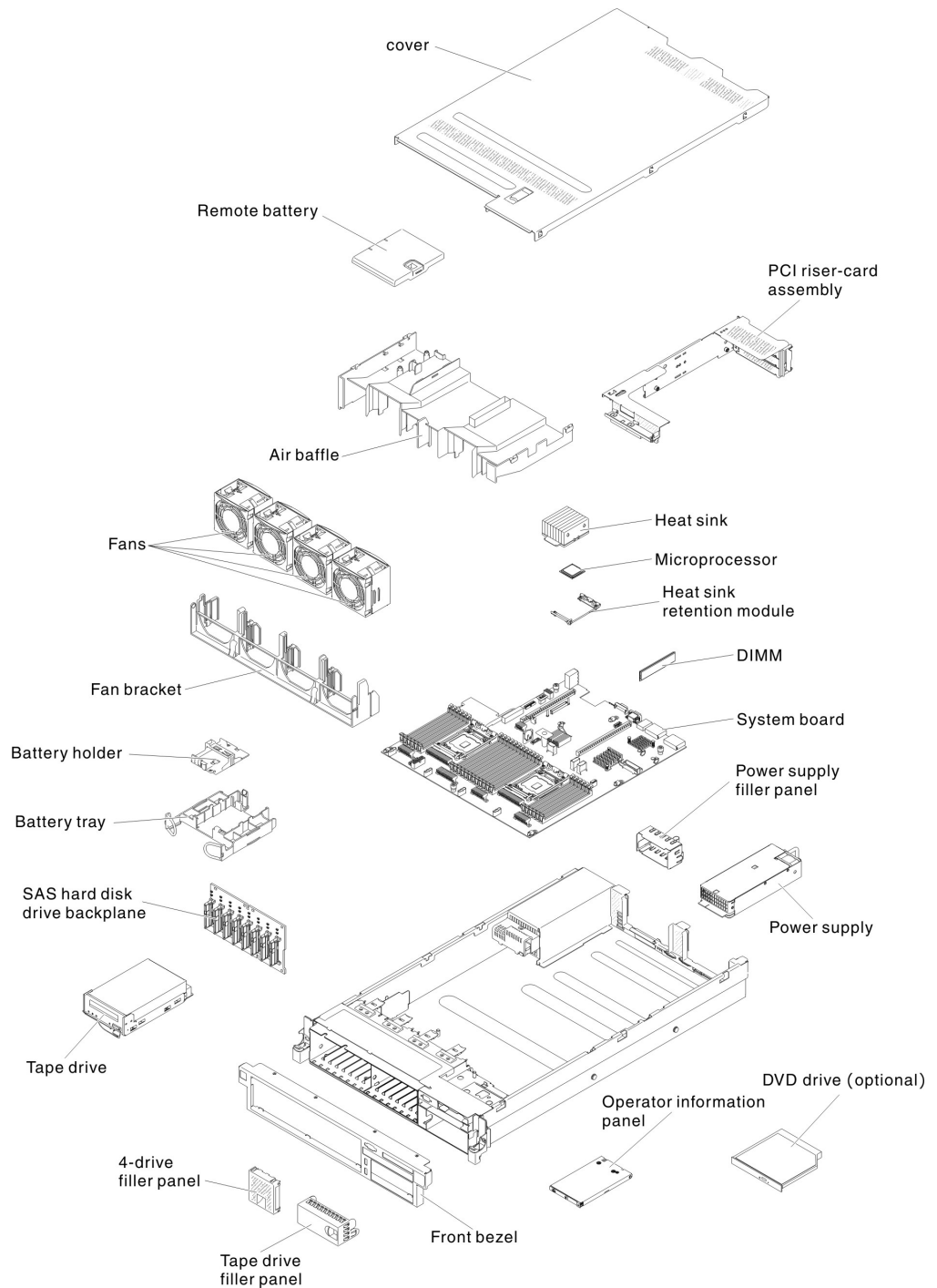- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server 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

The system reliability guidelines to ensure proper system cooling.

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 fan when you installed the second microprocessor option.

Working inside the server with the power on

Guidelines to work 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

Use this information to handle 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

Use this information to remove the cover.

About this task

To remove the server cover, complete the following steps:

Procedure
1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
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.
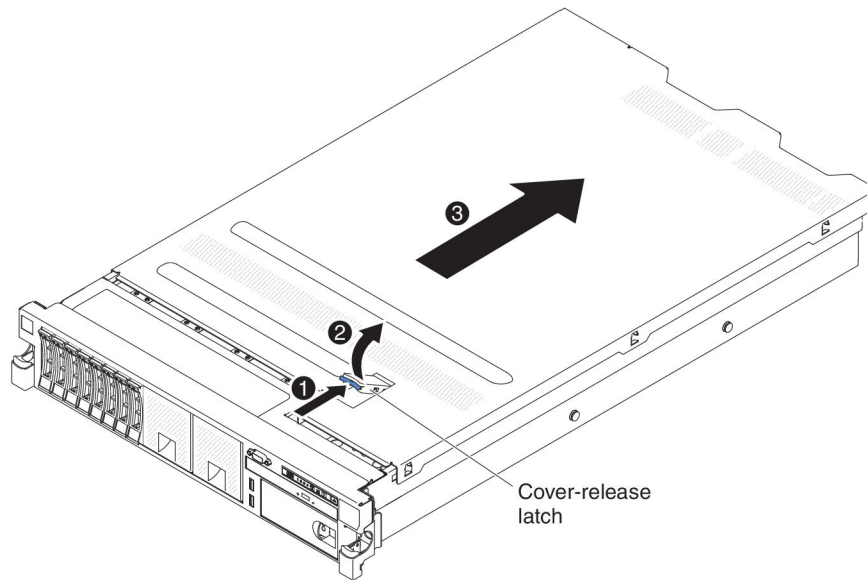
Figure 21. Cover removal

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.

Results

Removing a PCI riser-card assembly

Use this information to remove a PIC riser-card assembly.

About this task

The server comes with one riser-card assembly (with option to add one more) that each contains two to three PCI slots. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of riser-card assemblies that you can use with the server.

To remove a PCI riser-card assembly, complete the following steps:

PCI riser-card
assembly 2

PCI riser-card
assembly 1
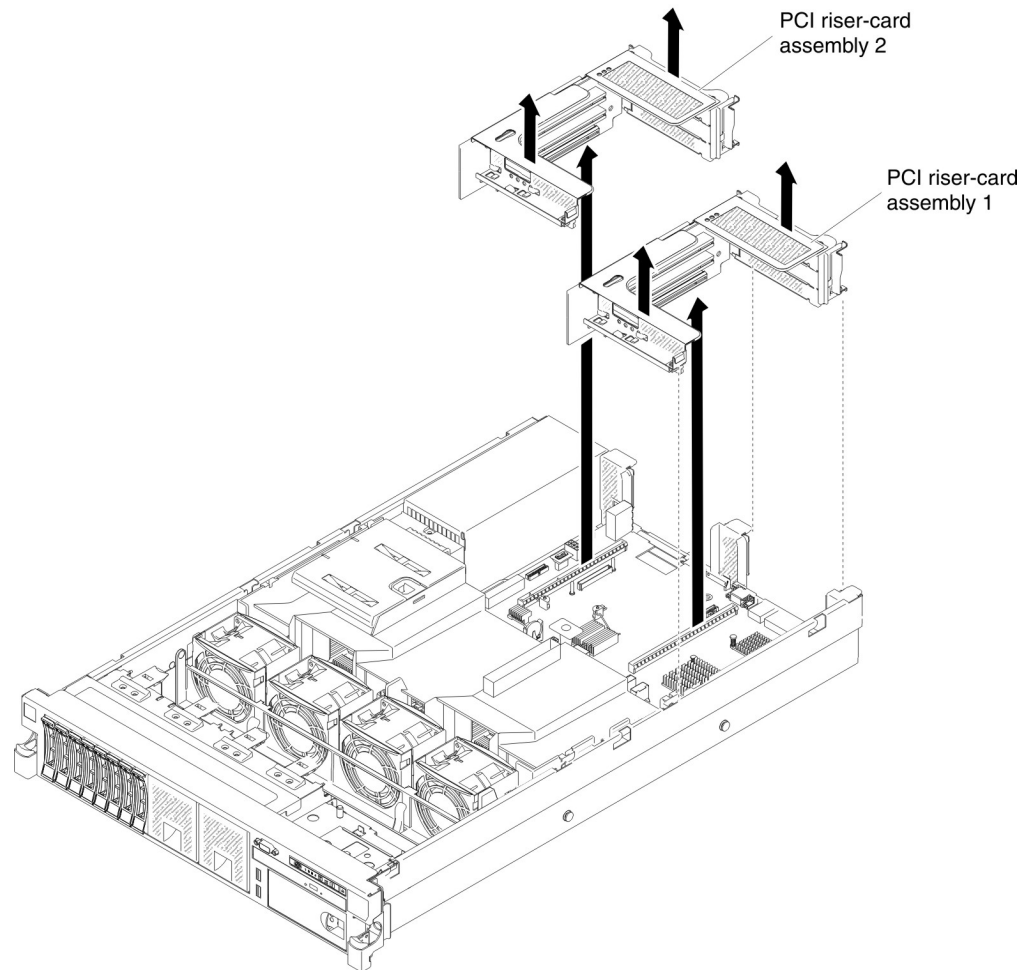
Figure 22. Removing PCI riser-card assembly

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see "Removing the cover" on page 37).
4. Grasp the assembly at the front tab and rear edge and lift it to remove it from the server. Place the riser-card assembly on a flat, static-protective surface.

Removing the air baffle

When you work with some optional devices, you must first remove the air baffle to access certain components or connectors on the system board. The following illustration shows how to remove the air baffle.

About this task
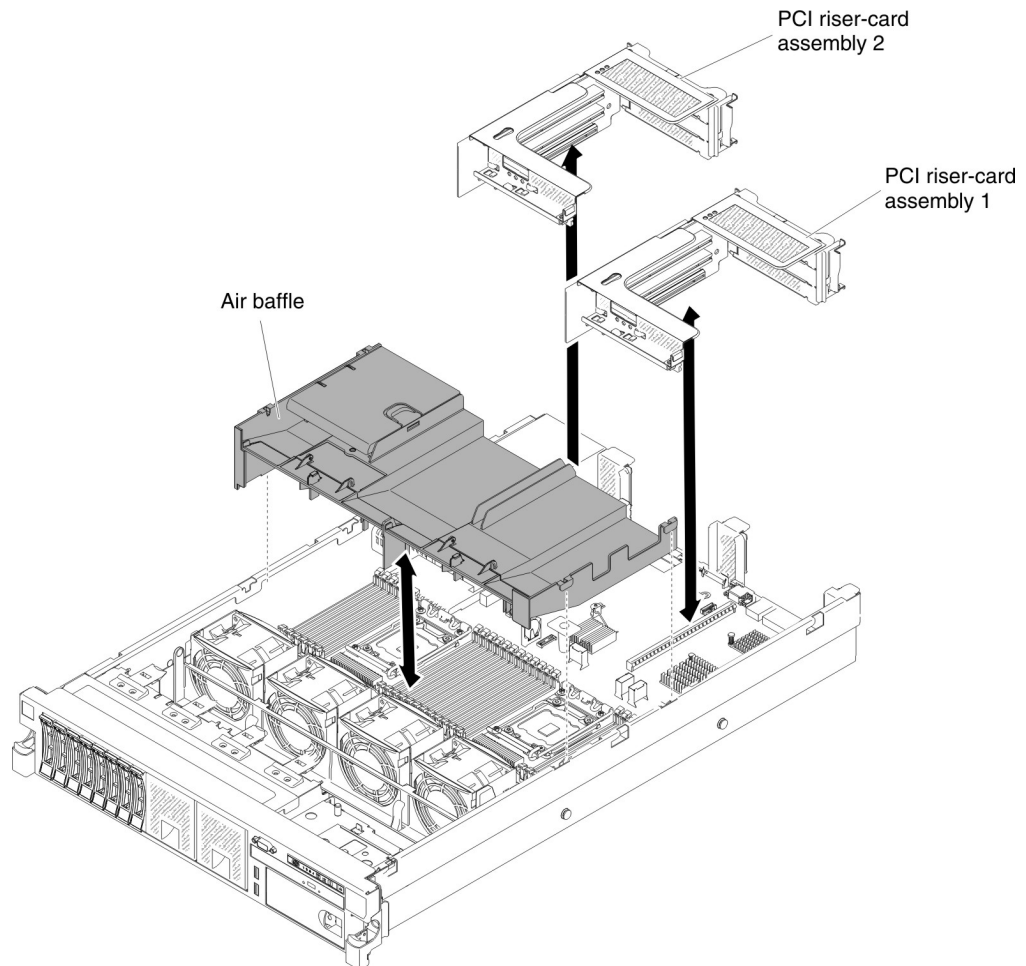
Figure 23. Air baffle removal

To remove the air baffle, complete the following steps:

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove PCI riser-card assemblies, if needed (see "Removing a PCI riser-card assembly" on page 38).
5. Place your fingers under the front and back of the top of the air baffle; then, lift the air baffle out of the server.

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.

Stretching a PCI riser-card assembly

Use this information to stretch a PCI riser-card assembly.

About this task

Note: It is not necessary to capture adaptor card with the full-length adaptor bracket when installing half length adaptor cards.

If you are installing a full-length adapter in the upper riser-card PCI slot, you must first stretch the PCI riser-card assembly.
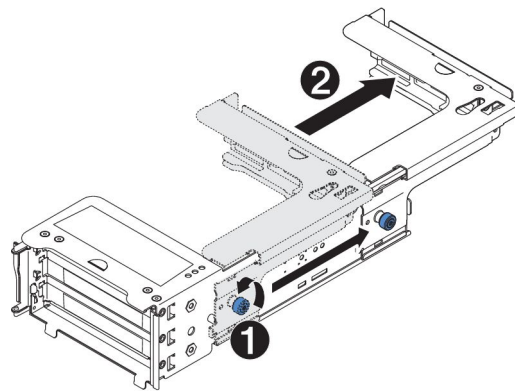
Figure 24. Stretching a PCI riser-card assembly

To stretch the riser-card assembly, complete the following steps:

Procedure

1. Orient the riser-card assembly as shown.
2. Rotate the thumb screw 1, which is close by the PCI slot end, counterclockwise and lengthen the PCI riser-card assembly 2.
3. Fasten the thumbscrew.
4. Return to the adapter-installation instructions.

Shrinking a PCI riser-card assembly

Use this information to shrink a PCI riser-card assembly.

About this task

If you are removing a full-length adapter in the upper riser-card PCI slot and will replace it with a shorter adapter or no adapter, you must shrink the full-length PCI riser-card assembly.
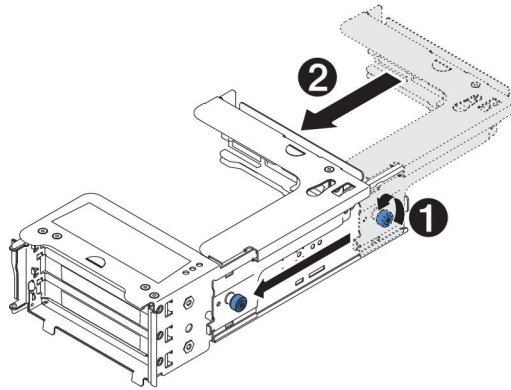
Figure 25. Shrinking a PCI riser-card assembly

To shrink the full-length PCI riser-card assembly, complete the following steps:

Procedure

1. Rotate the thumb screw 1, which is far from the PCI slot end, counterclockwise and shorten the PCI riser-card assembly 2.
2. Fasten the thumbscrew.
3. Return to "Installing an adapter" on page 62 or "Installing a PCI riser-card assembly" on page 129, as applicable.

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 sixteen 2.5-inch or six 3.5-inch hot-swap SAS or SATA hard disk drives.
- The simple-swap server models support up to thirty-two 1.8-inch solid-state drives or six 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/.

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.

Installing a hot-swap hard disk drive

Use this information to install a hot-swap hard disk drive.

About this task

- Before you install an additional hot-swap hard disk drive, go to Table 2 on page 10 for detailed power supply configurations.

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).

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 26. 2.5-inch hot-swap hard disk drives installation

3.5-inch hot-swap
hard disk drive

Latch

Handle   Filler panel
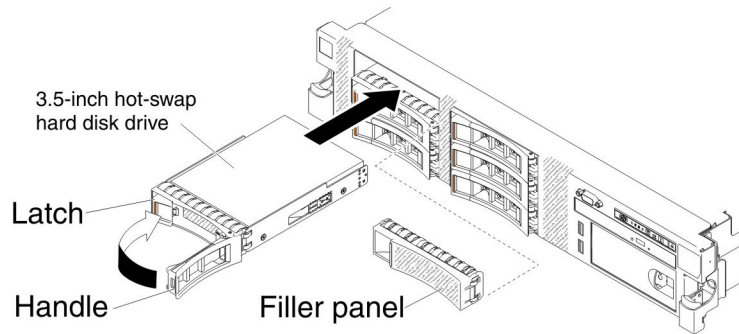
Figure 27. 3.5-inch hot-swap hard disk drives installation

   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.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing a simple-swap hard disk drive

Use this information to install a simple-swap hard disk drive.

About this task

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 six 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.
- 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.

- Before you install an additional simple-swap hard disk drive, go to Table 2 on page 10 for detailed power supply configurations.

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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.
   b. Gently push the drive into the bay until the drive stops.
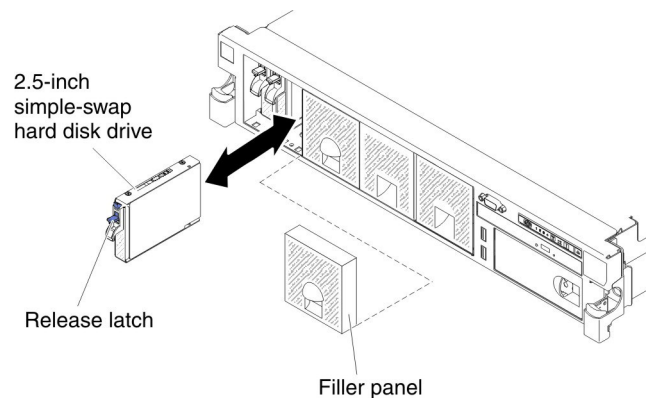
Figure 28. 2.5-inch simple-swap hard disk drive installation
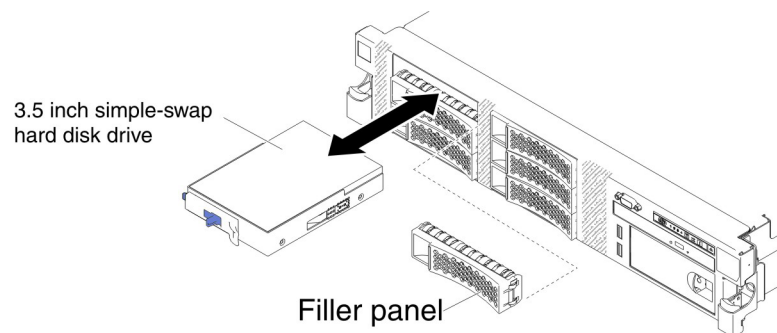
Figure 29. 3.5-inch simple-swap hard disk drive installation

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 a 1.8-inch hot-swap solid state drive

Use this information to install a 1.8-inch hot-swap solid state drive.

About this task

To install a 1.8-inch hot-swap solid state drive, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Remove the filler panel. 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 handle is in the open (unlocked) position.
   b. Align the drive with the guide rails in the bay.

Figure 30. 1.8-inch hot-swap solid state drives installation

   c. Gently push the drive into the bay until the drive stops.
   d. Rotate the handle to the closed (locked) position.
   e. Check the solid state drive status LED to verify that the solid state drive is operating correctly. If the yellow solid state drive status LED of a drive is lit continuously, that drive is faulty and must be replaced. If the green solid state 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 solid disk drives. See the ServeRAID adapter documentation for additional information about RAID operation and complete instructions for using the ServeRAID adapter.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127

Installing an optional DVD drive

Use this information to install an optional DVD drive.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
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.

Figure 31. 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.
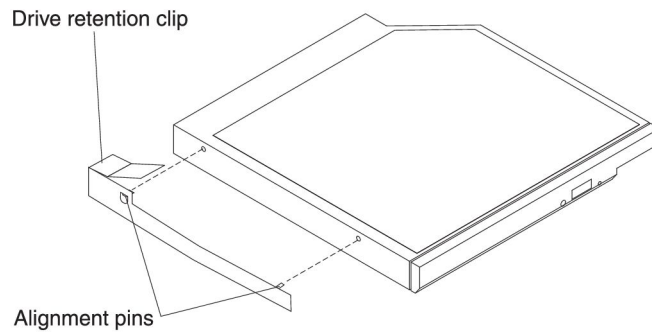
Figure 32. DVD drive retention clip installation

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.
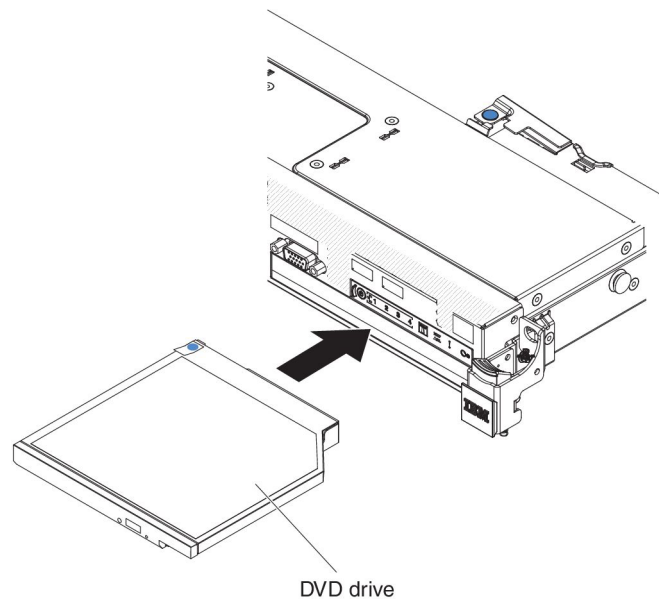
Figure 33. DVD drive installation

10. Connect the DVD drive cable (see "Replacing the DVD drive cable" on page 267). The following illustration shows the cable routing for the DVD drive:

Release tab

Optical drive
connector

DVD drive
cable

Cable connector
latch
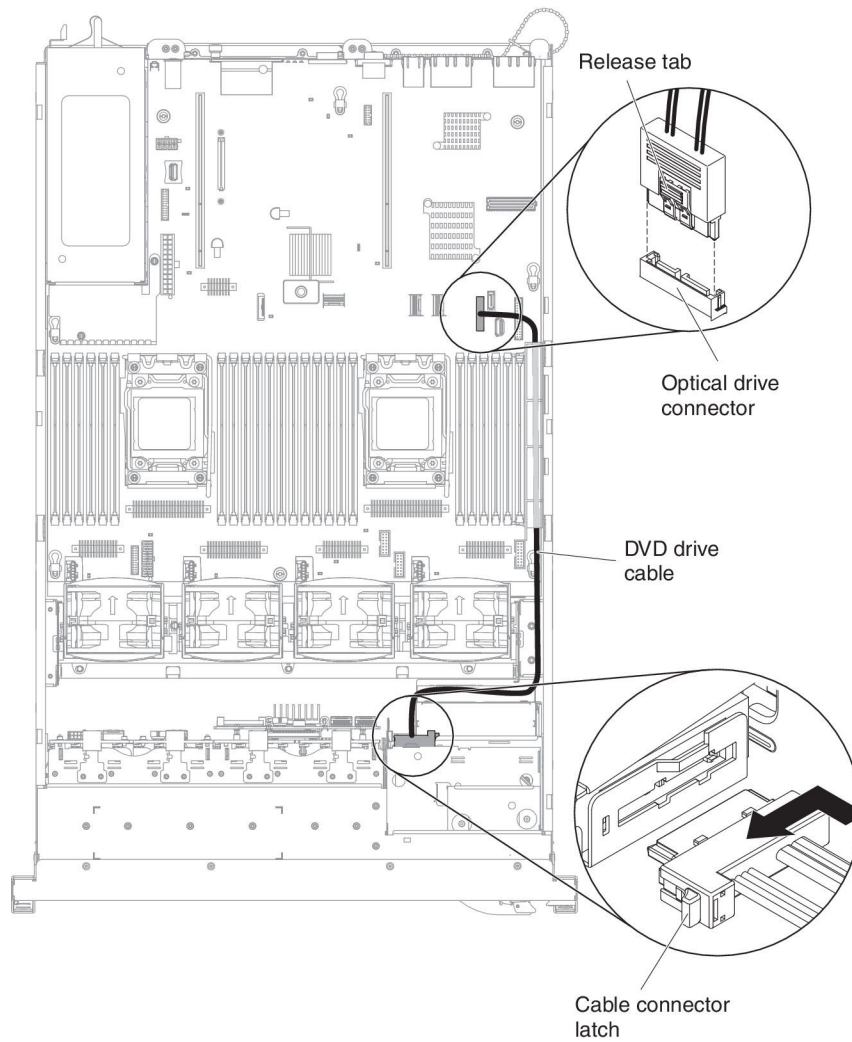
Figure 34. DVD drive cable routing

Results

If you have other devices to install or remove, do so now. Otherwise, go to
"Completing the installation" on page 127.

Installing an optional DVD drive cable

Use this information to install an optional DVD drive cable.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
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 35. 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.
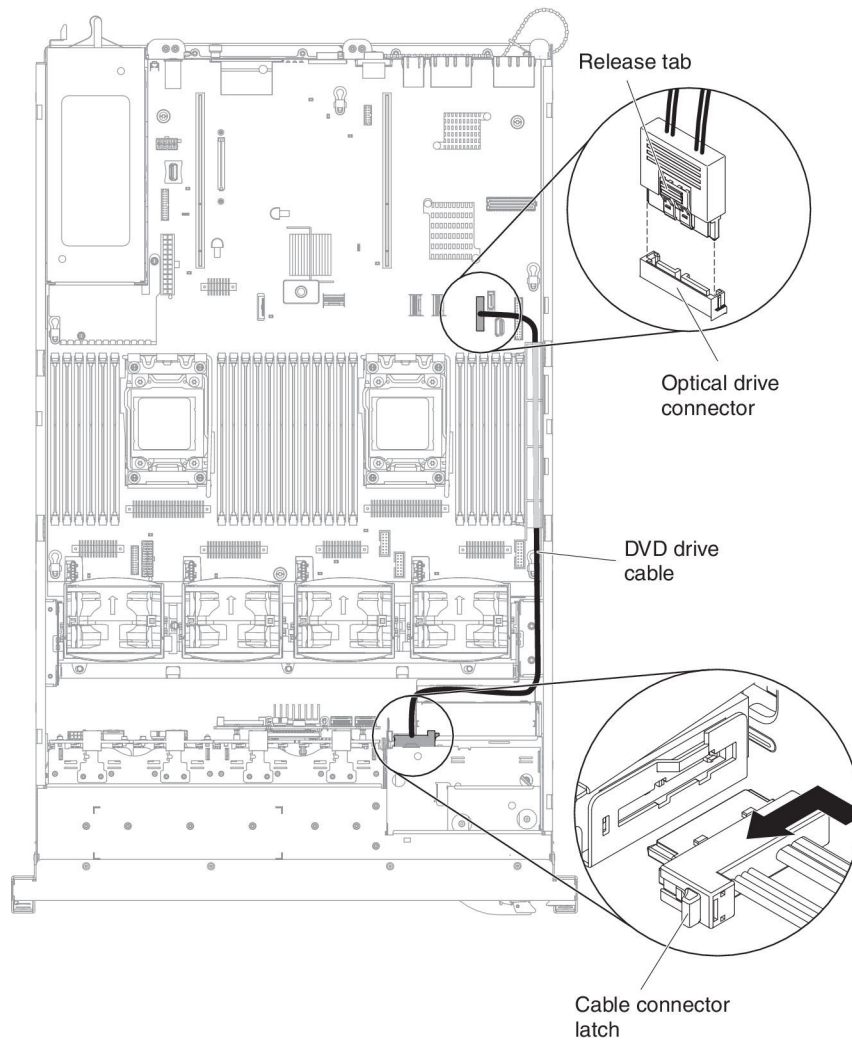
Figure 36. DVD drive cable routing

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

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 6. 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
24	HCDIMMs	16 GB	384 GB
24	HCDIMMs	32 GB	768 GB
16	Quad-rank RDIMMs	8 GB	128 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 HCDIMM options that are available for the server are 16 GB and 32 GB. The server supports a minimum of 16 GB and a maximum of 768 GB of system memory using HCDIMMs.

  Note: Do not mix the 16 GB HCDIMM and the 32 GB HCDIMM in the server.
- 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 134.
- 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, HCDIMM, 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.

Microprocessor 1

CPU1

DIMM 12
DIMM 11
DIMM 10
DIMM 9
DIMM 8
DIMM 7

DIMM 6
DIMM 5
DIMM 4
DIMM 3
DIMM 2
DIMM 1

DIMM 24
DIMM 23
DIMM 22
DIMM 21
DIMM 20
DIMM 19

CPU2

DIMM 18
DIMM 17
DIMM 16
DIMM 15
DIMM 14
DIMM 13

Microprocessor 2

Figure 37. 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 7. 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 138. 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 38. Connectors on each memory channel

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

Table 8. 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 8. 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 138. 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 39. 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 9. 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 9. 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

Use this information to install a memory module.

About this task

- Before you install an additional memory module, go to Table 2 on page 10 for detailed power supply configurations.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. If PCI riser-card assembly 1 contains one or more adapters, remove riser-card assembly 1 (see "Removing a PCI riser-card assembly" on page 38).
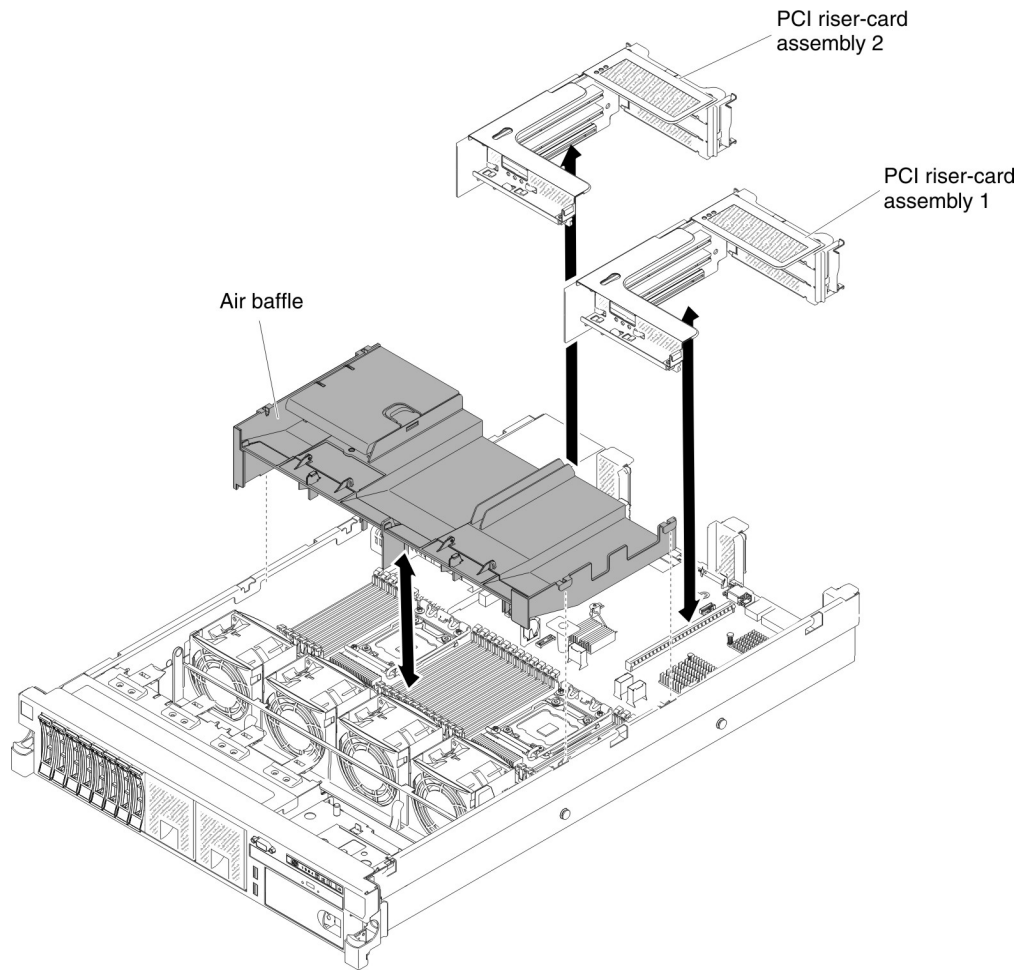
Figure 40. Removing PCI riser-card assembly

5. Remove the air baffle (see "Removing the air baffle" on page 40).
6. 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.
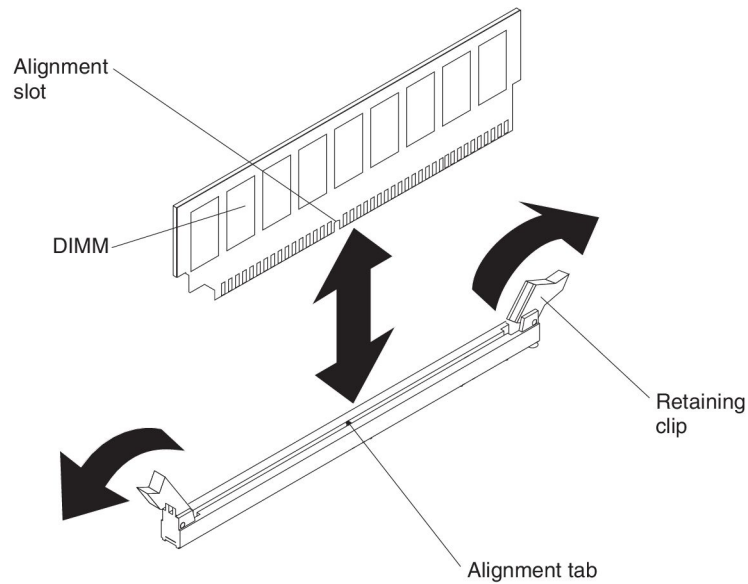
Figure 41. DIMM removal

7. 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.
8. Turn the DIMM so that the alignment slot align correctly with the alignment tab.
9. 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).
10. 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.
11. Install the air baffle (see "Replacing the air baffle" on page 246).
12. Install PCI riser-card assembly 2, if you removed it (see "Installing a PCI riser-card assembly" on page 129).

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing an adapter

The following illustration shows the PCI adapter expansion slots from the rear of the server.

About this task

Table 10. The maximal card dimension supported in each slot (rear view)

PCI riser-card assembly 1		PCI riser-card assembly 2	
1	Full height, up to full length	4	Full height, up to full length
2	Full height, half length	5	Full height, up to full length
3	Full height, half length	6	Full height, half length

Note: If you are installing a ServeRAID-M5110 with x3650 M4 Plus 8 2.5-inch HS HDD Assembly Option Kit, it can only be installed in PCI slot 2; if you are installing a ServeRAID-M5120 or an IBM LLM-SM dual port 10GbE SFP+ adapter, it can only be installed in PCI slot 1, 2, 4, or 5.

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 two internal SAS connectors and two SAS/SATA RAID riser-card 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 11. NVIDIA Quadro video adapter configurations

Description	Supported maximum total memory size
Quadro 600 adapter	128 GB
Quadro 2000 adapter	512 GB
Quadro 4000 adapter	512 GB
Quadro 6000 adapter	512 GB

- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported
- The server does not support 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.

- Before you install an additional adapter, go to Table 2 on page 10 for detailed power supply configurations.

The following illustration shows the adapter connectors on the PCI riser-card assembly.
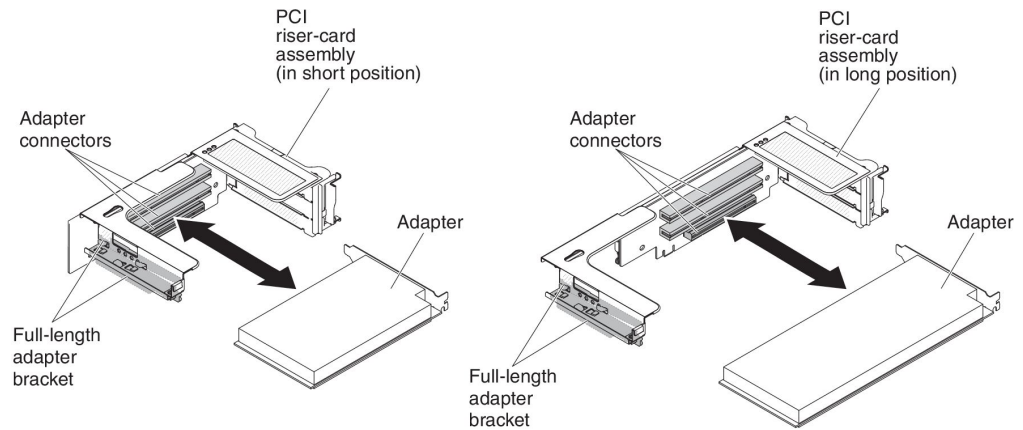
Figure 42. PCI riser-card adapter connectors

To install an adapter, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 37).

4. Determine which expansion slot you will use for the adapter.

5. If you are installing an adapter in PCI expansion slot 1, 2, or 3, remove PCI riser-card assembly 1; if you are installing an adapter in PCI expansion slot 4, 5, or 6, remove PCI riser-card assembly 2. See "Removing a PCI riser-card assembly" on page 38.

6. Rotate the bracket out of the way.

7. Slide the expansion-slot cover out of the PCI riser-card assembly expansion slot.
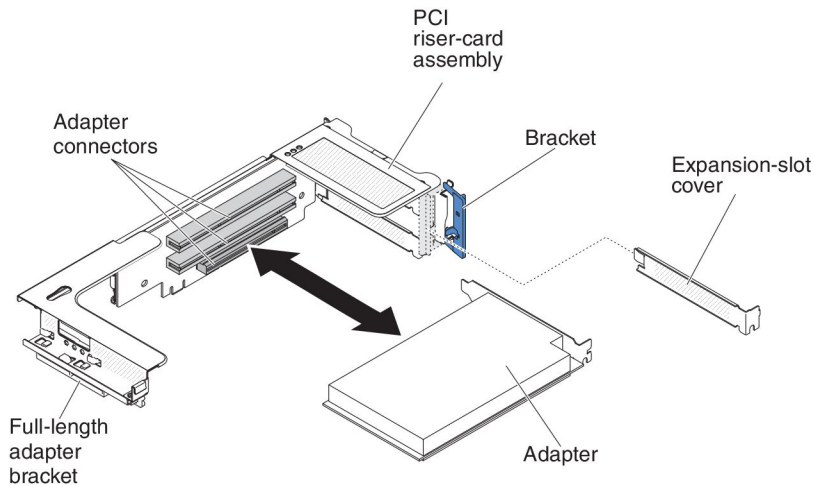
Figure 43. Adapter installation

8. Install the adapter:

   a. For riser 1: if the adapter is a full-length adapter for the upper expansion slot in the riser card, remove the full-length-adapter bracket from underneath the top of the riser-card assembly and insert it in the end of the upper expansion slot of the riser-card assembly. See "Stretching a PCI riser-card assembly" on page 41 for instructions.

   b. For riser 2: if the adapter is a full-length adapter for the upper expansion slot in the riser card, the bracket is on the cage by default. Insert it in the end of the upper expansion slot of the riser-card assembly. See "Stretching a PCI riser-card assembly" on page 41 for instructions.
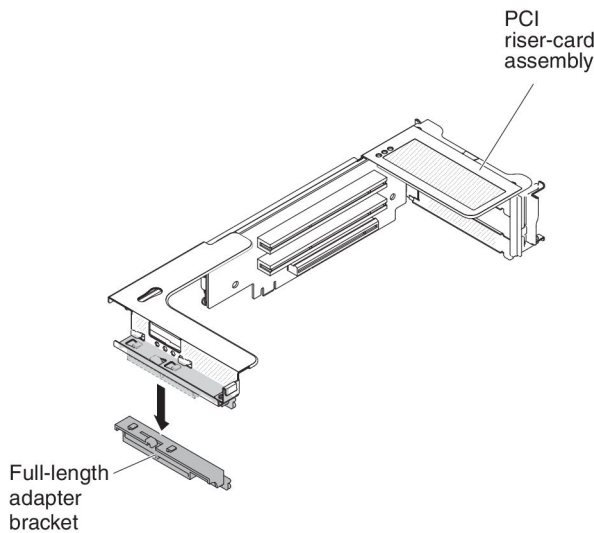
Figure 44. PCI riser-card assembly

   c. Align the adapter with the PCI connector on the riser card and the guide on the external end of the riser-card assembly.

   d. Press the adapter firmly into the PCI connector on the riser card.
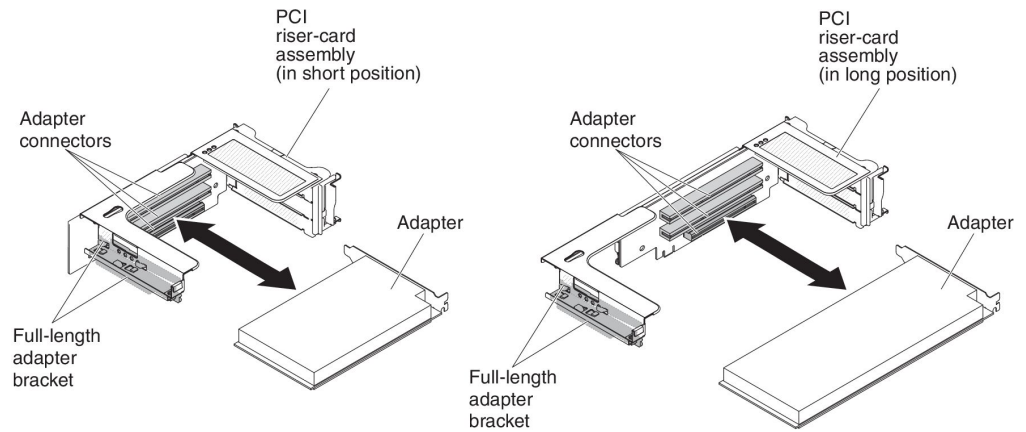
Figure 45. PCI riser-card adapter connectors

9. Connect any required cables to the adapter.

   Attention:

   - When you route cables, do not block any connectors or the ventilated space around any of the fans.
   - Make sure that cables are not routed on top of components that are under the PCI riser-card assembly.
   - Make sure that cables are not pinched by the server components.

10. Align the PCI riser-card assembly with the selected PCI riser-card connector on the system board.
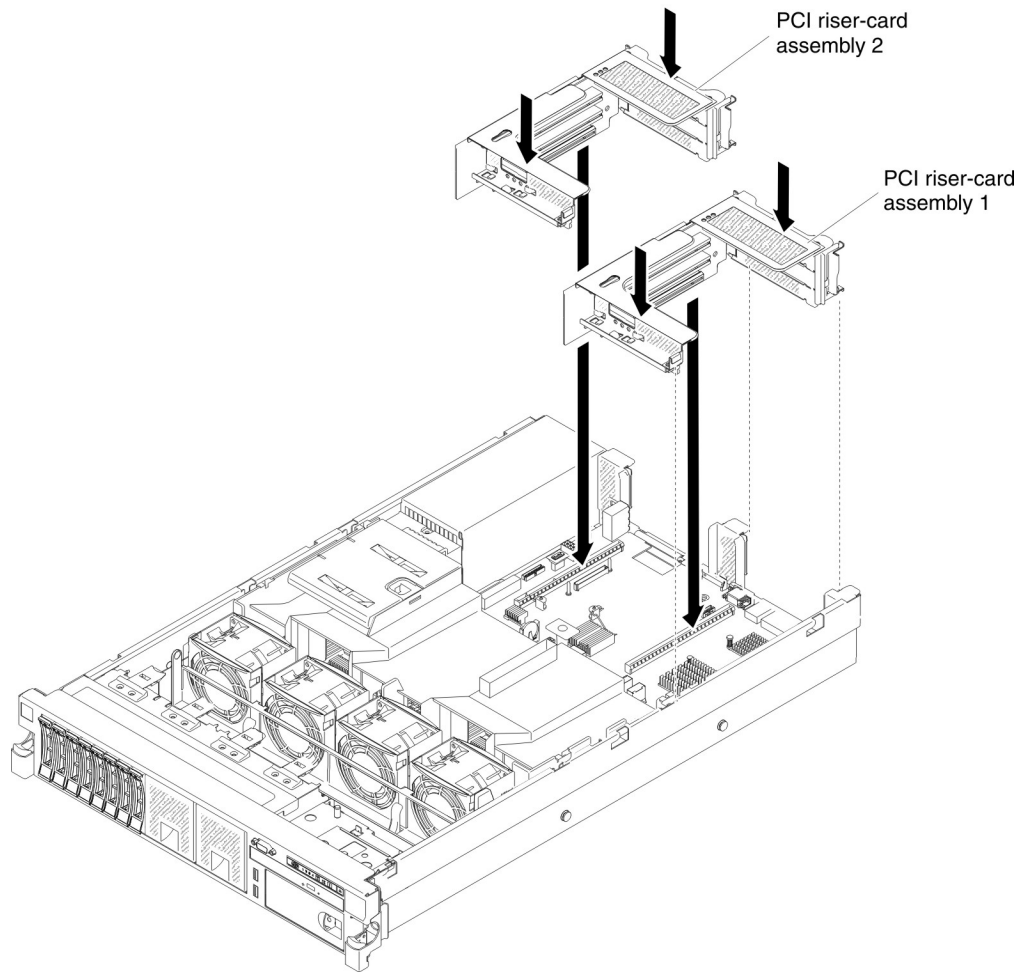
Figure 46. Installing PCI riser-card assembly

- PCI riser-card connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets in the side of the chassis; align the rear of the assembly with the guides on the rear of the server.
- PCI riser-card connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the PCI riser-card connector on the system board; align the rear of the assembly with the guides on the rear of the server.

11. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the PCI riser-card connector on the system board.

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

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing an optional ServeRAID upgrade adapter

Use this information to install an optional ServeRAID upgrade adapter.

About this task

To install an optional ServeRAID upgrade adapter, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Connect the supercap cable to the ServeRAID upgrade adapter.
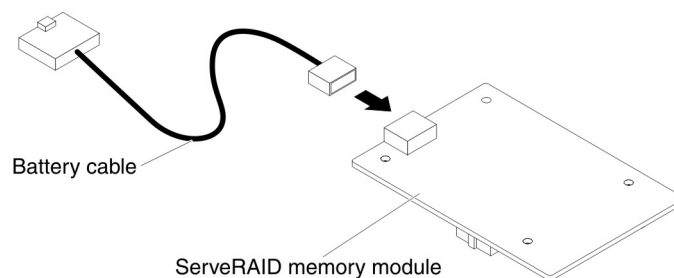
Figure 47. ServeRAID upgrade adapter and supercap cable

5. Attach the three pegs to the ServeRAID upgrade adapter and install the ServeRAID upgrade adapter into the system board.
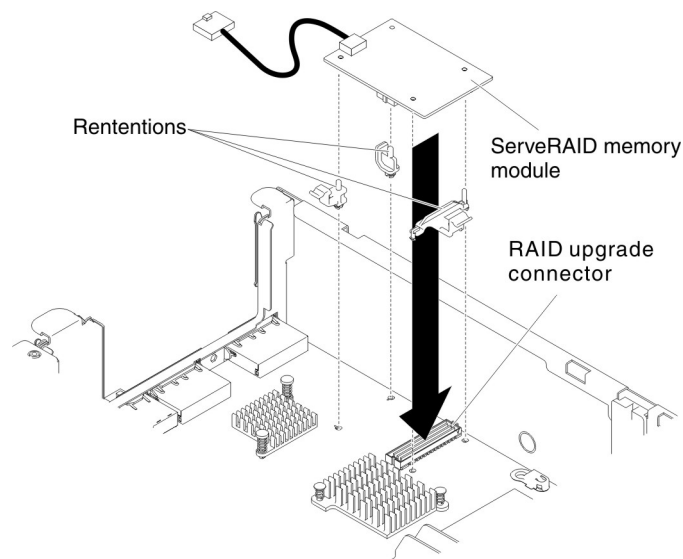
Figure 48. Installing ServeRAID upgrade adapter and supercap cable

6. Connect the other end of the supercap cable to the battery.
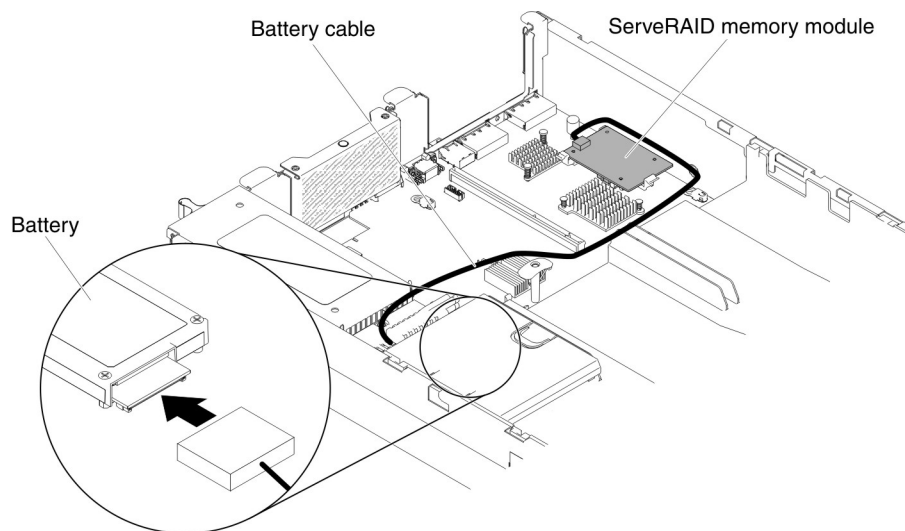
Figure 49. Connecting the supercap cable

> **Note:** Make sure the battery is seated properly (see "Installing a ServeRAID SAS controller battery on the remote battery tray").

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing a ServeRAID SAS controller battery on the remote battery tray

Use this information to install a ServeRAID SAS controller battery on the remote battery tray.

About this task

> **Note:** For brevity, in this documentation the Intelligent Battery Backup Unit (iBBU) is often referred to as the *battery*.

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. The batteries must be installed near the fan cage.

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

> **Note:** If you are installing ServeRAID-M5100 Series 512 MB cache RAID 5 upgrade that comes with a battery, you must install the battery in ServeRAID SAS controller remote battery retention instead (see "Installing an optional ServeRAID SAS controller battery holder").

Battery 4 / flash power module 4

Battery 3 / flash power module 3
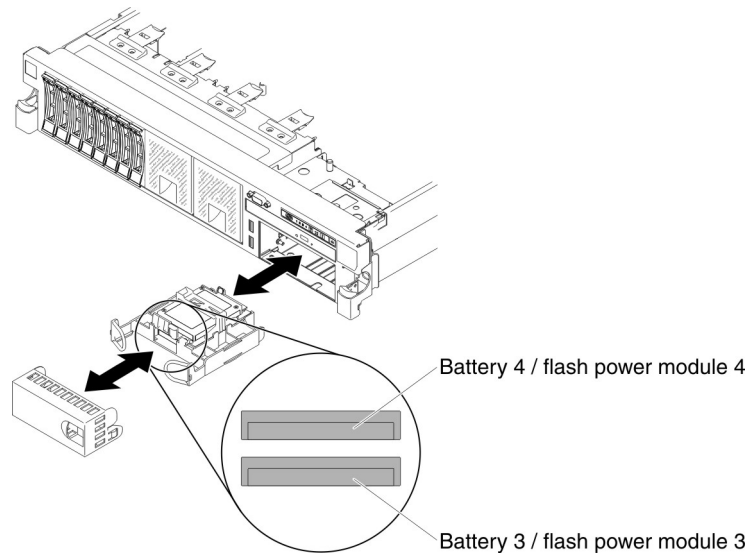
Figure 50. Installing a ServeRAID SAS controller battery on the remote battery tray

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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

3. Remove the cover (see "Removing the cover" on page 37).

4. Connect one end of the battery cable to the ServeRAID SAS controller battery connector.

5. Route the remote battery cable along the chassis.

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

6. Install the battery near the fan cage:

   a. Align the battery cable connector with the slot on the battery holder. Place the battery into the battery holder and make sure that the battery holder engages the battery securely.

Battery 2 / flash power module 2

Battery 1 / flash power module 1
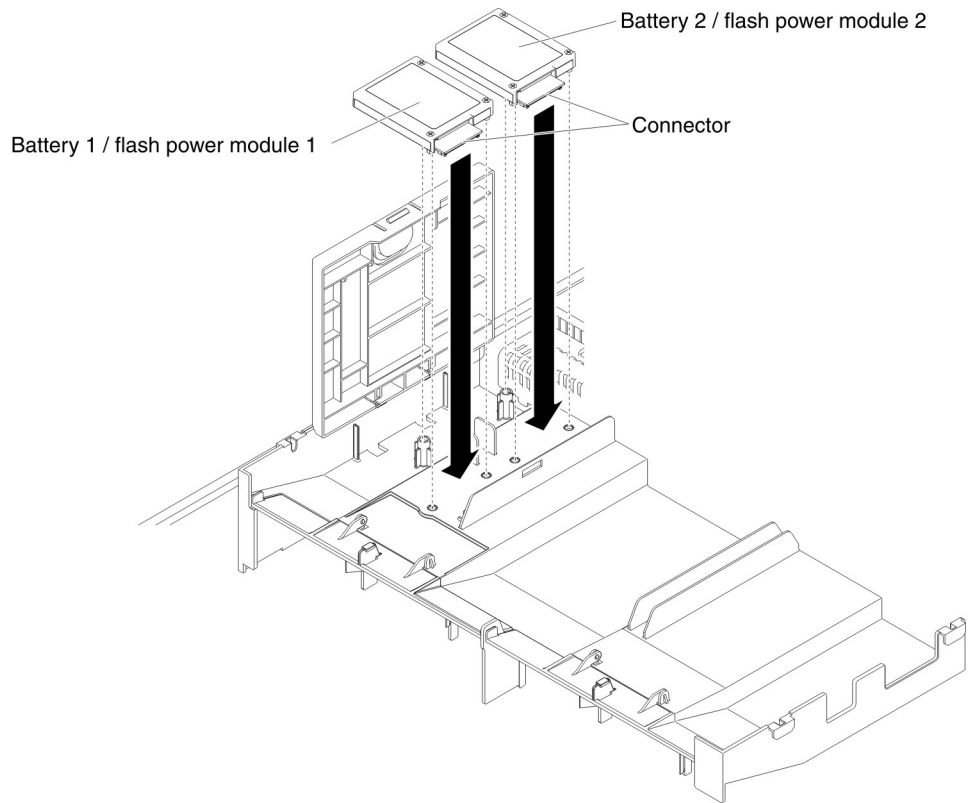
Connector

Figure 51. RAID adapter battery installation

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

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

c. Place the battery retention clip underneath while pressing the release tab toward the front of the server until it snaps in place to hold the battery retention clip firmly in place.

Note: The battery must recharge for at least 6 hours under normal operating conditions. To protect your data, the ServeRAID controller firmware changes the write policy to write-through until the battery unit is sufficiently charged. When the battery unit is charged, the ServeRAID controller firmware changes the write policy to write-back.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing the dual-port network adapter

Use this information to install the dual-port network adapter.

About this task

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	Four fans installed required.
Emulex dual-port 10GbE SFP+ Embedded VFA III	90Y6456	90Y5100	
Dual-port FDR embedded adapter	00D4143	90Y6606	
Note: You can purchase IBM System x3650 M4 Thermal Solution Kit (option part number 46W8422) to acquire an additional fan for your server.			

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 138), 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 138), 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 x3650 M4** > **7915**.

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 37).

4. Remove the PCI riser-card assembly (if installed) from PCI riser connector 2 (see "Removing a PCI riser-card assembly" on page 283).

5. Remove the adapter filler panel on the rear of the chassis (if it has not been removed already).

Figure 52. 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.
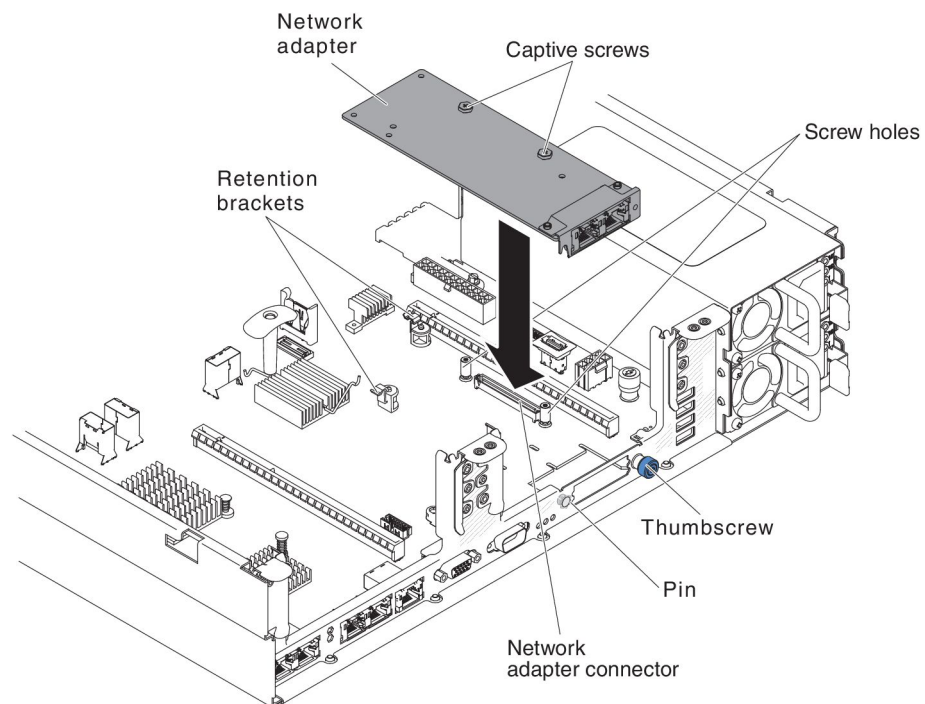
Figure 53. Network adapter installation

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.

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 284).

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing a hot-swap ac power supply

Use this information to install a hot-swap ac power supply.

About this task

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.

- Before you install an additional power supply or replace a power supply with one of a different wattage, go to Table 2 on page 10 for detailed configurations.

- 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.

Figure 54. Power supply installation

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 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.

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 install power supplies of different watt 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.
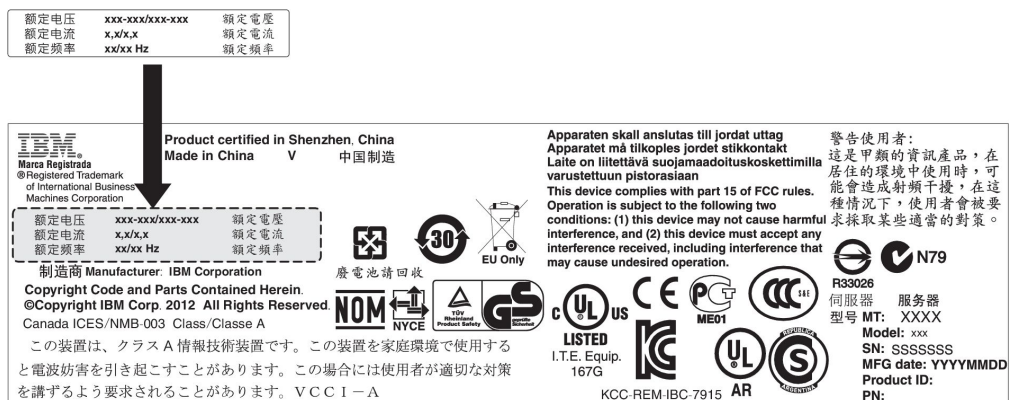
Figure 55. Power information label

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.
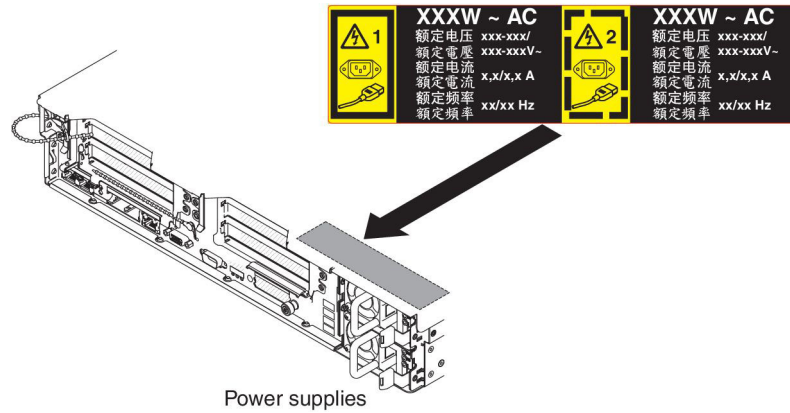
Power supplies

Figure 56. Attaching the redundant power information label

Installing a hot-swap dc power supply

Use this information to install a hot-swap dc power supply.

About this task

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.
- Before you install an additional power supply or replace a power supply with one of a different wattage, go to Table 2 on page 10 for detailed configurations.
- 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 mm² (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 below.

- 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.	
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.
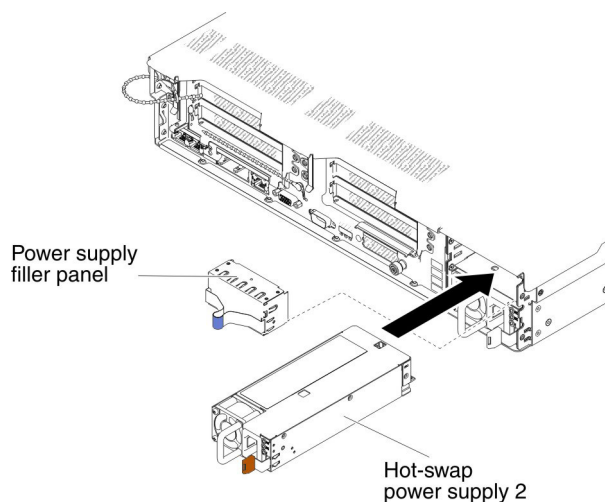
Statement 34

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.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 57. 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.
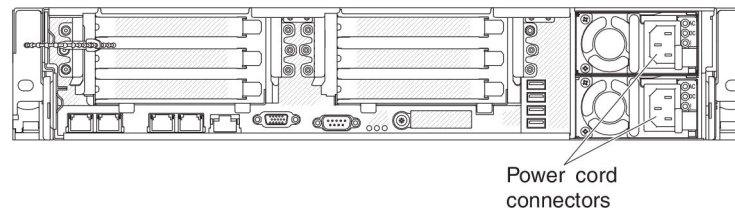
Figure 58. Power supply installation

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 "Installing a hot-swap dc power supply" on page 77. 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 59. 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 60. Redundant power information label

Installing a hot-swap fan

Use this information to install a hot-swap fan.

About this task

The server comes standard with three replaceable double fans. For proper cooling, the server requires that all four fans be installed at all times.

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:

Vertical tabs

Fan 4

Fan 3

Fan 2

Fan 1

Figure 61. Fan installation

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

2. Remove the cover (see "Removing the cover" on page 37).

   Attention: To ensure proper system cooling, do not remove the top cover for more than 30 minutes during this procedure.

3. Rotate the air baffle up.

4. Orient the new fan over its position in the fan bracket so that the connector on the bottom aligns with the fan connector on the system board.

5. Align the vertical tabs on the fan with the slots on the fan cage bracket.

6. Push the new fan into the fan connector on the system board. Press down on the top surface of the fan to seat the fan fully. Make sure that the yellow LED next to the fan connector on the system board is off.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing a SAS/SATA 8 Pac HDD option

Use this information to install a SAS/SATA 8 Pac HDD option.

About this task

You can install an IBM System x3650 M4 Hot-swap SAS/SATA 8 Pac HDD option to add eight additional 2.5-inch hot-swap hard disk drives in the server. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported optional devices. To order a SAS/SATA 8 Pac HDD option, contact your IBM marketing representative or authorized reseller.

The SAS/SATA 8 Pac HDD option kit contains the following components:
* One 2.5-inch hard disk drive backplane
* One SAS expander adapter
* Two M3 x 5 screws
* Two SAS signal cables which attached to the expander adapter

Note: The 8 pac HDD option including structural parts and Tier 1 parts.

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the two 4-drive filler panels that are to the right of drive bay 8, beneath the IDs 8 - 15 on the front bezel.

4-drive
filler panel
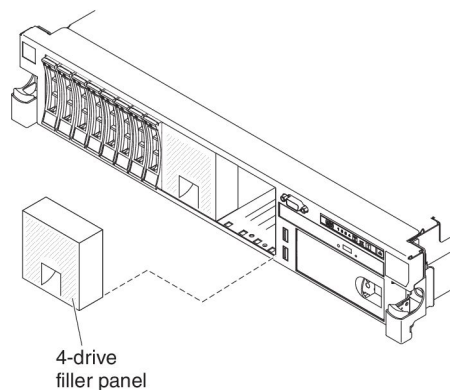
Figure 62. Filler panels

5. To obtain more working room, remove fans 2 and 3 (see "Removing a hot-swap fan" on page 318).
6. Pull the hard disk drives or fillers out of the server slightly to disengage them from the backplanes. For more information, (see "Removing a hot-swap hard disk drive" on page 254).
7. Disconnect the SAS signal cables from the system board. Leave the other end of the SAS signal cables connected to the hard disk drive backplanes.

8. Remove hard disk drive backplane 1 from the server.
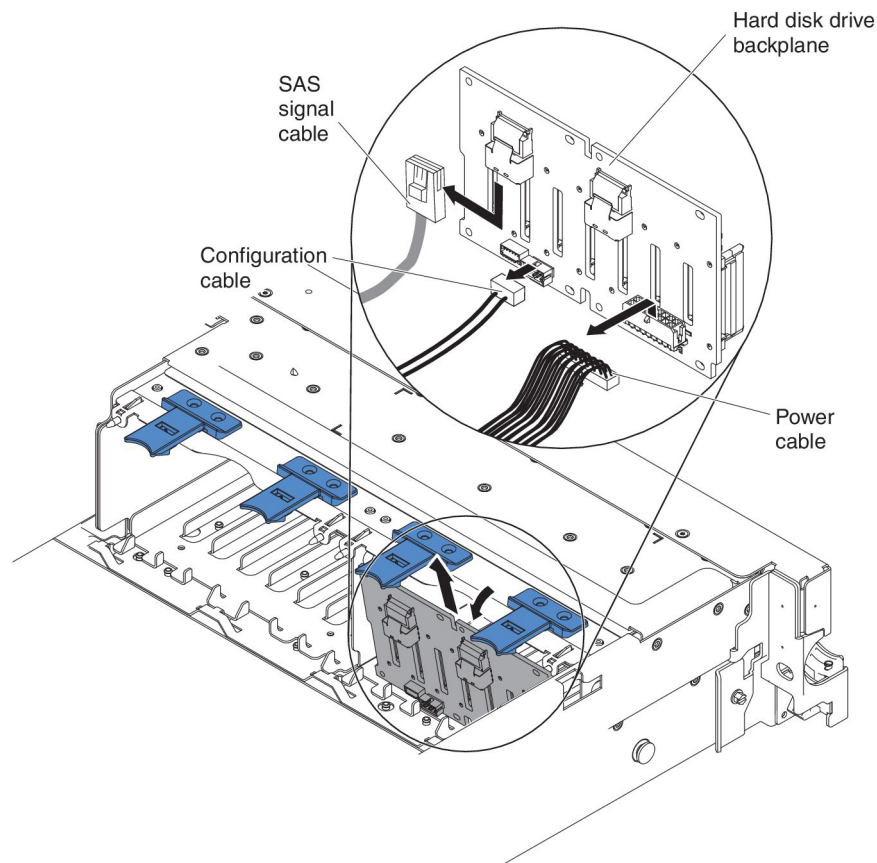
Figure 63. Hard disk drive backplane removal

    a. From backplane 1, disconnect the following cables in the order listed:
- Power cable 1
- SAS signal cable 2
- Configuration cable 3

    b. Lift backplane 1 out of the server by pulling it toward the rear of the server and then lifting it up.

9. Install the new backplane in slot 2:

    a. Connect the SAS signal cable to new backplane 2. The new backplane comes with the option kit.

    b. Connect the configuration cable to backplane 2.

    c. Connect the cables which come with the option kit to backplane 1.
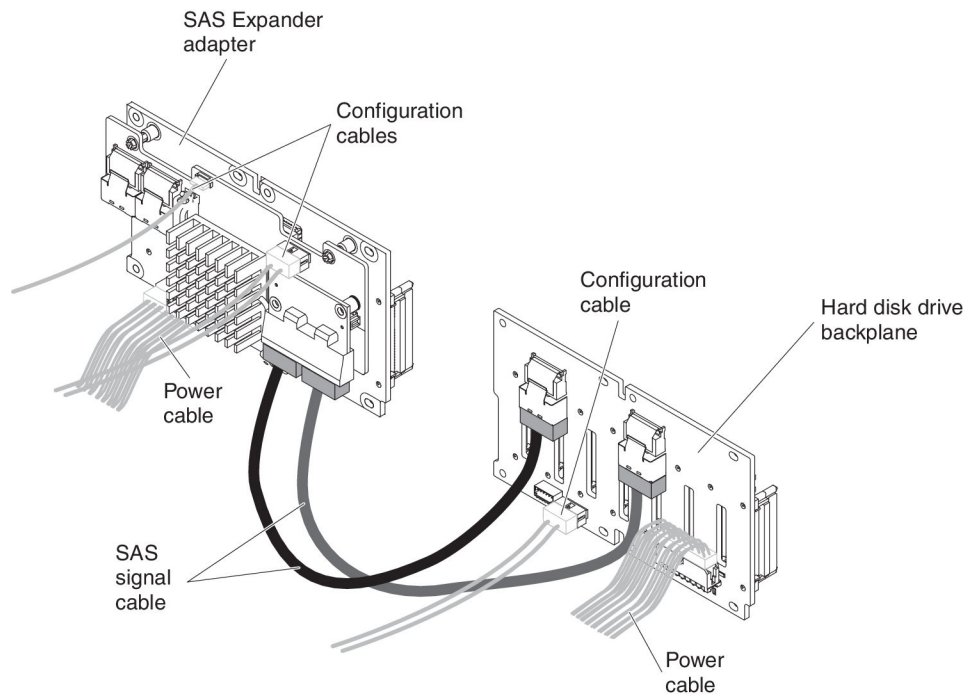
Figure 64. Cables connection

    d. Connect the configuration cable and the power cable back to backplane 1.

    e. Angle the new backplane and place the bottom edge into the slots for backplane 2 on the chassis next to the optical drive.
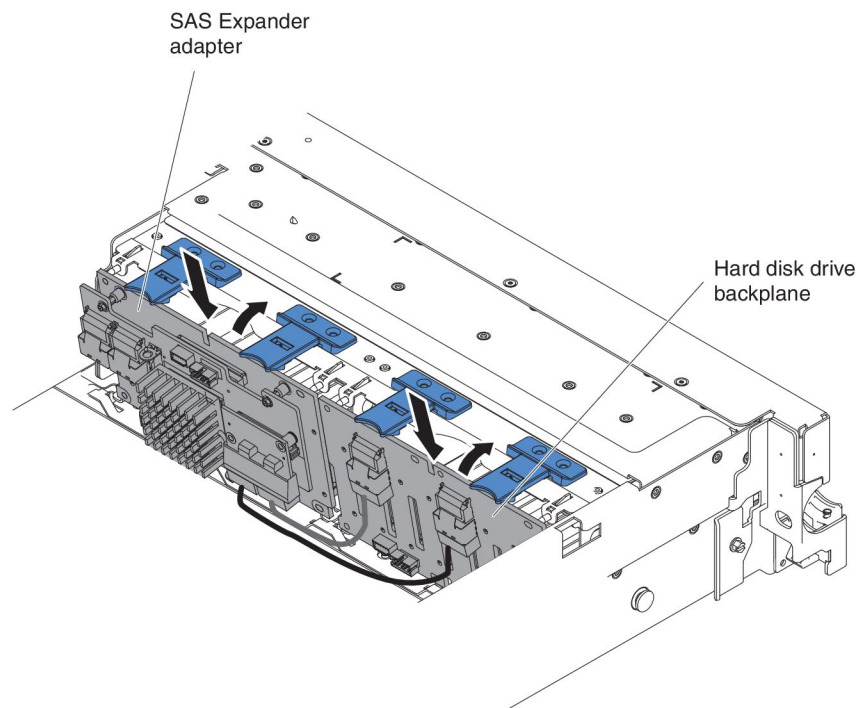
Figure 65. New backplane installation

    f. Angle the backplane and place the bottom edge into the slots for backplane 1 on the chassis.

g. Rotate the backplane upright so that the bracket goes underneath the latch and tabs on the chassis and is engaged into the slots on the backplane bracket.

10. Connect the loose end of the SAS signal cables to the system board. Route the cable underneath the cable retention features on the baffle. See the illustration.

SAS 1

SAS 0
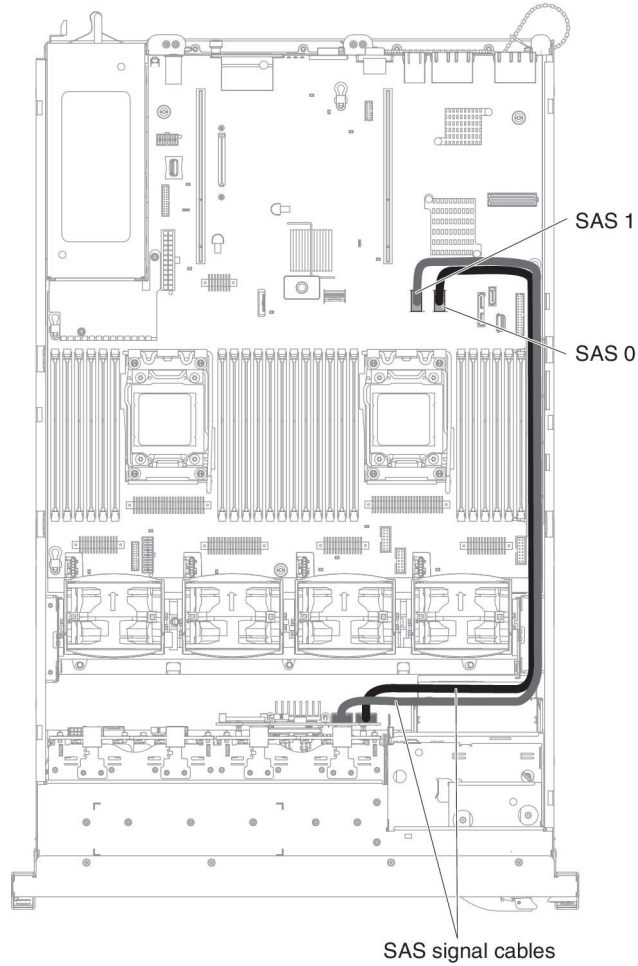
SAS signal cables

Figure 66. SAS signal cables routing

11. Make sure that the configuration cable is connected to the backplanes and system board.

Configuration cable
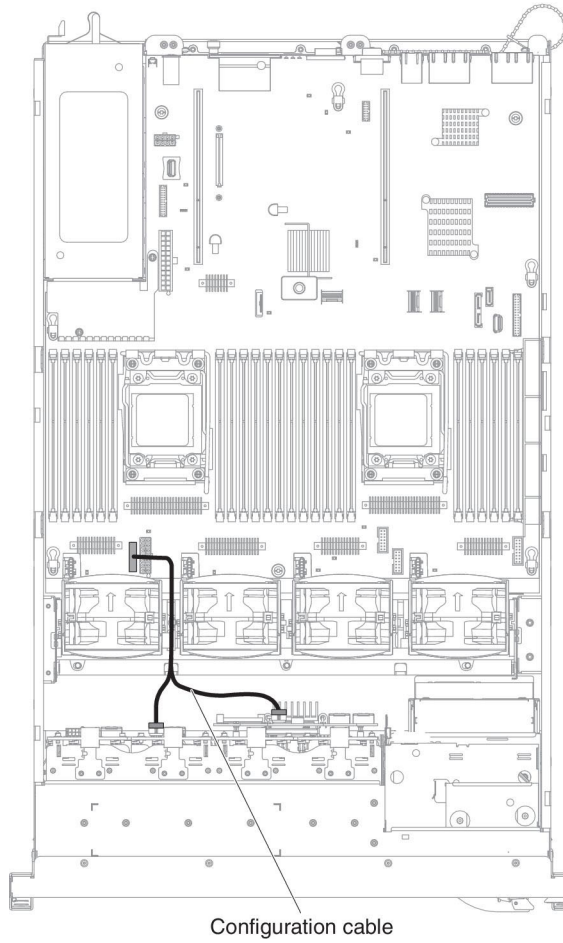
Figure 67. Configuration cable routing

12. Make sure that the SAS power cable is connected to the backplanes and
    system board.

SAS/SATA
power cable
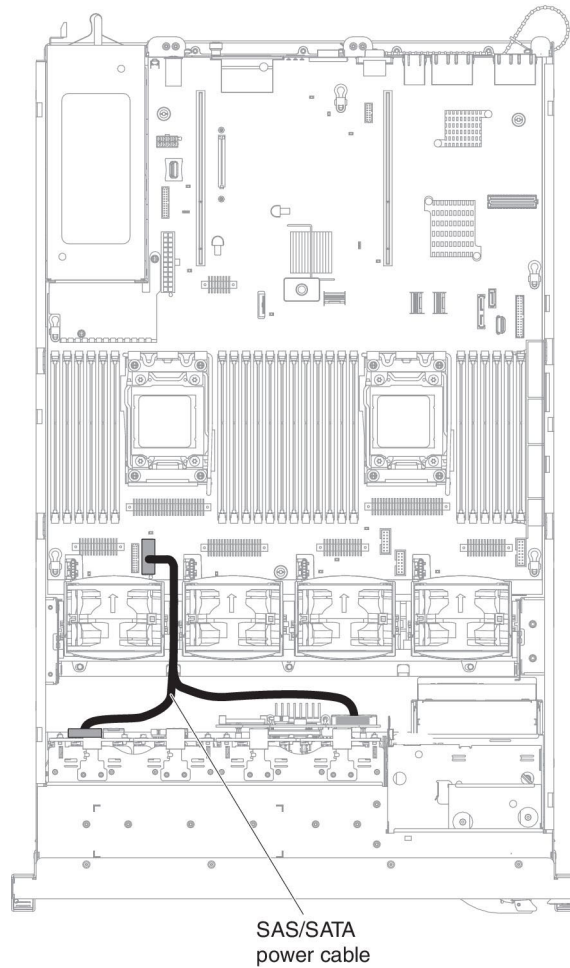
Figure 68. SAS power cable routing

13. If you removed any fans, install them.
14. Insert the hard disk drives and the fillers the rest of the way into the bays.

Results

If you have other devices to install or remove, do so now. Otherwise, go to
"Completing the installation" on page 127.

Installing a SAS/SATA 8 Pac HDD with a ServeRAID adapter option

Use this information to install a SAS/SATA 8 Pac HDD with a ServeRAID adapter option.

About this task

You can install an IBM System x3650 M4 Hot-swap SAS/SATA 8 Pac HDD with a ServeRAID adapter option. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported optional devices. To order a SAS/SATA 8 Pac HDD with a ServeRAID adapter option, contact your IBM marketing representative or authorized reseller.

The SAS/SATA 8 Pac HDD with a ServeRAID adapter option kit contains the following components:
- Eight blank EMC fillers
- Two SAS signal cables
- One configuration cable
- One internal power cable
- One 2.5-inch hard disk drive backplane
- One RAID adapter (part number 00D7082 or 46M0912)

  Note: RAID adapter comes in a different option kit. Touch the static-protective package to any unpainted metal surface on the server.

To install a SAS/SATA 8 Pac HDD with a ServeRAID adapter option, complete the following steps:
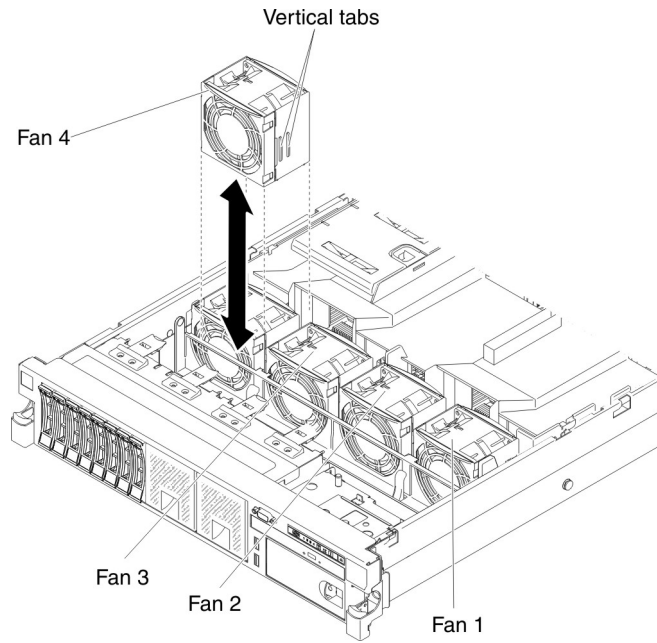
Note: You can install the RAID adapter into PCI riser-card assembly 1 only.

Procedure
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the two 4-drive filler panels that are to the right of drive bay 8, beneath the IDs 8 - 15 on the front bezel.
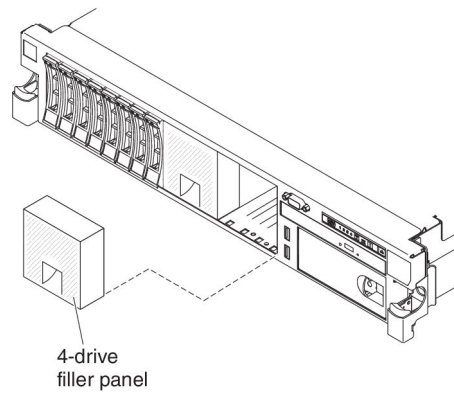
Figure 69. Filler panels

5. To obtain more working room, remove fans 2 and 3 (see "Removing a hot-swap fan" on page 318).

6. Install the new backplane in slot 2:
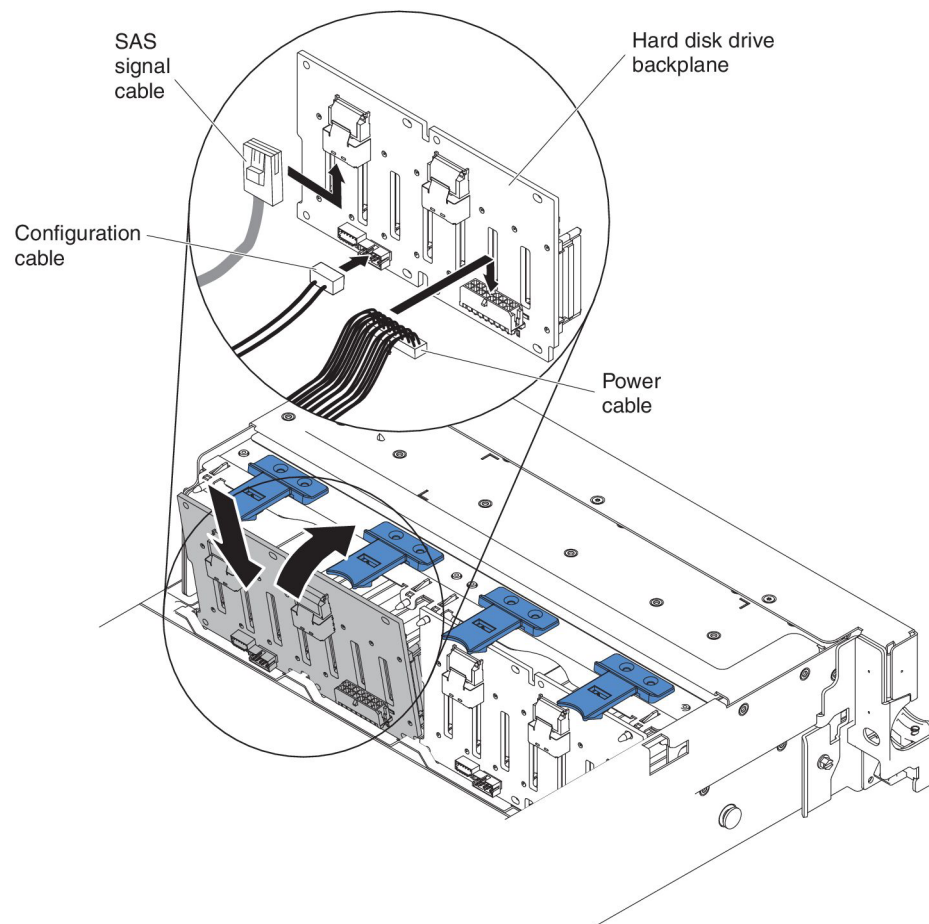
Figure 70. New backplane installation

a. Connect the following cables in the order listed:
- Configuration cable 1
- SAS signal cable 2
- Power cable 3

   b. Angle the new backplane and place the bottom edge into the slots for backplane 2 on the chassis next to the optical drive.

   c. Rotate the backplane upright so that the bracket goes underneath the latch and tabs on the chassis and is engaged into the slots on the backplane bracket.

7. Touch the static-protective package that contains the RAID adapter to any unpainted metal surface on the server. Then, remove the RAID adapter from the package.

8. Remove the PCI riser-card assembly 1 (see "Removing a PCI riser-card assembly" on page 38).

9. Install the RAID adapter in the connector on the PCI riser card (see "Installing an adapter" on page 62).

   Note: While installing the RAID adapter (part number 00D7082) into PCI riser-card assembly, it can be installed in slot 1 or slot 2 only.
   Attention: Incomplete insertion might cause damage to the server or the adapter.

10. Connect the SAS signal cables to the connectors on the RAID adapter:
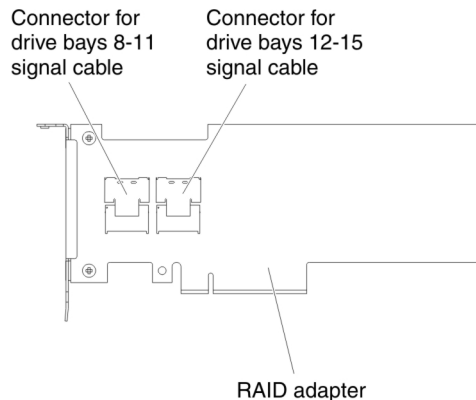
Figure 71. RAID adapter (part number 46M0912)
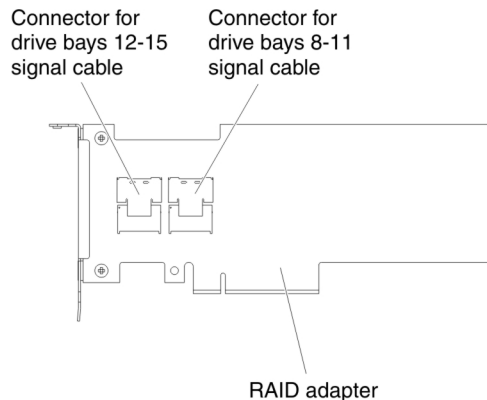
Figure 72. RAID adapter (part number 00D7082)

   a. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 8-11.

   b. Connect another SAS signal cable to the other SAS connector for drive bays 12-15.

11. Align and install the PCI riser-card assembly in the server (see "Installing a PCI riser-card assembly" on page 129).
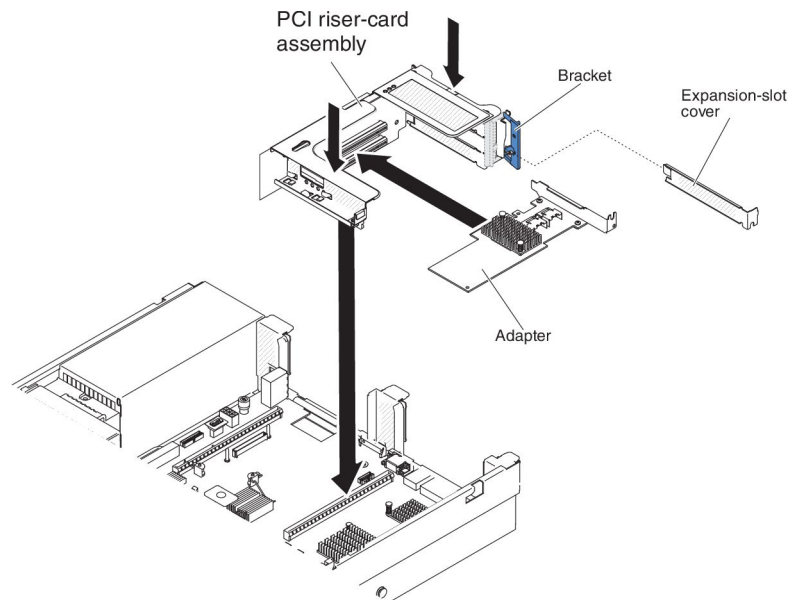
Figure 73. PCI riser-card assembly installation

12. Route the cables underneath the cable retention (taking the RAID adapter, part number 46M0912, as an example).
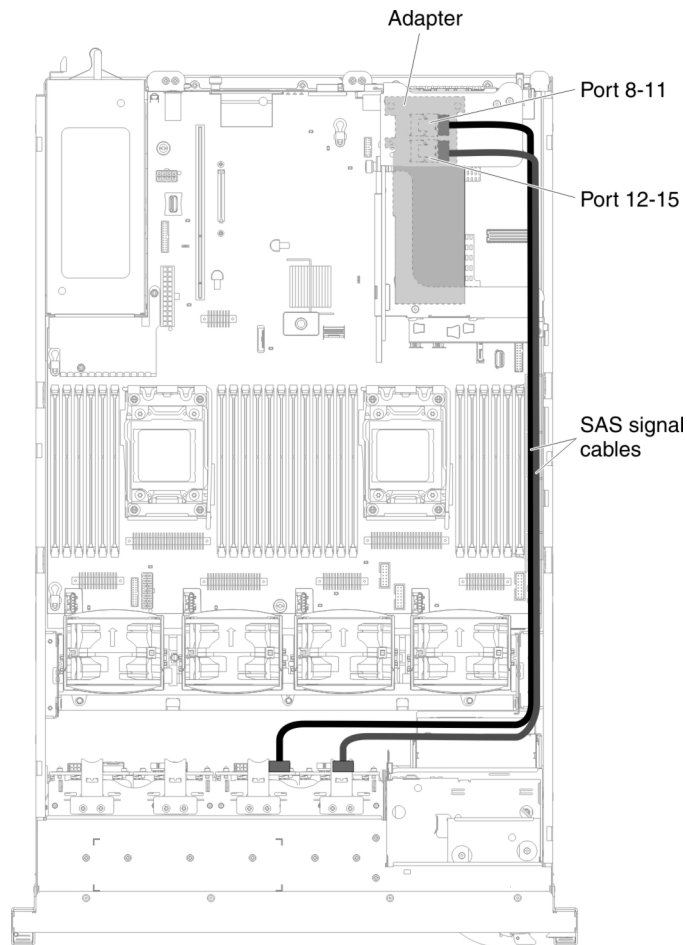
Figure 74. SAS signal cables routing

13. Make sure that the configuration cable is connected to the backplanes and system board.

Configuration cable
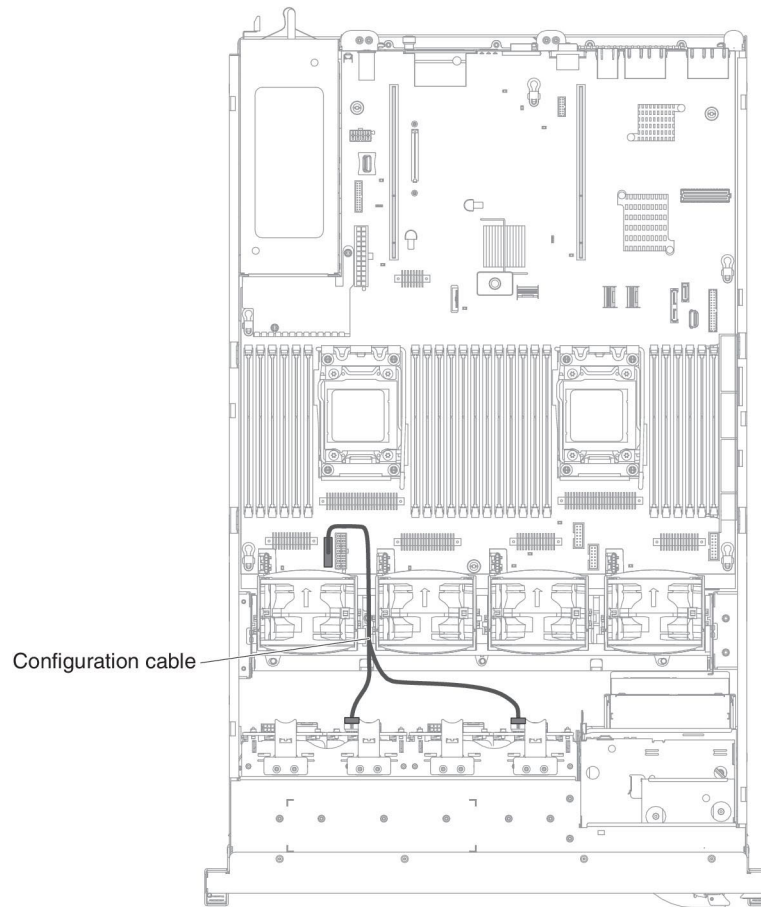
Figure 75. Configuration cable routing

14. Make sure that the SAS power cable is connected to the backplanes and system board.
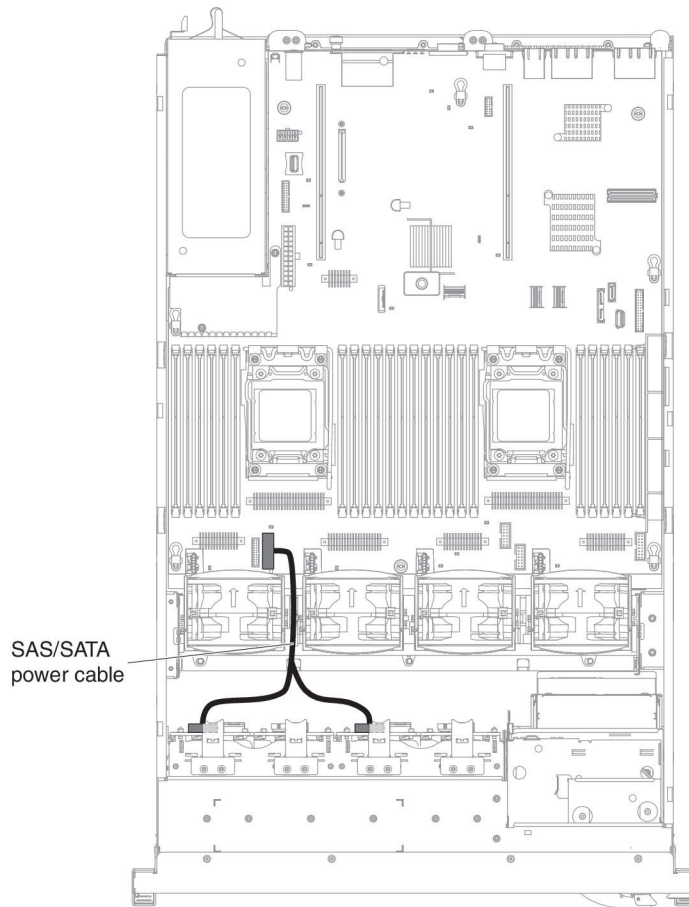
Figure 76. SAS power cable routing

15. If you removed any fans, install them.
16. Insert the hard disk drives and the fillers the rest of the way into the bays.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing a SAS/SATA 8 Pac HDD with two 6 GB performance optimized HBA adapters option

Use this information to install a SAS/SATA 8 Pac HDD with two 6 GB performance optimized HBA adapters option.

About this task

You can install an IBM System x3650 M4 Hot-swap SAS/SATA 8 Pac HDD with two 6 GB performance optimized HBA adapters option. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported optional devices. To order a SAS/SATA 8 Pac HDD with two 6 GB performance optimized HBA adapters option, contact your IBM marketing representative or authorized reseller.

The SAS/SATA 8 Pac HDD with two 6 GB performance optimized HBA adapters option kit contains the following components:

Note: You must purchase the SAS cable option (part number 00D9532) before installing this kit.
- Eight blank EMC fillers
- SAS signal cables (including the ones from the SAS cable option)
- One configuration cable
- One internal power cable
- One 2.5-inch hard disk drive backplane
- Two RAID adapters (part number 46M0912)

    Note: RAID adapters come in a different option kits. Touch the static-protective packages to any unpainted metal surface on the server.

To install a SAS/SATA 8 Pac HDD with two 6 GB performance optimized HBA adapters option, complete the following steps:

Procedure
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the two 4-drive filler panels that are to the right of drive bay 8, beneath the IDs 8 - 15 on the front bezel.

4-drive
filler panel

Figure 77. Filler panels

5. To obtain more working room, remove fans 2 and 3 (see "Removing a hot-swap fan" on page 318).
6. Remove the 2 SAS cables which connect both the backplane and the system board.

Port 4-7

Port 0-3

Port 0-3

Port 4-7

SAS signal cables
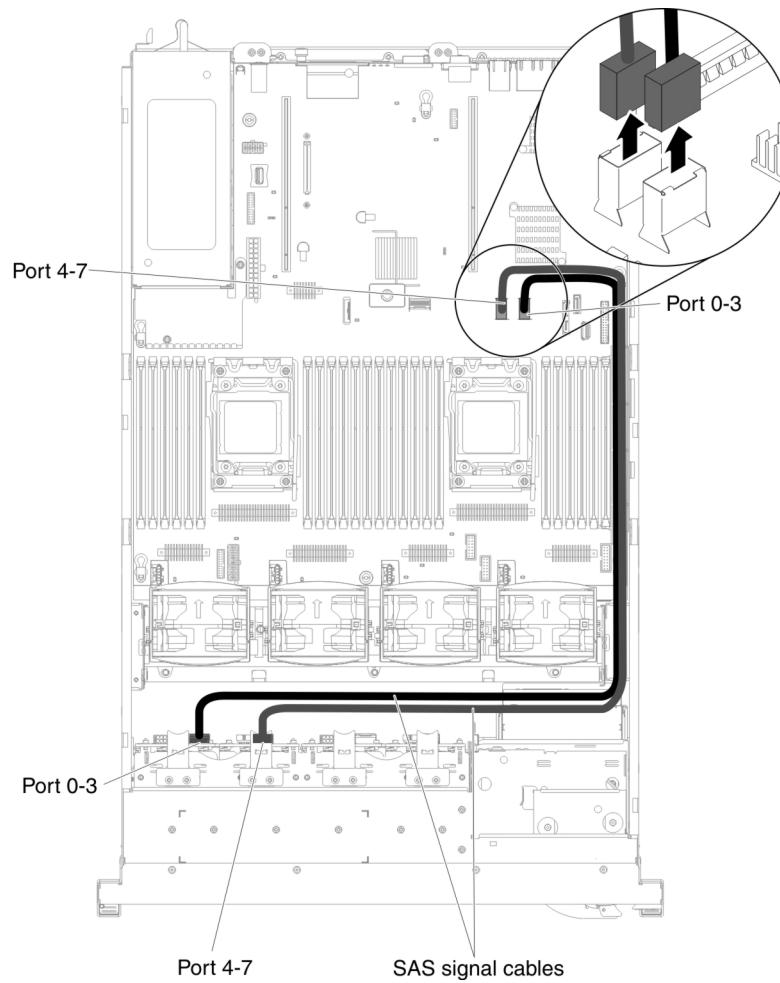
Figure 78. SAS cables removal

7. Take out the 2 SAS cables (925 mm) from the SAS cable option and connect them to the backplane.

Figure 79. SAS cables connection

8. Touch the static-protective package that contains the RAID adapter to any unpainted metal surface on the server. Then, remove the RAID adapter from the package.

9. Remove the PCI riser-card assembly 1 (see "Removing a PCI riser-card assembly" on page 38).

10. Install the RAID adapter in the connector on the PCI riser card (see "Installing an adapter" on page 62).

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

11. Connect the SAS signal cables to the connectors on the RAID adapter:

    a. Connect a SAS signal cable to the RAID adapter connector for drive bays 0-3.

    b. Connect another SAS signal cable to the other SAS connector for drive bays 4-7.
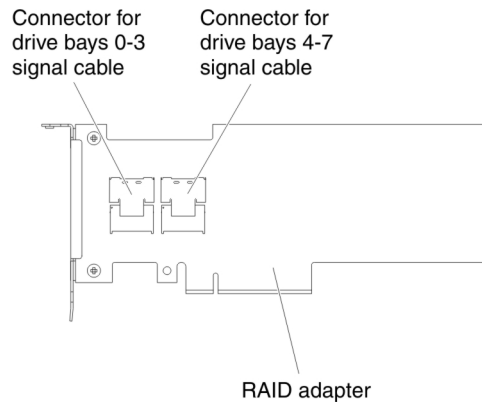
Figure 80. RAID adapter connectors

12. Align and install the PCI riser-card assembly in the server (see "Installing a PCI riser-card assembly" on page 129).
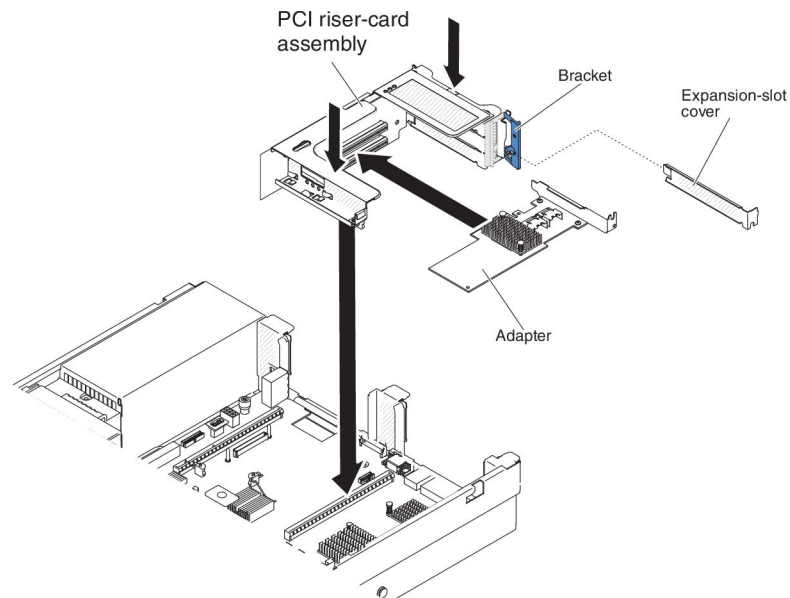
Figure 81. PCI riser-card assembly installation

13. Route the cables underneath the cable retention.

Adapter

Port 0-3

Port 4-7
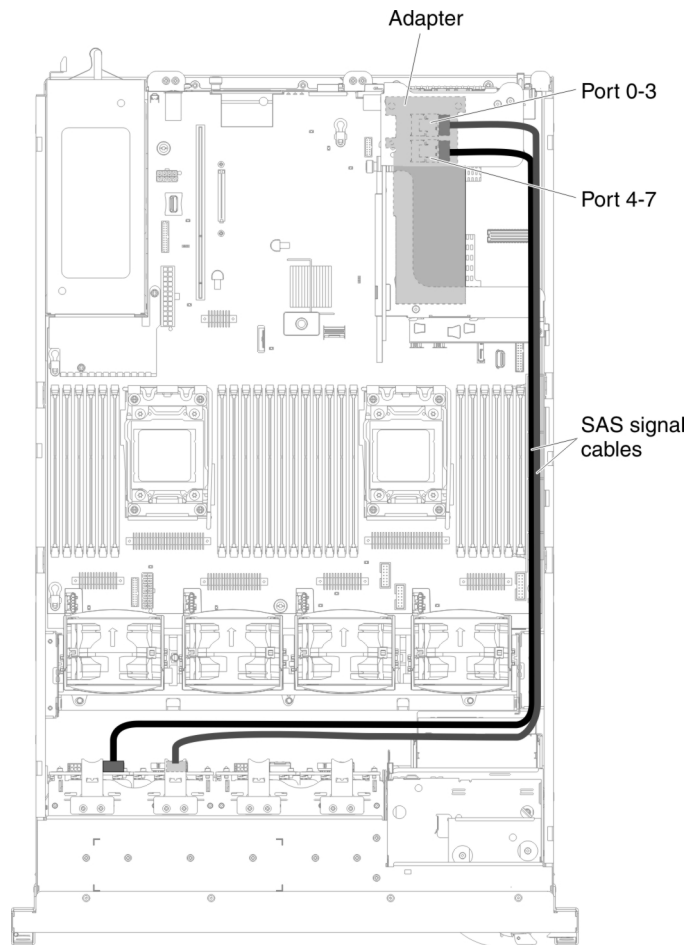
SAS signal
cables

Figure 82. SAS signal cables routing

14. Refer from step 6 of the "Installing a SAS/SATA 8 Pac HDD with a
    ServeRAID adapter option" on page 90 section for installing the second
    backplane, arranging the cable routing, installing the fans, and installing the
    hard disk drives. The illustration below is the cable routing for the second set
    of RAID adapter and backplane.
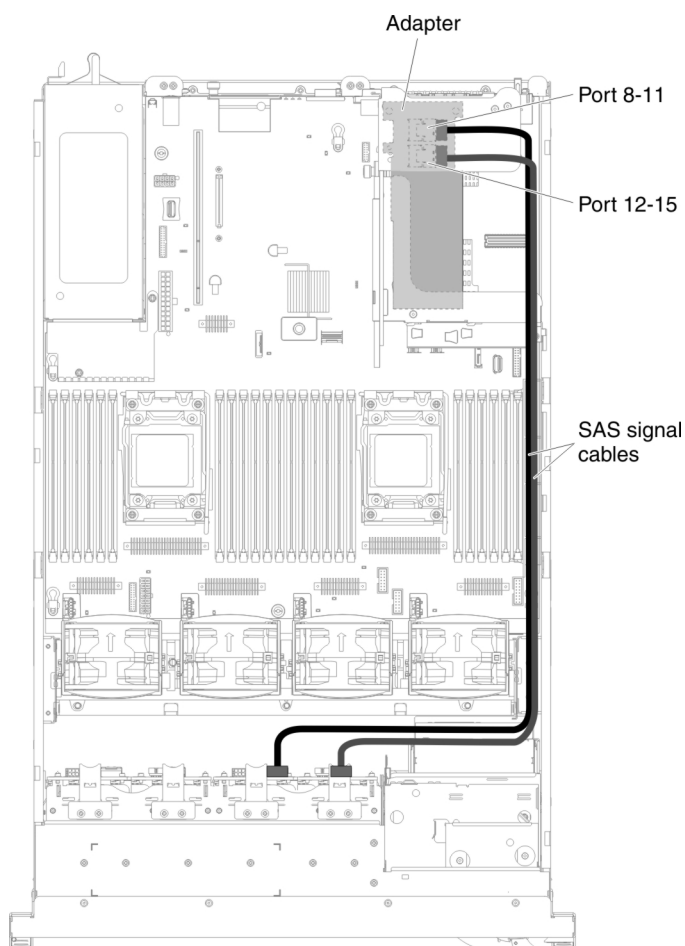
Figure 83. Cable routing for the second set of RAID adapter and backplane

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing 2 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option

Use this information to install 2 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option.

About this task

To order 2 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option, contact your IBM marketing representative or authorized reseller.

The 2 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option kit contains the following components:

- Four SAS signal cables
- Two configuration cables
- One internal power cable
- Two eXFlash 1.8-inch drive cage and backplane assemblies

- Two RAID adapters (part number 46M0912)

  Note: RAID adapters come in a different option kits. Touch the static-protective packages to any unpainted metal surface on the server.

To install the 2 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option in the server, complete the following steps.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the two 4-drive filler panels that are to the right of drive bay 8, beneath the IDs 8 - 15 on the front bezel.

4-drive
filler panel
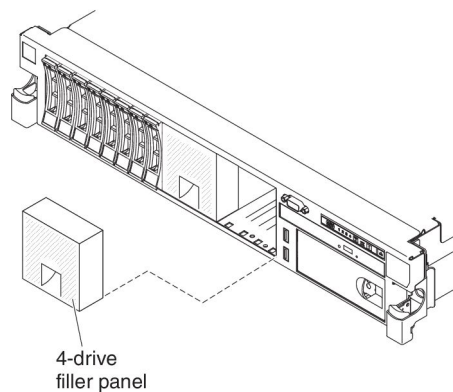
Figure 84. Filler panels

5. To obtain more working room, remove fans 2 and 3 (see "Removing a hot-swap fan" on page 318).
6. Install the new backplane assemblies.

eXFlash 1.8-inch drive cage
and backplane assembly
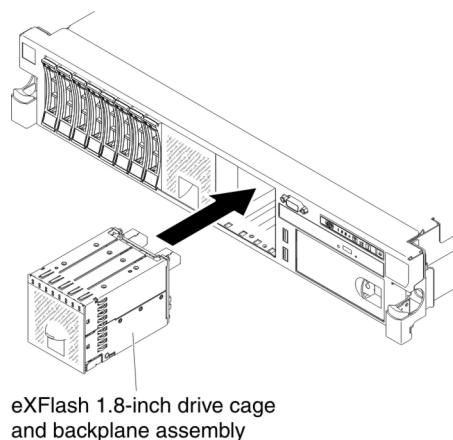
Figure 85. New backplane assemblies installation

7. Connect the following cables in the order listed:
   - Configuration cable 1

- SAS signal cables **2**
- Power cable **3**
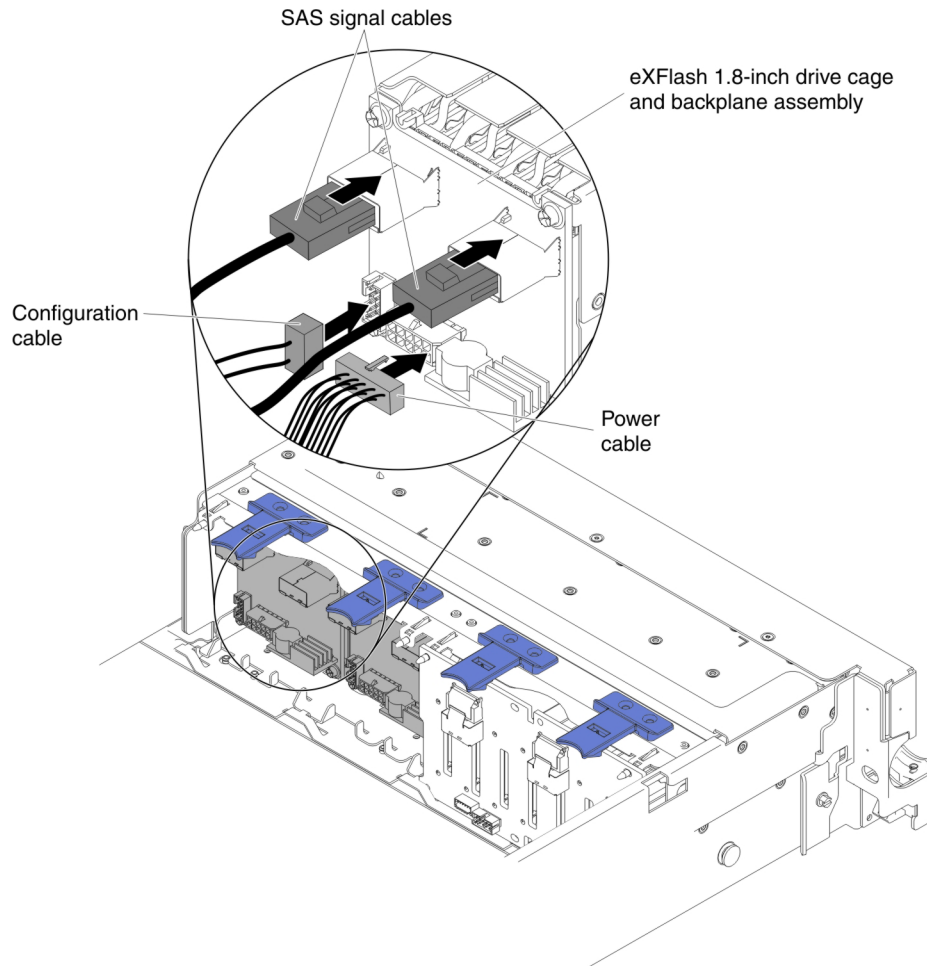
Figure 86. Cable connections

8. Touch the static-protective package that contains the RAID adapter to any unpainted metal surface on the server. Then, remove the RAID adapter from the package.

9. Remove the PCI riser-card assembly **1** (see "Removing a PCI riser-card assembly" on page 38).

10. Install both RAID adapters in the connectors on the PCI riser card (see "Installing an adapter" on page 62).

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

11. Connect the SAS signal cables to the connectors on the RAID adapter:

    a. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 8-11.

    b. Connect another SAS signal cable to the other SAS connector for drive bays 12-15.

Connector for drive bays 8-11 signal cable Connector for drive bays 12-15 signal cable

Connector for drive bays 16-19 signal cable Connector for drive bays 20-23 signal cable

RAID adapter

RAID adapter

*Figure 87. RAID adapter connectors*

    c. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 16-19.

    d. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 20-23.

12. Align and install the PCI riser-card assembly 1 in the server (see "Installing a PCI riser-card assembly" on page 129).

PCI riser-card assembly

Bracket

Expansion-slot cover

Adapter
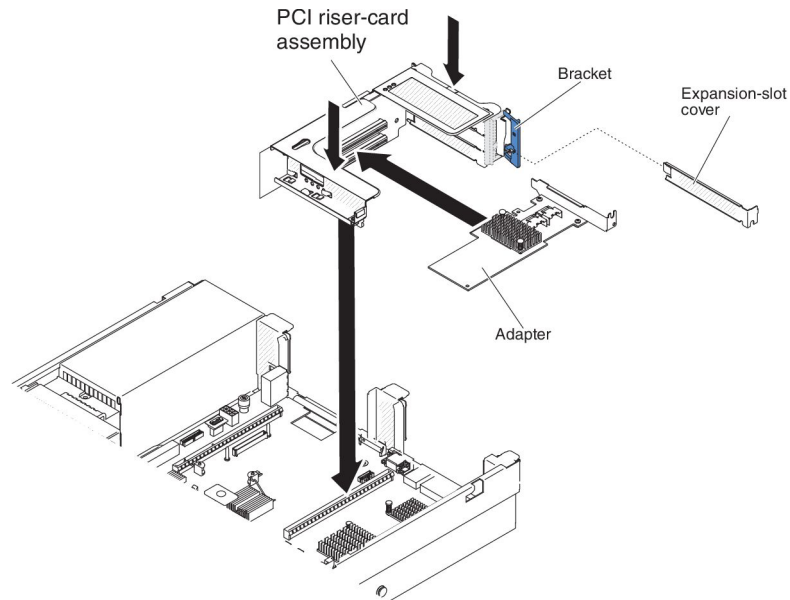
Figure 88. PCI riser-card assembly installation

13. Route the cables underneath the cable retention.
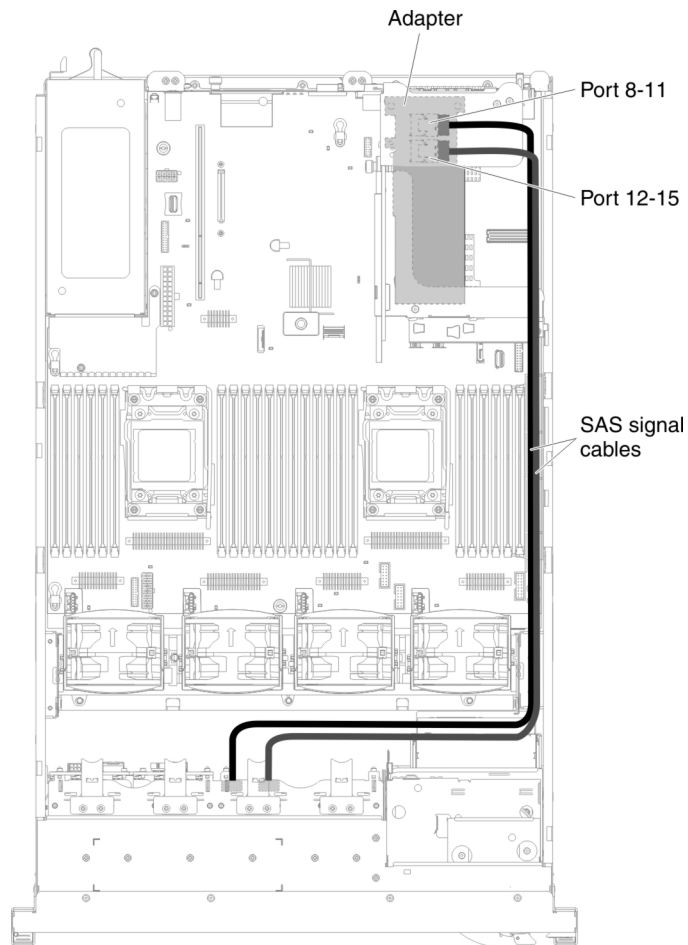
Figure 89. SAS signal cables routing
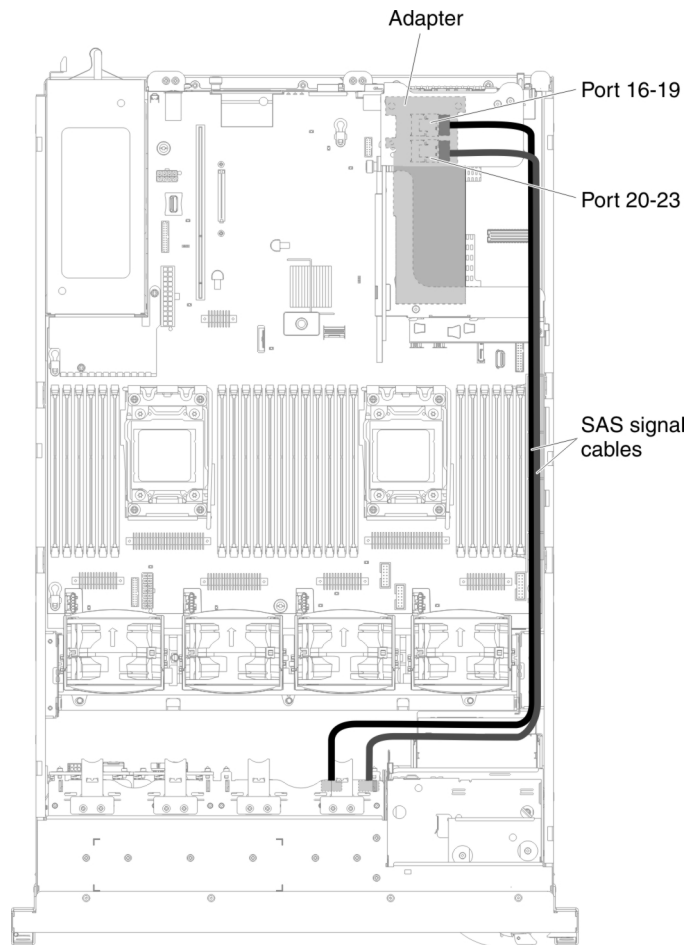
Figure 90. SAS signal cables routing

14. Make sure that the configuration cable is connected to the backplanes and system board.

SAS/SATA backplane config connector 1

SAS/SATA backplane config connector 2

Configuration cable (Connector for drive bays 0-7 and 8-15)

Configuration cable (Connector for drive bays 16-23)
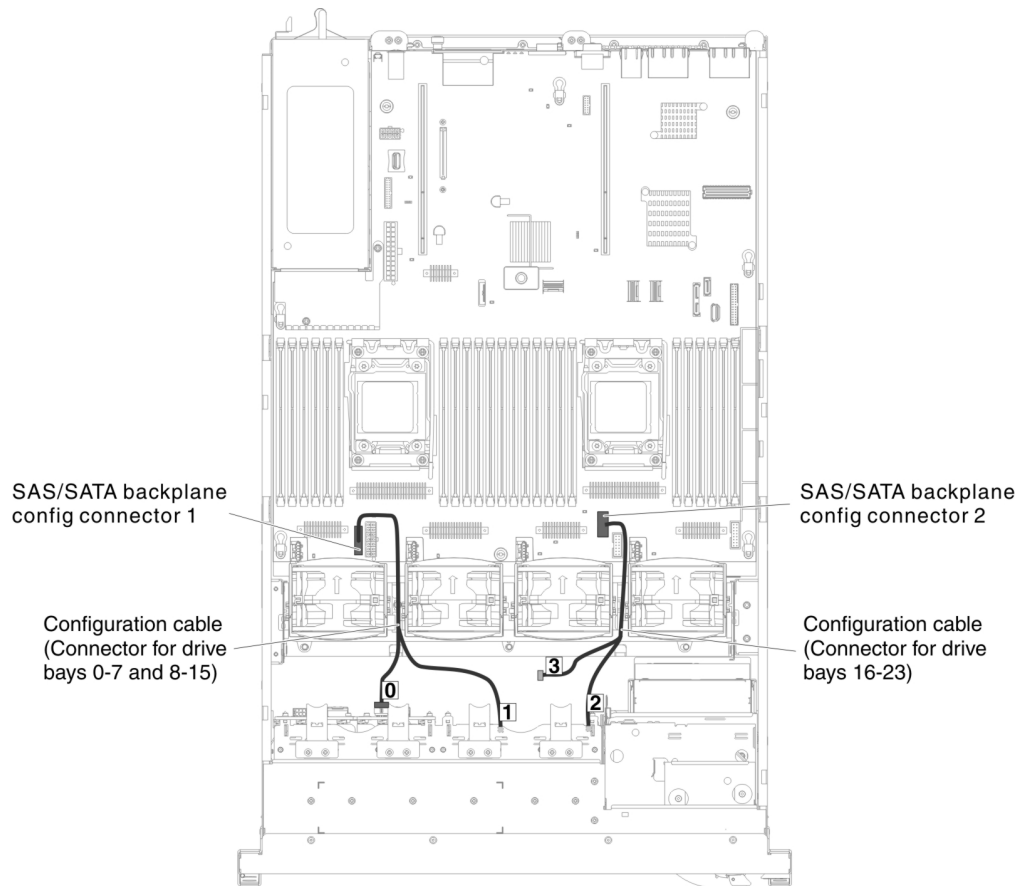
Figure 91. Configuration cables routing

> **Note:** Leave the cable segment with the label 3 unconnected.

15. Make sure that the SAS power cable is connected to the backplanes and system board.
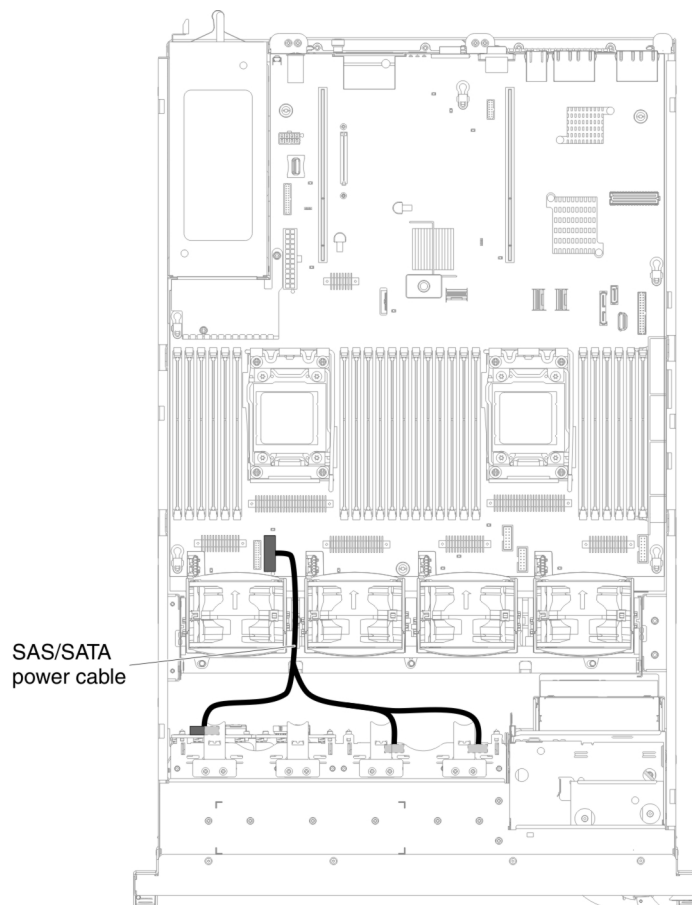
Figure 92. SAS/SATA power cable routing

16. If you removed any fans, install them.
17. Insert the hard disk drives and the fillers the rest of the way into the bays.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing 4 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option

Use this information to install 4 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option.

About this task

To order 4 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option, contact your IBM marketing representative or authorized reseller.

The 4 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option kit contains the following components:

• Four SAS signal cables
• One configuration cable

- Two eXFlash 1.8-inch drive cage and backplane assemblies
- Two RAID adapters (part number 46M0912)

  Note: RAID adapters come in a different option kits. Touch the static-protective packages to any unpainted metal surface on the server.

To install the 4 x 8 1.8-inch SSDs with two 6 GB performance optimized HBA adapters option in the server, complete the following steps.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the two 4-drive filler panels that are to the right of drive bay 8, beneath the IDs 8 - 15 on the front bezel.
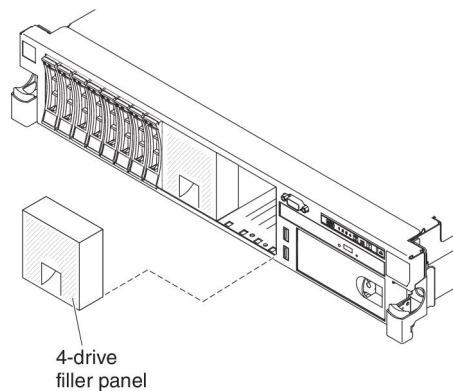

4-drive
filler panel
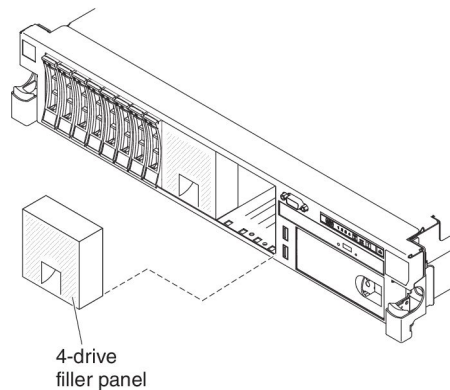
Figure 93. Filler panels

5. To obtain more working room, remove fans 2 and 3 (see "Removing a hot-swap fan" on page 318).
6. Install the new backplane assemblies.

eXFlash 1.8-inch drive cage
and backplane assembly
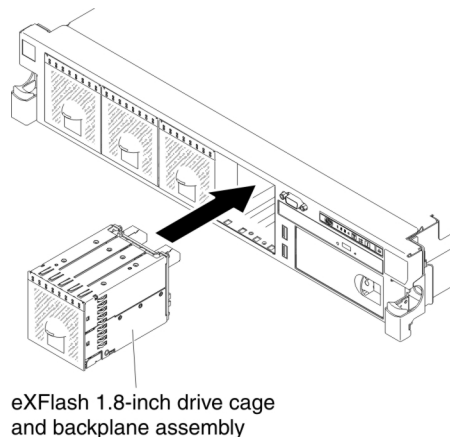
Figure 94. New backplane assemblies installation

7. Connect the following cables in the order listed:

- Configuration cable 1
- SAS signal cables 2
- Power cable 3

SAS signal cables

eXFlash 1.8-inch drive cage
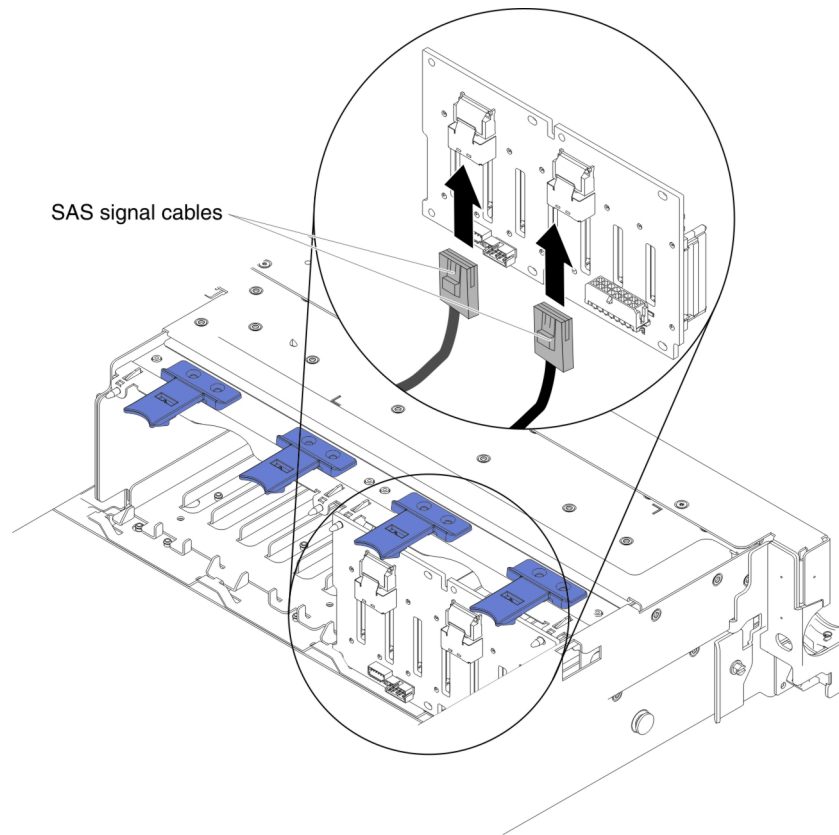and backplane assembly

Configuration
cable

Power
cable
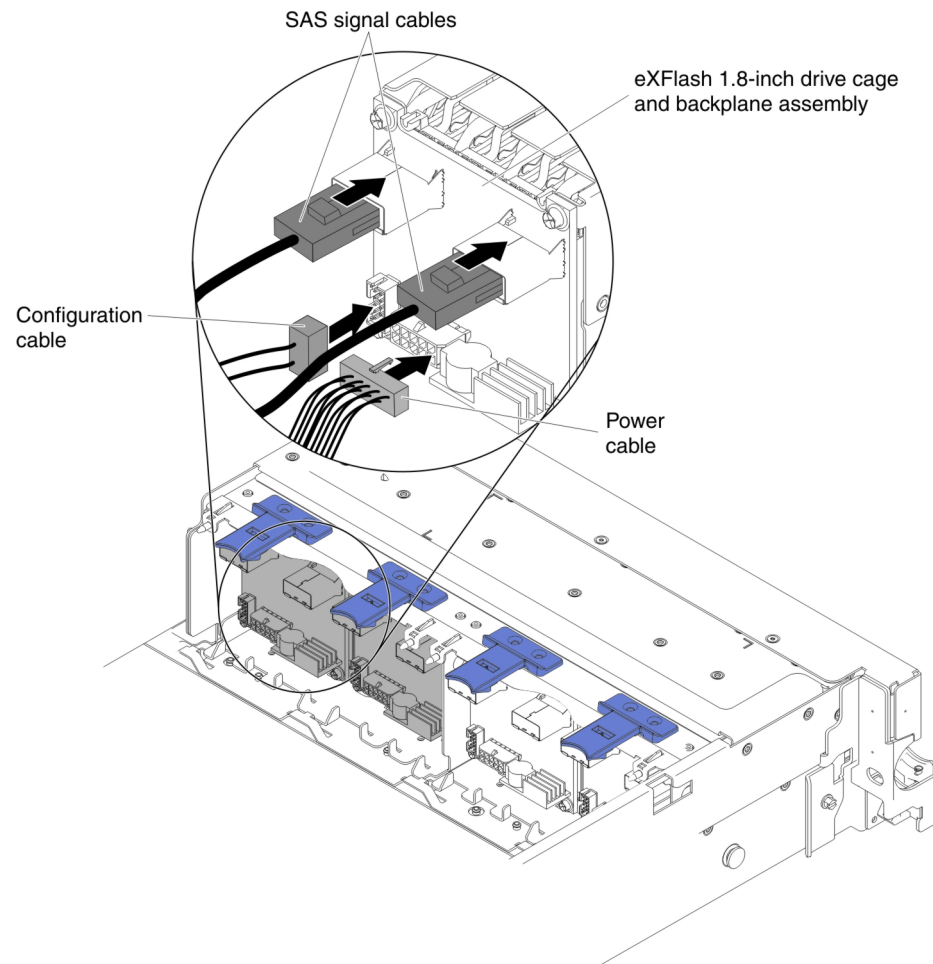
Figure 95. Cable connections

8. Touch the static-protective package that contains the RAID adapter to any unpainted metal surface on the server. Then, remove the RAID adapter from the package.

9. Remove the PCI riser-card assembly 2 (see "Removing a PCI riser-card assembly" on page 38).

10. Install both RAID adapters in the connectors on the PCI riser card (see "Installing an adapter" on page 62).

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

11. Connect the SAS signal cables to the connectors on the RAID adapter:

    a. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 16-19.

    b. Connect another SAS signal cable to the other SAS connector for drive bays 20-23.

Connector for drive bays 16-19 signal cable   Connector for drive bays 20-23 signal cable   Connector for drive bays 24-27 signal cable   Connector for drive bays 28-31 signal cable

RAID adapter   RAID adapter
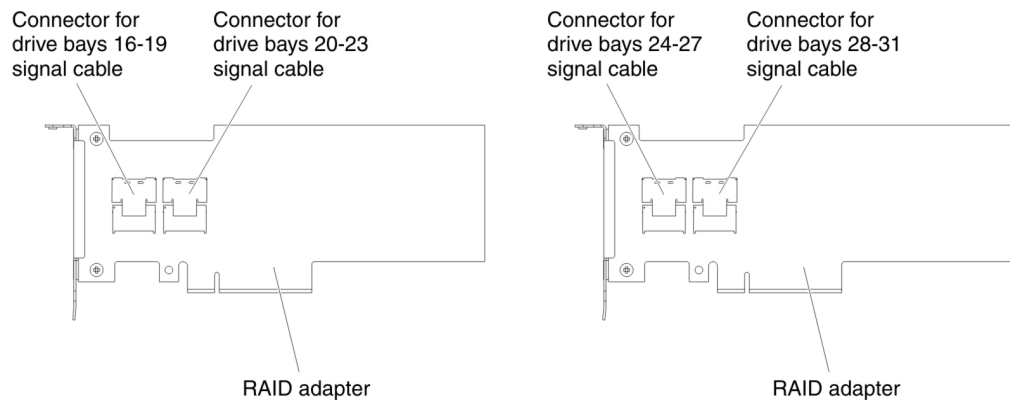
Figure 96. RAID adapter connectors

    c. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 24-27.

    d. Connect a SAS signal cable that comes with the option kit to the RAID adapter connector for drive bays 28-31.

12. Align and install the PCI riser-card assembly 2 in the server (see "Installing a PCI riser-card assembly" on page 129).

PCI riser-card assembly

Bracket

Expansion-slot cover

Adapter
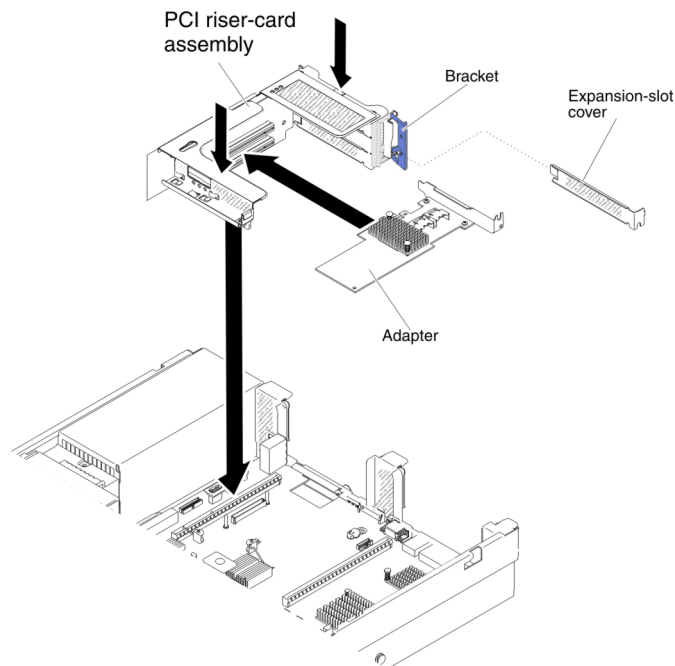
Figure 97. PCI riser-card assembly installation

13. Route the cables underneath the cable retention.

Adapter

Port 16-19

Port 20-23
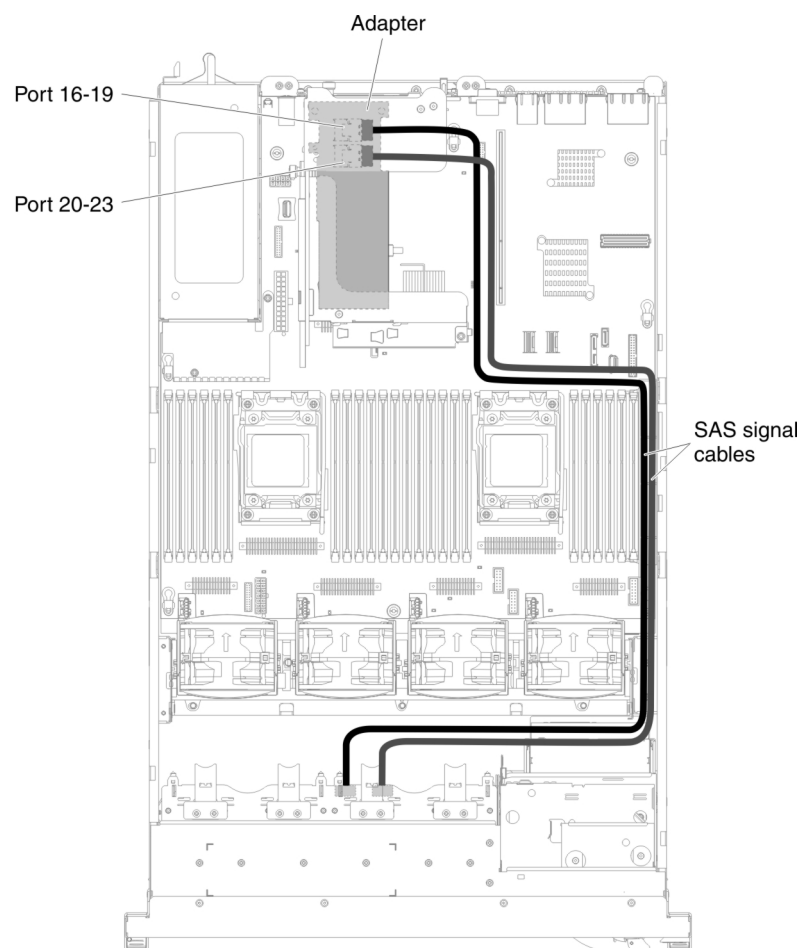
SAS signal
cables

Figure 98. SAS signal cables routing

Adapter

Port 24-27

Port 28-31
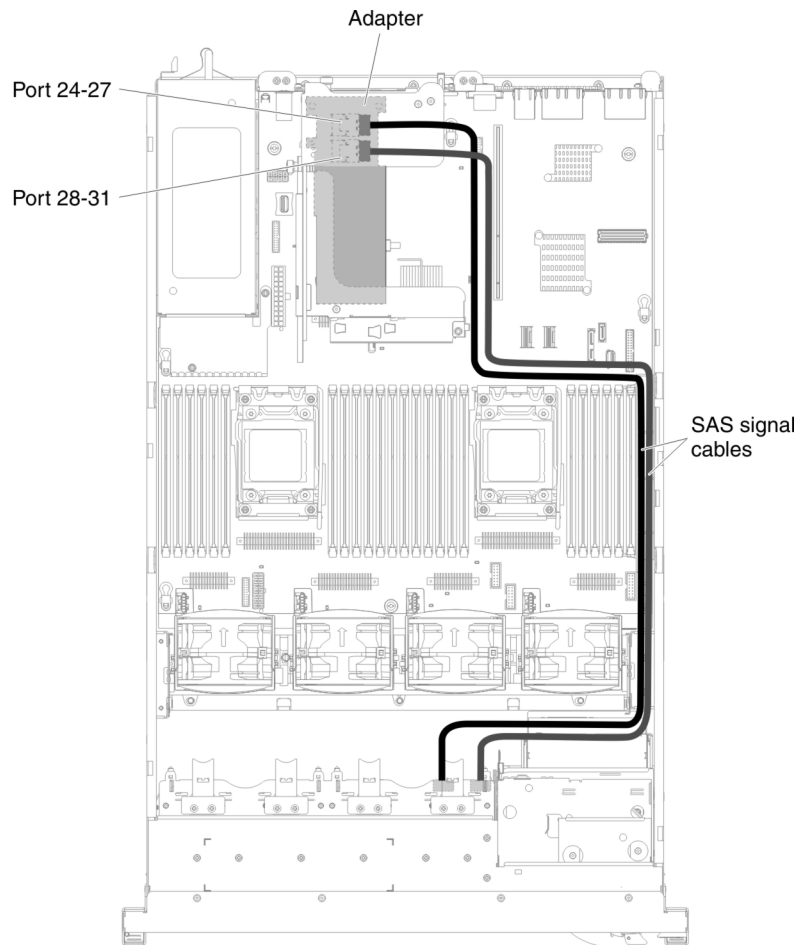
SAS signal
cables

Figure 99. SAS signal cables routing

14. Make sure that the configuration cable is connected to the backplanes and system board.

SAS/SATA backplane
config connector 2

Configuration cable
(Connector for drive
bays 16-31)

2

3
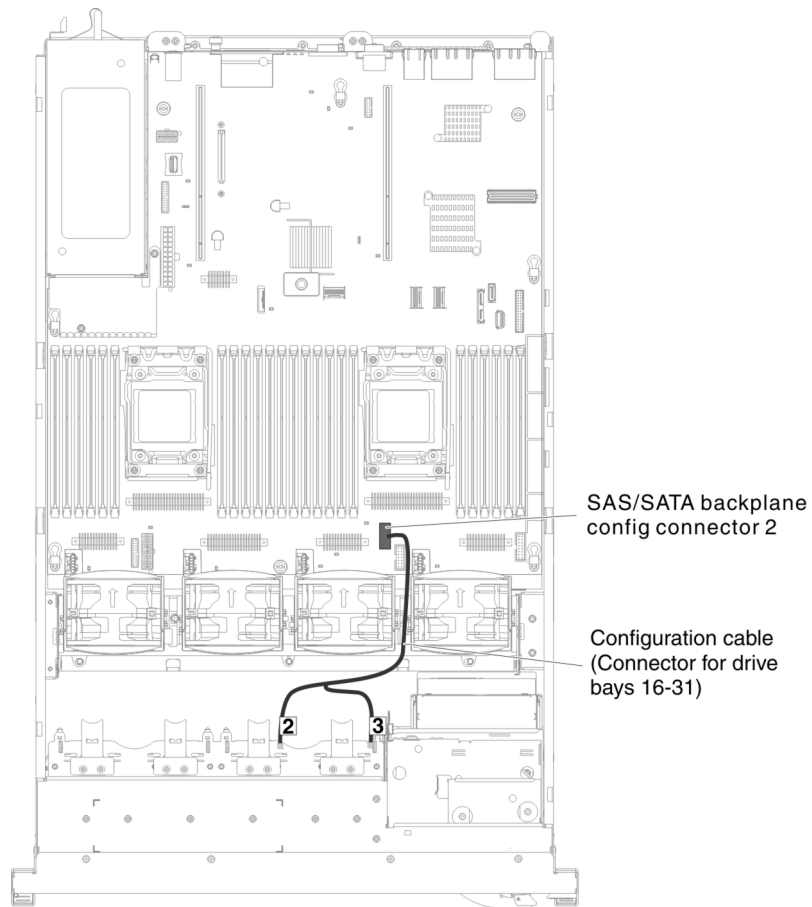
Figure 100. Configuration cables routing

15. Make sure that the SAS power cable is connected to the backplanes and system board.
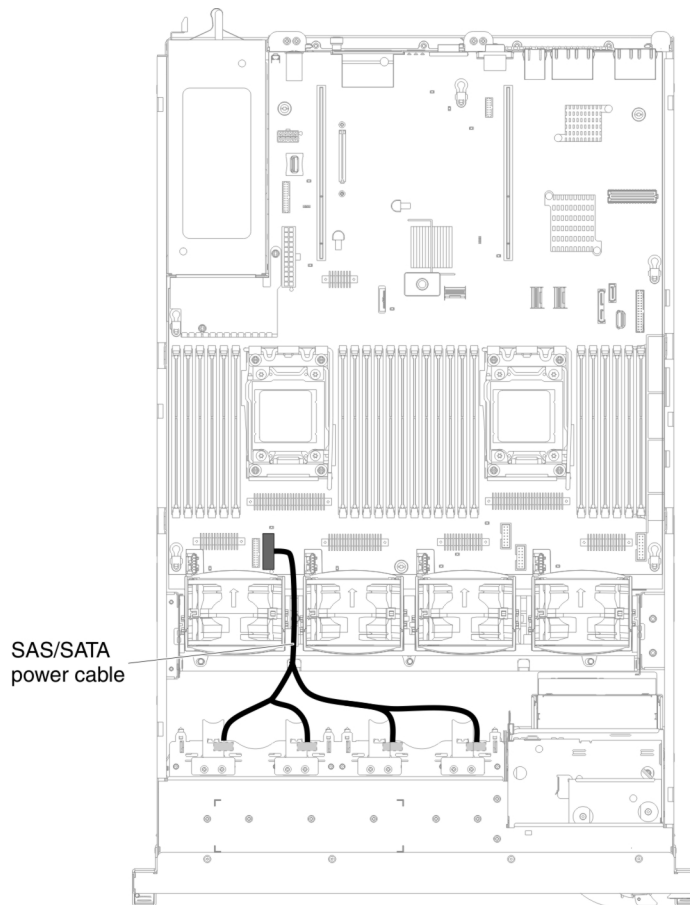
Figure 101. SAS/SATA power cable routing

16. If you removed any fans, install them.
17. Insert the hard disk drives and the fillers the rest of the way into the bays.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing an optional tape drive

Use this information to install an optional tape drive.

About this task

The IBM System x3650 M4 RDX-DDS internal enablement kit is used to install an IBM tape drive in an IBM System x3650 M4 server. The IBM System x3650 M4 RDX-DDS internal enablement kit is compatible only with the following tape drives:

- IBM DDS Generation 5 (DDS/5) SATA tape drive
- IBM DDS Generation 6 (DDS/6) USB tape drive
- IBM RDX USB Removable Hard Disk Drive

The RDX-DDS internal enablement kit contains the following components:

- One tape enablement tray
- One SAS signal cable (for USB tape drive only)
- One tape drive power cable
- Four M3 x 6 screws

The following illustration shows how to install an optional tape drive.
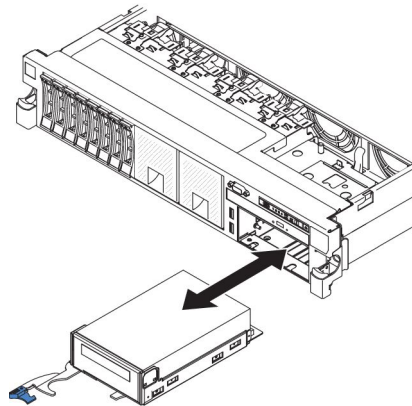
Figure 102. Tape drive installation

To install a SATA or USB tape drive, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Install the tape drive on the tray as shown in the following illustration. If the tape drive comes with a metal spacer attached, remove the spacer before you install the tape drive on the tray.
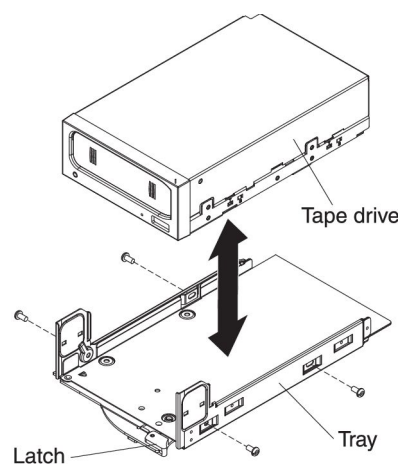
Figure 103. Installing the tape drive on the tray

4. Prepare the drive according to the instructions that come with the drive, setting any switches or jumpers.

5. Connect the following tape enablement kit cables to the connectors on the system board:
   - SAS signal cables into the SAS connectors on the system board
   - Tape drive power cable to the system board
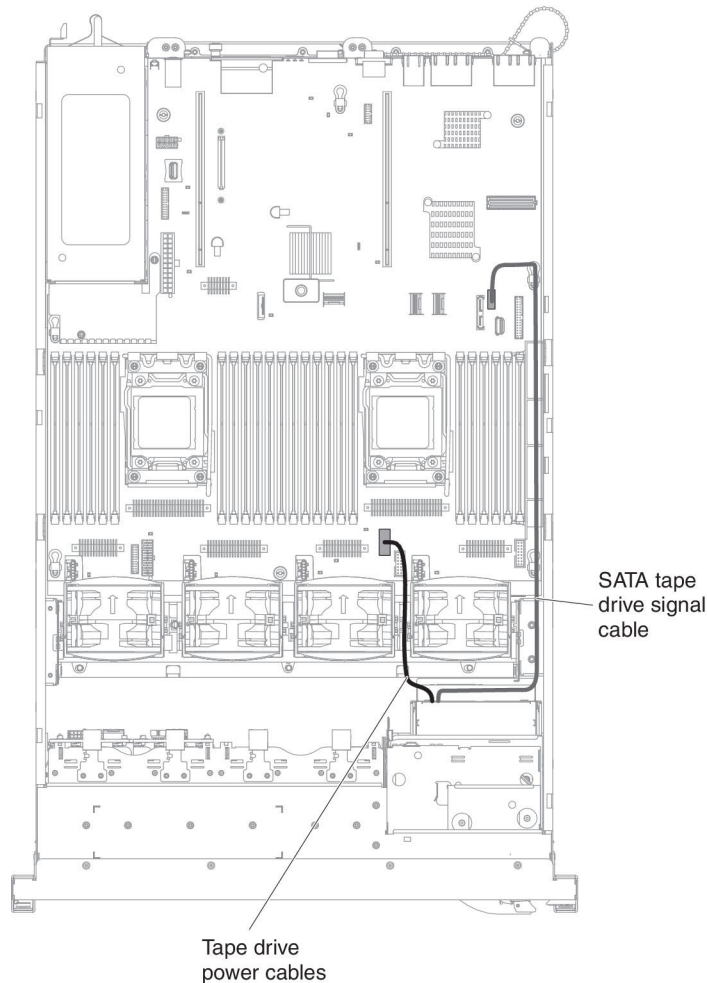
Figure 104. Cable connections

6. Slide the tape-drive assembly most of the way into the tape-drive bay.
7. Connect the SAS signal cable and the power cable to the back of the tape drive.

   Attention: Make sure that all the cables are positioned underneath the tape-drive assembly before you insert the assembly in the tape-drive bay. Otherwise, the cables might be damaged.

8. Slide the tape-drive assembly the rest of the way into the tape-drive bay.
9. Push the latch to the closed (locked) position.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Installing a USB embedded hypervisor flash device

Use this information to install a USB embedded hypervisor flash device.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove PCI riser-card assembly (see "Removing a PCI riser-card assembly" on page 38).
5. Align the flash device with the connector on the system board and push it into the USB connector until it is firmly seated.
6. Press down on the retention latch to lock the flash device into the USB connector.
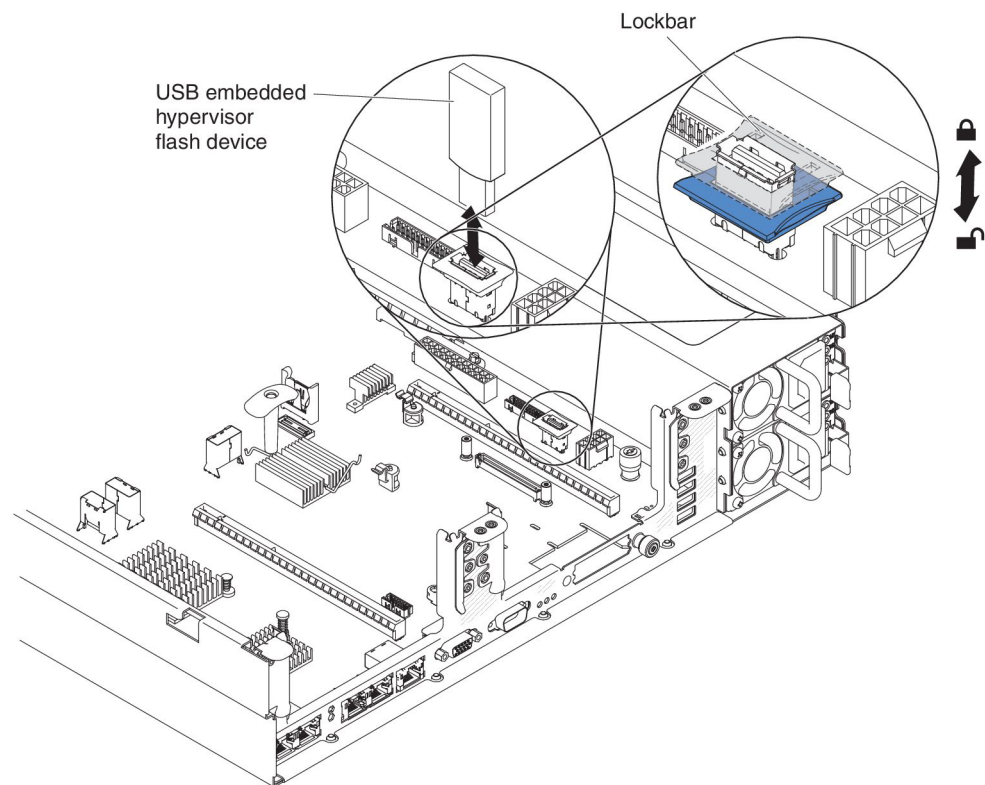
Figure 105. USB hypervisor flash device installation

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Note: You must configure the server to boot from the hypervisor USB drive. See Chapter 3, "Configuration information and instructions," on page 133 for

information about enabling the embedded hypervisor.

Installing an additional microprocessor and heat sink

Use this information to install an additional microprocessor and heat sink.

About this task

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 and the fourth fan. See "Installing a memory module" on page 53 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 126.

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 37.

3. Remove the cover (see "Removing the cover" on page 37).

4. Remove the air baffle (see "Removing the air baffle" on page 40).

5. Rotate the heat sink retention module release lever to the open position.

Figure 106. Heat-sink lever rotation

6. Open the microprocessor socket release levers and retainer:
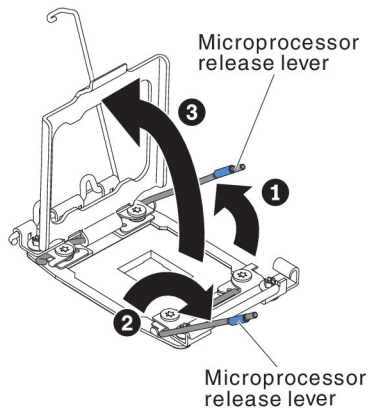
Figure 107. Microprocessor socket levers and retainer disengagement

    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 108. 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.
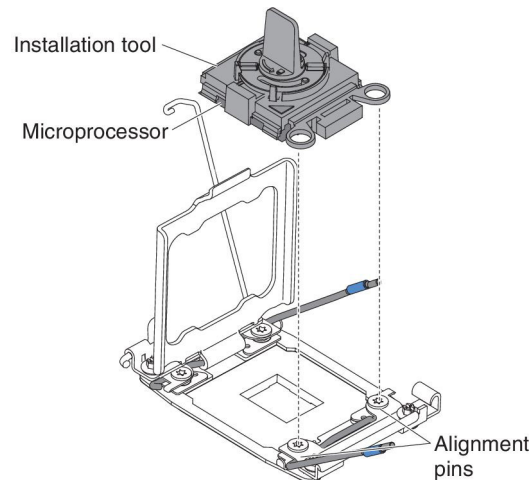
Figure 109. Installation tool alignment

> 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.
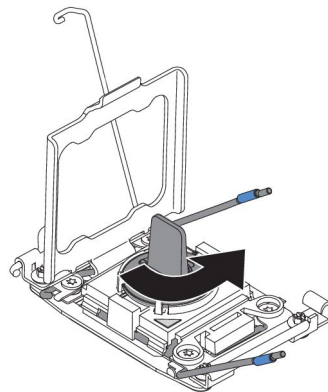
Figure 110. Installation tool handle adjustment

> **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.
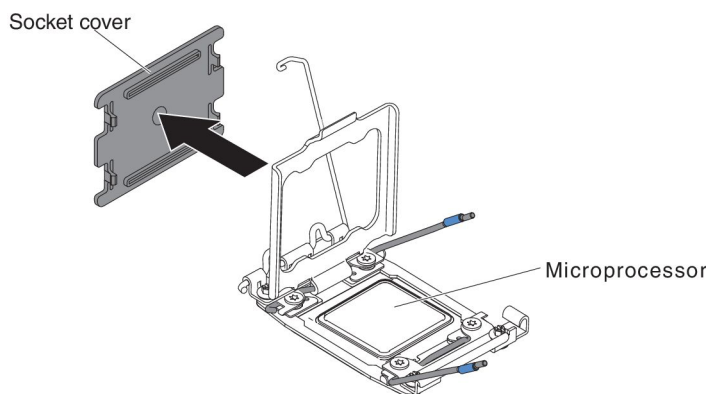
Figure 111. Socket cover removal

> **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 37.

9. Close the microprocessor socket release levers and retainer:
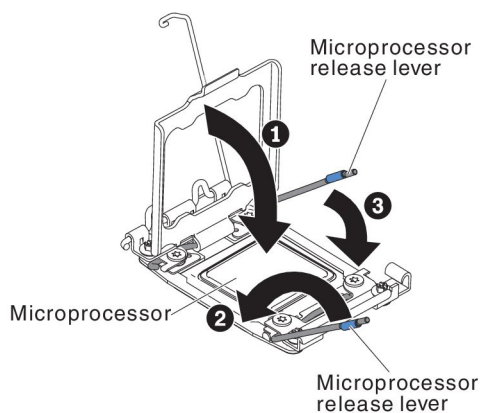
Figure 112. Microprocessor socket levers and retainer engagement

> 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 126 for more information.
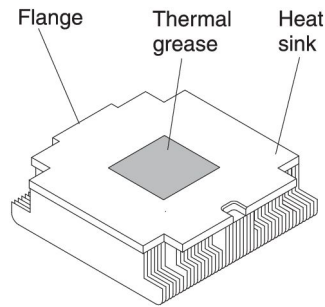
Figure 113. Thermal grease

    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.
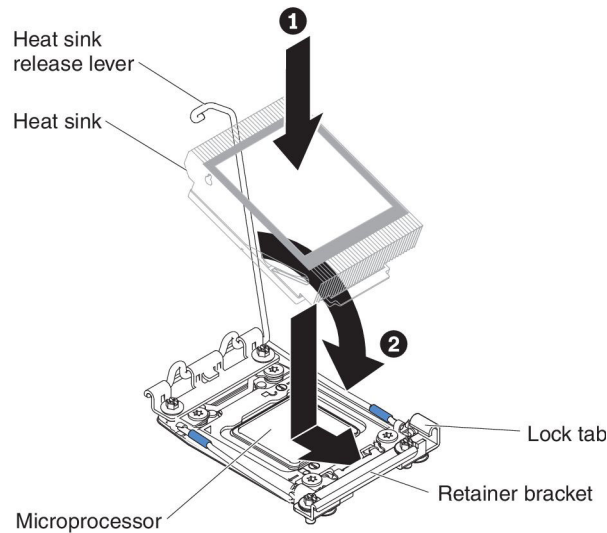
Figure 114. Heat sink installation

    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 fan (see "Replacing a hot-swap fan" on page 319).

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

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. Use this information to replace damaged or contaminated thermal grease on the microprocessor and heat sink.

About this task

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 34.
- Read "Handling static-sensitive devices" on page 37.

To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

Procedure

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 115. Thermal grease distribution

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

Figure 116. Syringe

6. Install the heat sink onto the microprocessor as described in 10 on page 341.

Completing the installation

Use this information to complete the installation.

About this task

To complete the installation, complete the following steps:

Procedure

1. If you removed the air baffle, reinstall it (see "Replacing the air baffle" on page 128).
2. If you removed either of the PCI riser-card assemblies, replace the riser-card assemblies (see "Installing a PCI riser-card assembly" on page 129).
3. If you removed the server cover, replace it (see "Replacing the cover" on page 130).
4. Install the server in the rack cabinet (see the *Rack Installation Instructions* that come with the server for instructions).
5. Reconnect the cables and power cords (see "Connecting the external cables" on page 131).
6. Update the server configuration (see "Updating the server configuration" on page 132).
7. Slide the server back into the rack, if necessary.
8. Start the server. Confirm that it starts correctly and recognizes the newly installed devices, and make sure that no error LEDs are lit.
9. (IBM Business Partners only) Complete the additional steps in "Instructions for IBM Business Partners" on page 26.

Results

Replacing the air baffle

Use this information to replace the air baffle.

About this task

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

Figure 117. Air baffle installation
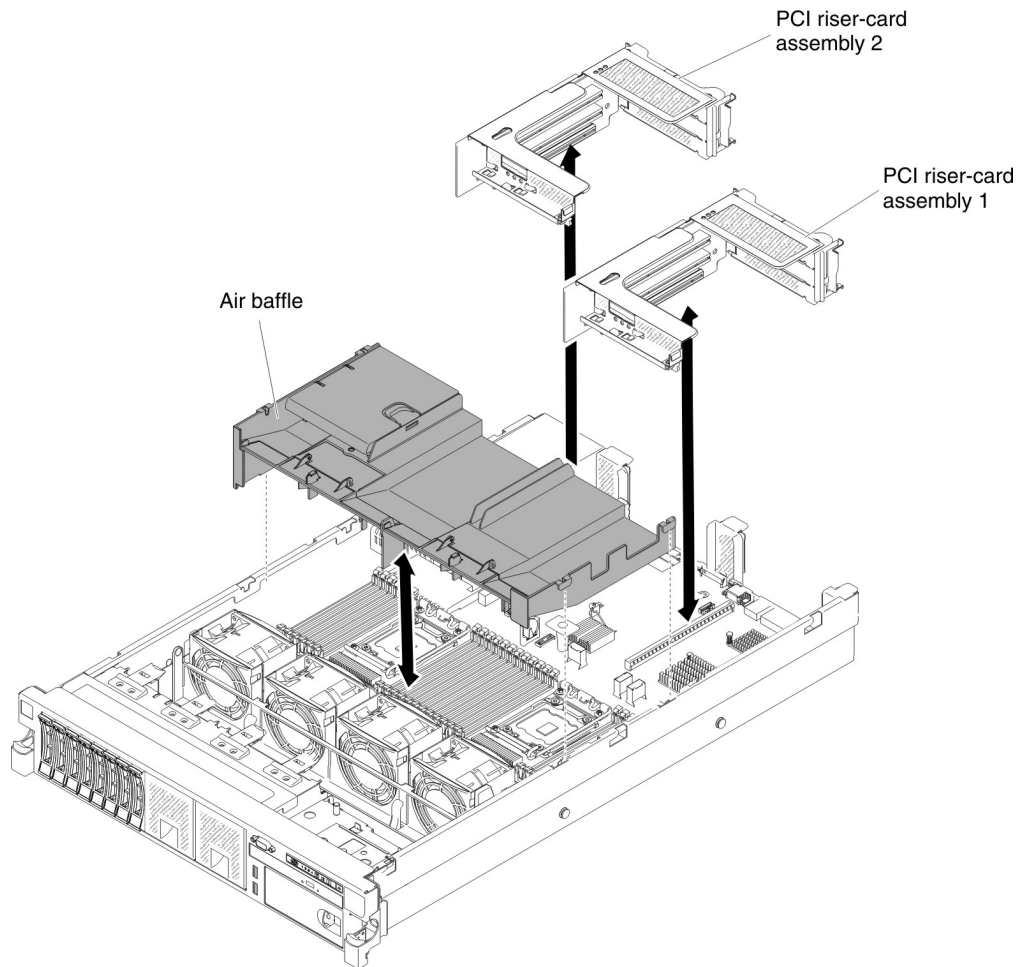
Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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. Make sure that PCI riser-card assembly 1 is removed if it is in long position and sitting on the air baffle (see "Removing a PCI riser-card assembly" on page 38).
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.

5. Install PCI riser-card assembly 1, if needed (see "Installing a PCI riser-card assembly").

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 a PCI riser-card assembly

Use this information to install a PCI riser-card assembly.

About this task

To install a PCI riser-card assembly, complete the following steps:
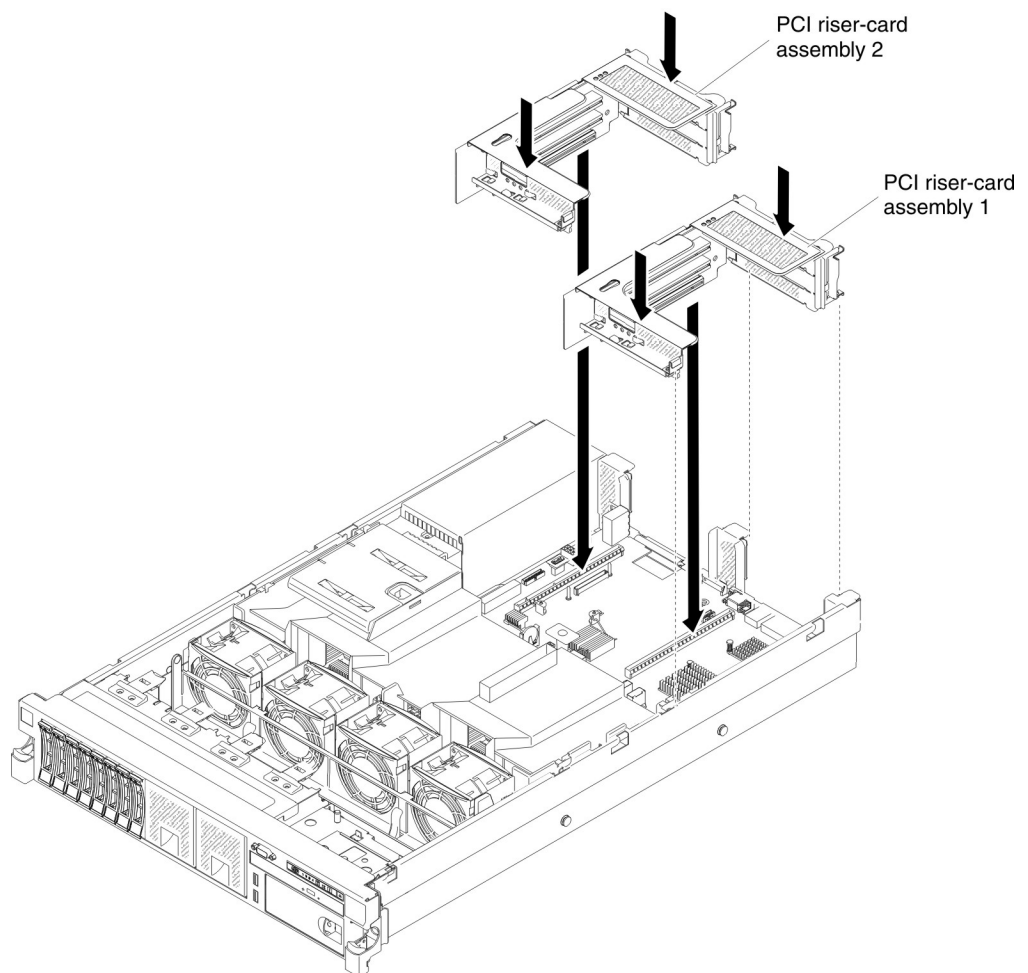
Figure 118. Installing a PCI riser-card assembly

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.

2. Make sure that the server and all peripheral devices are turned off and that the power cords and all external cables are disconnected.

3. Reinstall any adapters and reconnect any internal cables that you removed in other procedures.
4. Align the PCI riser-card assembly with the selected PCI riser-card connector on the system board:
   - PCI riser-card connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets in the side of the chassis.
   - PCI riser-card connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the PCI riser-card connector on the system board.
5. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.

Results

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 127.

Replacing the cover

Use this information to replace the cover.

About this task

To replace the server cover, complete the following steps:

Procedure

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 119. Cover installation

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

Connecting the external cables

The following illustrations show the locations of the input and output connectors of the server.

The following illustrations show the locations of the input and output connectors on the front and rear of the server.
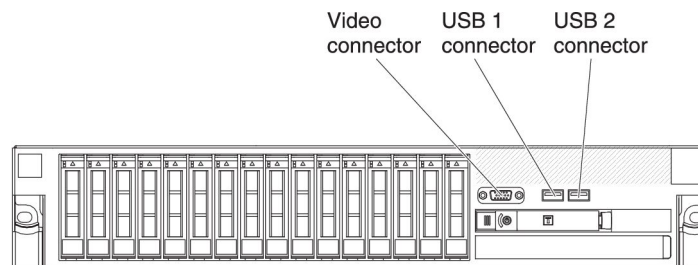
Figure 120. Front view
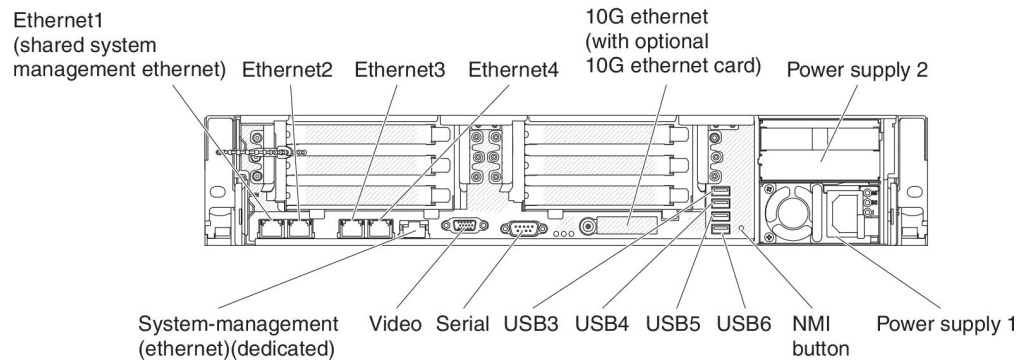
Figure 121. Rear view

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.

If the server comes with an installed operating system, see the documentation that comes with the operating system for additional cabling instructions.

Updating the server configuration

Use this information to update 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.

If you have installed a USB hypervisor memory key on the SAS riser-card, see the user's guide that comes with the hypervisor memory key. Hypervisor enables guest operating systems to function on the server.

For information about configuring the integrated Gigabit Ethernet controller, see "Configuring the Ethernet controller" on page 151.

Chapter 3. Configuration information and instructions

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

Updating the firmware

Use this information to update 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.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 138.

- **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 145.

- **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 136.

- **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?brand=5000008&Indocid=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 146 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 150.

- **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 147.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see "Configuring the Ethernet controller" on page 151.

- **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 151.

- **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 151.

- **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 152.

- **Configuring RAID arrays**

  For information about configuring RAID arrays, see "Configuring RAID arrays" on page 151.

  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

Use this information to start up the Setup utility.

About this task

To start the Setup utility, complete the following steps:

Procedure

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 143 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 143 for more information.

– **Clear Power-on Password**

Select this choice to clear a power-on password. See "Power-on password" on page 143 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 144 for more information.

– **Clear Administrator Password**

Select this choice to clear an administrator password. See "Administrator password" on page 144 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 4 on page 31 for more information).
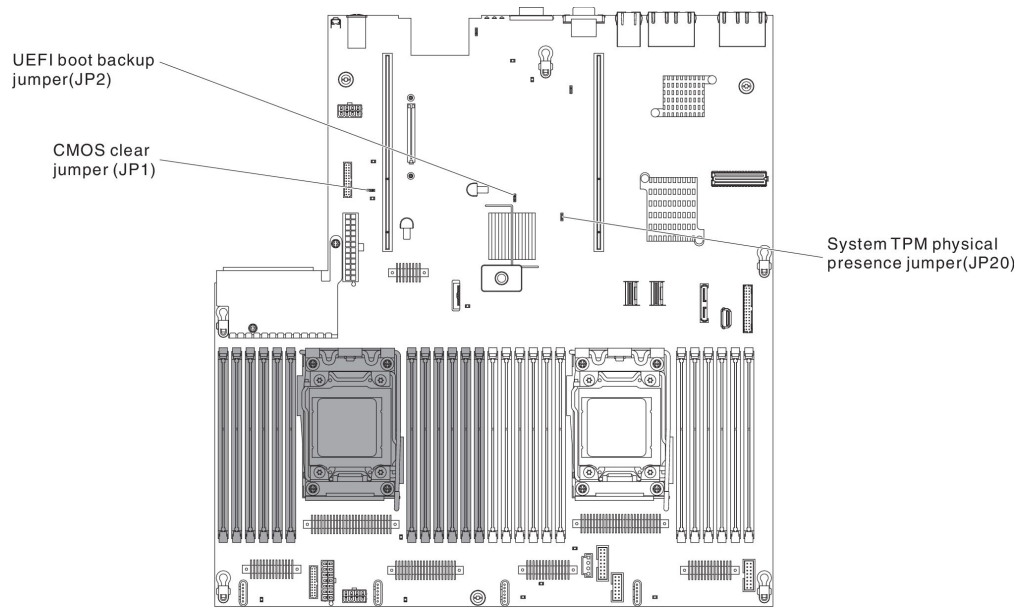
Figure 122. System-board switches, jumpers, and buttons

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.

About this task

To use the Boot Manager program, complete the following steps:

Procedure

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.

Results

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 30 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

Use this information to obtain the IMM host name.

About this task

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:

Procedure

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

Use this information to obtain the IP address for the IMM.

About this task

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:

Procedure

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
Use this information to log on to the web interface.

About this task

To log on to the IMM web interface, complete the following steps:

Procedure
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.

Results

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.

About this task

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:

Procedure

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**.

Results

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

Use this information to configure 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.

About this task

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:

Procedure

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

Use this information to update IBM Systems Director.

About this task

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
About this task

To locate and install a newer version of IBM Systems Director, complete the following steps:

Procedure
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
About this task

If your management server is connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

Procedure
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
About this task

If your management server is not connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

Procedure
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)

Use this information to update the Universal Unique Identifier (UUID).

About this task

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.

Procedure

1. Download the Advanced Settings Utility (ASU):
   a. Go to http://www.ibm.com/supportportal/.
   b. Click on the **Downloads** tab at the top of the panel.
   c. Under **ToolsCenter**, select **View ToolsCenter downloads**.
   d. Select **Advanced Settings Utility (ASU)**.
   e. Scroll down and click on the link and download the ASU version for your operating system.
2. ASU sets the UUID in the Integrated Management Module (IMM). Select one of the following methods to access the Integrated Management Module (IMM) to set the UUID:
   - Online from the target system (LAN or keyboard console style (KCS) access)
   - Remote access to the target system (LAN based)
   - Bootable media containing ASU (LAN or KCS, depending upon the bootable media)
3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:
   - For Windows based operating systems:
     – ibm_rndis_server_os.inf
     – device.cat
   - For Linux based operating systems:
     – cdc_interface.sh
4. After you install ASU, use the following command syntax to set the UUID: `asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]`
   Where:

   <uuid_value>
   > Up to 16-byte hexadecimal value assigned by you.

   [access_method]
   > The access method that you selected to use from the following methods:

- Online authenticated LAN access, type the command:

`[host <imm_internal_ip>] [user <imm_user_id>][password <imm_password>]`

Where:

imm_internal_ip
> The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

imm_user_id
> The IMM `account` (1 of 12 accounts). The default value is USERID.

imm_password
> The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

Note: If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the unauthenticated KCS access method.

The following commands are examples of using the userid and password default values and not using the default values:

Example that does not use the userid and password default values:
`asu set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --user <user_id> --password <password>`
Example that does use the userid and password default values:
`asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>`

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example:
`asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>`

The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer. See the *Advanced Settings Utility Users Guide* for more details. You can access the ASU Users Guide from the IBM website.

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

a. Go to http://www.ibm.com/supportportal/.

b. Click on the **Downloads** tab at the top of the panel.

c. Under **ToolsCenter**, select **View ToolsCenter downloads**.

d. Select **Advanced Settings Utility (ASU)**.

e. Scroll down and click on the link and download the ASU version for your operating system. Scroll down and look under **Online Help** to download the *Advanced Settings Utility Users Guide*.

- Remote LAN access, type the command:

Note: When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.

`host <imm_external_ip> [user <imm_user_id>][password <imm_password>]`

Where:

imm_external_ip
> The external IMM LAN IP address. There is no default value. This parameter is required.

imm_user_id
> The IMM `account` (1 of 12 accounts). The default value is USERID.

imm_password
> The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

The following commands are examples of using the userid and password default values and not using the default values:

Example that does not use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --host <imm_ip>
--user <user_id> --password <password>
```

Example that does use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --host <imm_ip>
```

- Bootable media:

  You can also build a bootable media using the applications available through the ToolsCenter website at http://www.ibm.com/support/entry/portal/docdisplay?lndocid=TOOL-CENTER. From the **IBM ToolsCenter** page, scroll down for the available tools.

5. Restart the server.

Updating the DMI/SMBIOS data

Use this information to update the DMI/SMBIOS data.

About this task

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.

Procedure

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.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 459 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.

Procedure

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 168 for information about using light path diagnostics LEDs.
   - **Event logs:** See "Event logs" on page 180 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/.

   Attention: Installing the wrong firmware or device-driver update might cause the server to malfunction. Before you install a firmware or device-driver update, read any readme and change history files that are provided with the downloaded update. These files contain important information about the update and the procedure for installing the update, including any special procedure for updating from an early firmware or device-driver version to the latest version.

   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 and "Updating the firmware" on page 133. 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 164. For information about configuring the server, see Chapter 3, "Configuration information and instructions," on page 133.

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 187 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 x3650 M4 server.

To find service bulletins that are available for the IBM System x3650 M4 server, go to http://www.ibm.com/supportportal/ and search for 7915, 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 195 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 445. If the server is halted and no error message is displayed, see "Troubleshooting by symptom" on page 187 and "Solving undetermined problems" on page 214.

- For information about power-supply problems, see "Solving power problems" on page 211, "Power problems" on page 199, and "Power-supply LEDs" on page 175.
- For intermittent problems, check the event log; see "Event logs" on page 180 and Appendix A, "Diagnostic messages," on page 353.

Performing the checkout procedure

Use this information to perform the checkout procedure.

About this task

To perform the checkout procedure, complete the following steps:

Procedure

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 175).
   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 187.
   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 168).
   i. Check for the following results:
      - Successful completion of POST (see "POST" on page 183 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 187; if necessary, see "Solving undetermined problems" on page 214.
   - **Yes:** Run DSA (see "Running the DSA Preboot diagnostic programs" on page 185).
      - If DSA reports an error, follow the instructions in Appendix A, "Diagnostic messages," on page 353.
      - If DSA does not report an error but you still suspect a problem, see "Solving undetermined problems" on page 214.

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 168 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 180 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 146, Appendix B, "Integrated management module II (IMM2) error messages," on page 389, and the *Integrated Management Module II User's Guide* at www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5089484&brandind=5000008.

- **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 183 and Appendix A, "Diagnostic messages," on page 353.

  – 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 185 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 187 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 37.

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.
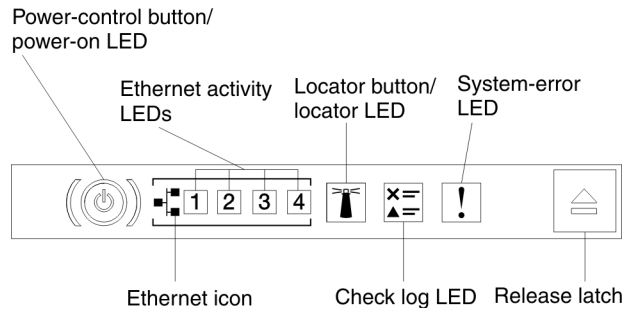
Figure 123. Operator information panel

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.
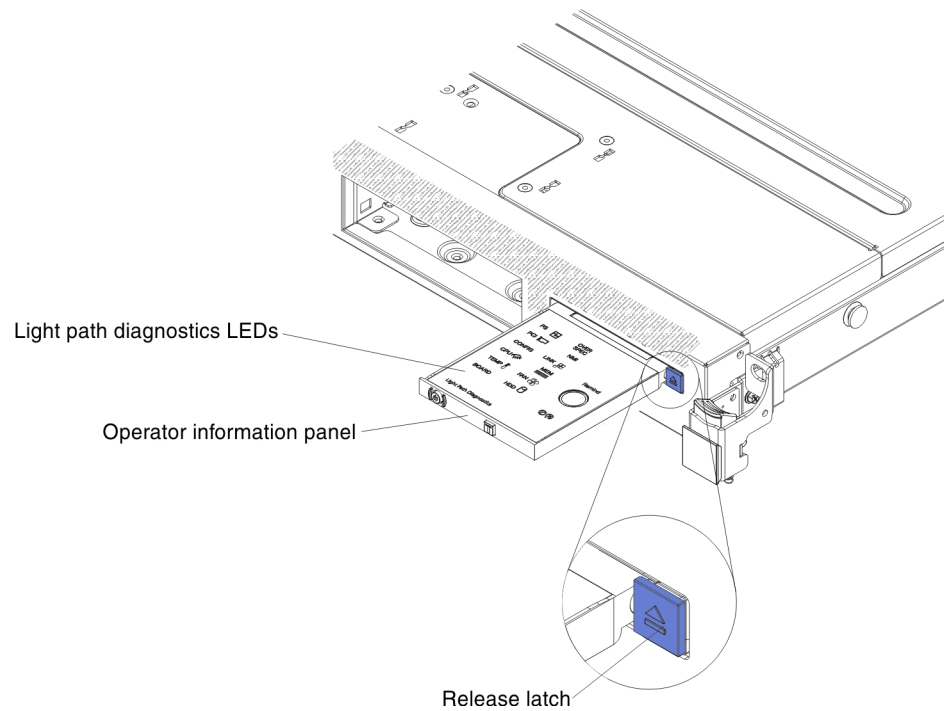
Figure 124. Light path diagnostics panel disengagement

The following illustration shows the light path diagnostics panel.
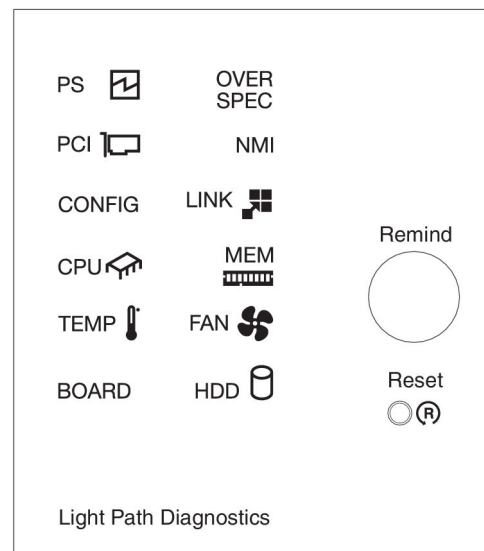
Figure 125. Light path diagnostics panel

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 171 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.
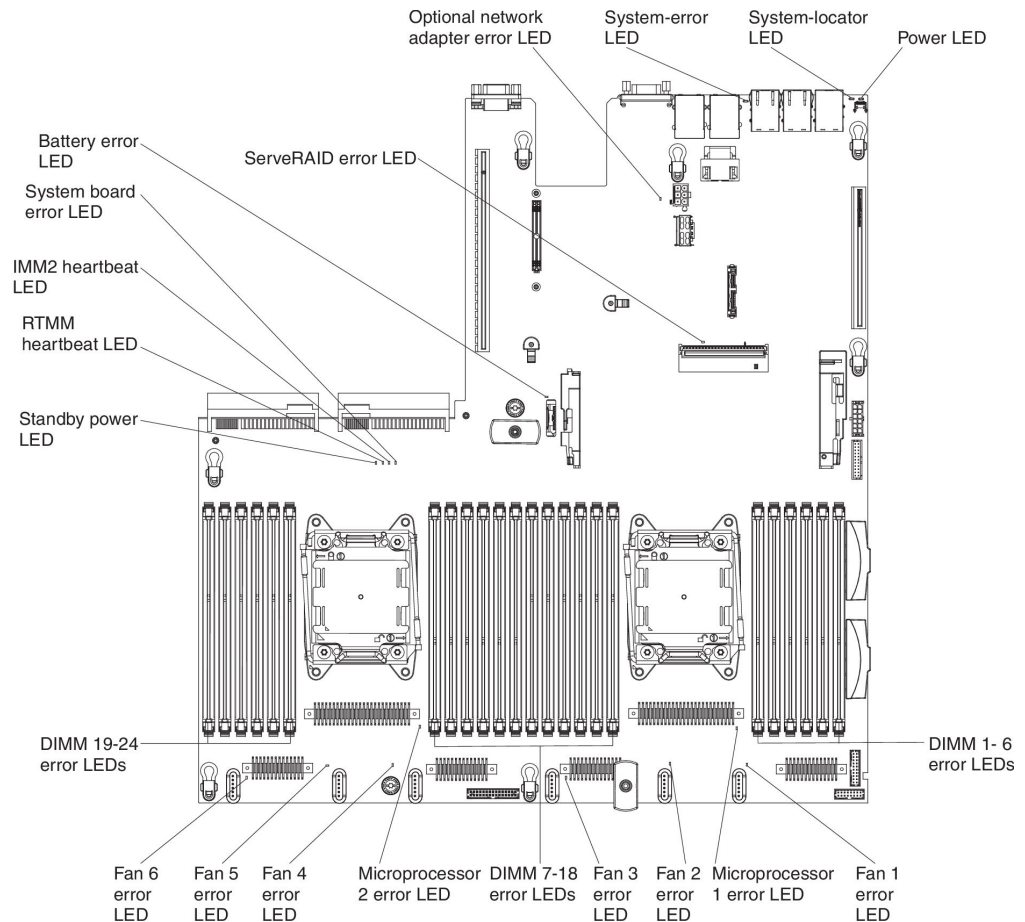
Figure 126. System board error LEDs

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 16 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.
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 175). 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 ((A, B, C, D, E, F, G, and H) 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.ibm.com/systems/bladecenter/resources/powerconfig.html.
		  b. Replace the failed power supply.
		2. If the Pwr Rail ((A, B, C, D, E, F, G, and H) error was also detected, follow actions listed in "Power problems" on page 199 and "Solving power problems" on page 211.

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
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/support/entry/portal/docdisplay?lndocid=SERV-CALL.
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 336 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 445 and Appendix B, "Integrated management module II (IMM2) error messages," on page 389.
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 336 for information about installation and requirements. 2. (Trained technician only) Replace the failing microprocessor (see "Removing a microprocessor and heat sink" on page 333 and "Replacing a microprocessor and heat sink" on page 336). 3. For more information, go to http://www.ibm.com/support/entry/portal/docdisplay?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 336 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 133). 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 445 and Appendix B, "Integrated management module II (IMM2) error messages," on page 389. 4. Replace the failing DIMM (see "Removing a memory module" on page 272 and "Installing a memory module" on page 53).
	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 445 and Appendix B, "Integrated management module II (IMM2) error messages," on page 389.
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/support/entry/portal/docdisplay?lndocid=SERV-CALL.
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	1. Check if your server installed with the adapters mentioned in Table 25 on page 301. If yes, make sure your server compile with the configuration with four fans installed. 2. Reseat the failing fan, which is indicated by a lit LED near the fan connector on the system board. 3. Replace the failing fan (see "Removing a hot-swap fan" on page 318 and "Replacing a hot-swap fan" on page 319).

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 327 and "Replacing the system battery" on page 329).
		  • (Trained technician only) System board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349).

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 171.
		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/support/entry/portal/docdisplay?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.

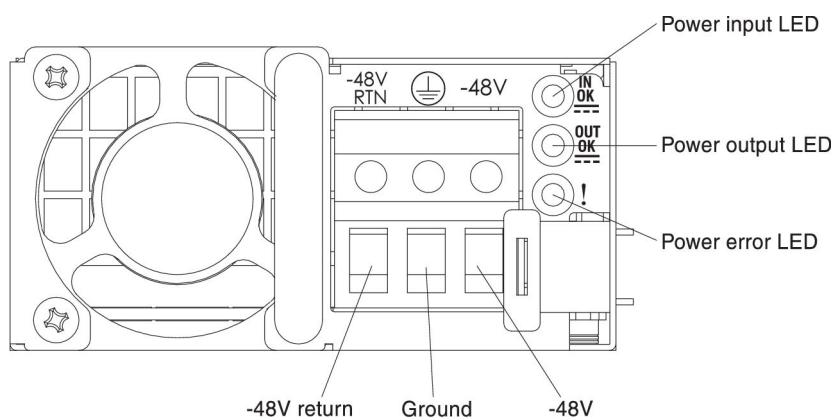The following illustration shows the locations of the power-supply LEDs on the ac power supply.
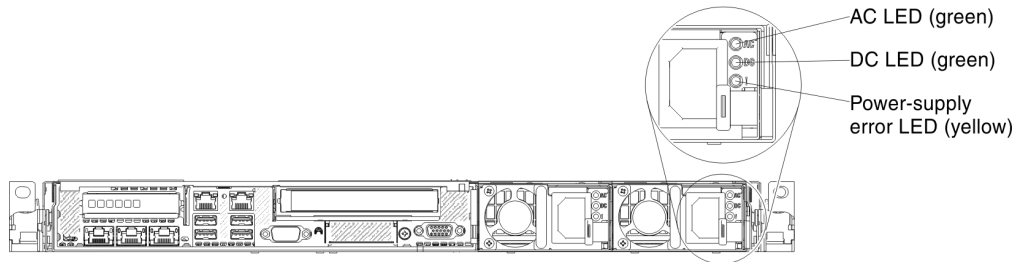
Figure 127. AC power-supply LEDs

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 199. 3. If the OVER SPEC LED on the light path diagnostics is lit, follow the actions in "Light path diagnostics LEDs" on page 171. 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 199 and "Solving power problems" on page 211 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 128. 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 199. 3. If the OVER SPEC LED on the light path diagnostics is lit, follow the actions in "Light path diagnostics LEDs" on page 171. 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 199 and "Solving power problems" on page 211 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.
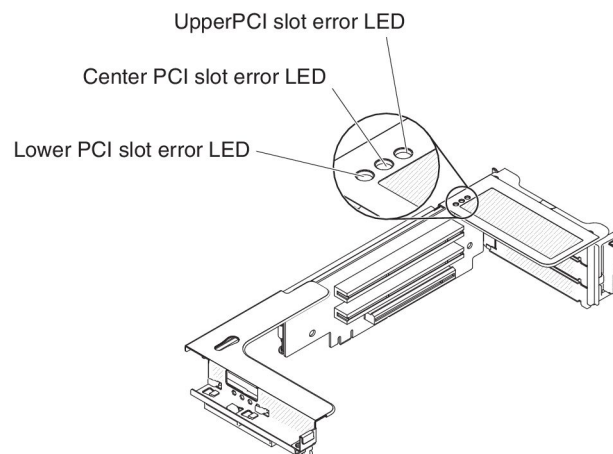
Figure 129. PCI riser-card LEDs

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 138). For more information about POST error codes, see Appendix C, "UEFI/POST diagnostic codes," on page 445.

- **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 389.

  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 149. 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 389.

- **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 181). For more information about DSA and DSA messages, see "IBM Dynamic System Analysis" on page 183 and Appendix A, "Diagnostic messages," on page 353.

Viewing event logs through the Setup utility

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

Procedure

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 149.

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 148 and "Logging on to the web interface" on page 149.
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 185 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 181.

Clearing the event logs

Use this information to clear the event logs.

About this task

To clear the event logs, complete the following steps.

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

Procedure

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 445 for more information.

If POST detects a problem, an error message is sent to the POST event log, see "Event logs" on page 180 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, "Diagnostic messages," on page 353.

If you cannot find a problem by using DSA, see "Solving undetermined problems" on page 214 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/support/entry/portal/docdisplay?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/support/entry/portal/ docdisplay?lndocid=TOOL-BOMC. 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/ support/entry/portal/docdisplay?lndocid=SERV-DSA.

Running the DSA Preboot diagnostic programs

Use this information to run the DSA Preboot diagnostic programs.

About this task

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:

Procedure

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.

Results

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.

Procedure

- 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.

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 445, Appendix B, "Integrated management module II (IMM2) error messages," on page 389, and Appendix A, "Diagnostic messages," on page 353 for more information.

Troubleshooting by symptom

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

About this task

If you cannot find a solution to the problem in these tables, see Appendix A, "Diagnostic messages," on page 353 for information about testing the server and "Running the DSA Preboot diagnostic programs" on page 185 for additional information about running DSA Preboot program. For additional information to help you solve problems, see "Start here" on page 161.

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:

Procedure

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 168).
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, "Diagnostic messages," on page 353).
4. Reinstall the new software or new device.

Results

CD/DVD drive problems

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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.
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

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 219 for more information. 2. See "Recovering the server firmware (UEFI update failure)" on page 216 for more information.

Hard disk drive problems

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 a hot-swap hard disk drive" on page 254 and "Replacing a hot-swap hard disk drive" on page 255).

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 215.

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 215.
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 185). • 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 215.

Hypervisor problems

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

• **Follow the suggested actions in the order in which they are listed in the Action column until 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 325 and "Replacing a USB embedded hypervisor flash device" on page 326). 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

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 180).
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 445 and Appendix A, "Diagnostic messages," on page 353. 2. If neither condition applies, check the system-error log or IMM system-event log (see "Event logs" on page 180).

Keyboard, mouse, or USB-device problems

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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

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

• Follow the suggested actions in the order in which they are listed in the Action column until 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 185). 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

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

• Follow the suggested actions in the order in which they are listed in the Action column until 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 168).
	
	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 199.
	 • 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 133.
	 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 214.

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 185).
	  • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 214.
	  • (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 133) 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

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 180), 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 300 and "Replacing the dual-port network adapter" on page 301). 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

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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

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

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 30). 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 175.
	
	9. See "Solving undetermined problems" on page 214.

- **Follow the suggested actions in the order in which they are listed in the Action column until 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 A 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 A error has been recorded in the IMM event log. 3. (Trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349). 4. Reinstall the component; then, restarting the server. If the Pwr rail A 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 333 and "Replacing a microprocessor and heat sink" on page 336). 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 B 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 B error has been recorded in the IMM event log. 3. Restart the server. If the Pwr rail B error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349). 4. Reinstall the component; then, restarting the server. If the Pwr rail B 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 333 and "Replacing a microprocessor and heat sink" on page 336). 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 C error has been recorded in the IMM event log.	1. Disconnect the server power cords. 2. Remove the following components if Pwr rail C 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 • Fan 1 • DIMMs 1 through 6 3. Restart the server. If the Pwr rail C error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349). 4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail C 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 272 and "Installing a memory module" on page 53). • Fan 1 • PCI riser-card assembly 1 (see "Removing a PCI riser-card assembly" on page 283 and "Replacing a PCI riser-card assembly" on page 284). • Optional adapter (if one is present) installed in PCI riser-card assembly 1 (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287). 5. Follow actions in "Solving power problems" on page 211, 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 D error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	
	2. Remove the following components if the Pwr rail D error has been recorded in the IMM event log:
	  • Optional PCI adapter power cable (if one is present)
	  • Fan 2
	  • DIMMs 7 through 12
	
	3. Restart the server. If the Pwr rail D error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349).
	
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail D 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 272 and "Installing a memory module" on page 53).
	  • Fan 2 (see "Removing a hot-swap fan" on page 318 and "Replacing a hot-swap fan" on page 319).
	  • Optional PCI adapter power cable (if one is present)
	
	5. Follow actions in "Solving power problems" on page 211, 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 E error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	2. Remove the following components if the Pwr rail E error has been recorded in the IMM event log:
	  • Optional DVD drive (if one is installed)
	  • Hard disk drives
	  • DIMMs 13 through 18
	3. Restart the server. If the Pwr rail E error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349).
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail E 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 272 and "Installing a memory module" on page 53).
	  • Hard disk drives
	  • Optional DVD drive, if one is present (see "Removing a DVD drive" on page 262 and "Replacing a DVD drive" on page 263).
	5. Follow actions in "Solving power problems" on page 211, 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 F error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	
	2. Remove the following components if the Pwr rail F error has been recorded in the IMM event log:
	  • Optional adapter (if one is present) installed in PCI riser-card assembly 1
	  • PCI riser-card assembly 1
	  • Fan 4
	  • DIMMs 19 through 24
	
	3. Restart the server. If the Pwr rail F error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349).
	
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail F 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 272 and "Installing a memory module" on page 53)
	  • Fan 4 (see "Removing a hot-swap fan" on page 318 and "Replacing a hot-swap fan" on page 319)
	  • PCI riser-card assembly 1 (see "Removing a PCI riser-card assembly" on page 283 and "Replacing a PCI riser-card assembly" on page 284).
	  • Optional adapter (if one is present) installed in PCI riser-card assembly 1 (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287).
	
	5. Follow actions in "Solving power problems" on page 211, 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 G error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	
	2. Remove the following components if the Pwr rail G error has been recorded in the IMM event log:
	  • Optional PCI adaptor power cable (if one is present)
	  • Fan 3
	  • Hard disk drives
	  • Hard disk drive backplane assembly
	
	3. Restart the server. If the Pwr rail G error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349).
	
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail G error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component.
	  • Hard disk drive backplane assembly
	  • Hard disk drives
	  • Fan 3 (see "Removing a hot-swap fan" on page 318 and "Replacing a hot-swap fan" on page 319)
	  • Optional PCI adaptor power cable (if one is present) (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287).
	
	5. Follow actions in "Solving power problems" on page 211, 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 H error has been recorded in the IMM event log.	1. Disconnect the server power cords.
	
	2. Remove the following components if the Pwr rail H error has been recorded in the IMM event log:
	  • Optional PCI adaptor power cable (if one is present)
	  • Optional adapter (if one is present) installed in PCI riser-card assembly 2
	  • PCI riser-card assembly 2
	
	3. Restart the server. If the Pwr rail H error has been recorded in the IMM event log again, (trained technician only) replace the system board (see "Removing the system board" on page 346 and "Replacing the system board" on page 349).
	
	4. Reinstall the components one at a time, in the order shown, restarting the server each time. If the Pwr rail H error has been recorded in the IMM event log again, the component that you just reinstalled is defective. Replace the defective component.
	  • PCI riser-card assembly 2 (see "Removing a PCI riser-card assembly" on page 283 and "Replacing a PCI riser-card assembly" on page 284).
	  • Optional adapter (if one is present) installed in PCI riser-card assembly 2 (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287).
	  • Optional PCI adaptor power cable (if one is present)Optional adapter (if one is present) installed in PCI riser-card assembly 1 (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287).Optional adapter (if one is present) installed in PCI riser-card assembly 1 (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287).Optional adapter (if one is present) installed in PCI riser-card assembly 1 (see "Removing an adapter" on page 286 and "Replacing an adapter" on page 287).
	
	5. Follow actions in "Solving power problems" on page 211, 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.

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.

• Follow the suggested actions in the order in which they are listed in the Action column until 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 unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See "Solving undetermined problems" on page 214.

Serial-device problems

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

• Follow the suggested actions in the order in which they are listed in the Action column until 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

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

• Follow the suggested actions in the order in which they are listed in the Action column until 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

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

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 138 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

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

See "Monitor and video problems" on page 196.

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.

About this task

To diagnose a power problem, use the following general procedure:

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 171).
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 233). 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 A error	• Microprocessor 1
Pwr rail B error	• Microprocessor 2
Pwr rail C error	• Optional adapter (if one is installed) in PCI riser-card assembly 1 • PCI riser-card assembly 1 • Fan 1 • DIMMs 1 through 6
Pwr rail D error	• Optional dual-port network adaptor • Fan 2 • DIMMs 7 through 12

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

Pwr rail error in the IMM event log	Components
Pwr rail E error	• Optional DVD drive (if one is installed) • Hard disk drives • DIMMs 13 through 18
Pwr rail F error	• Optional adapter (if one is installed) in PCI riser-card assembly 1 • PCI riser-card assembly 1 • Fan 4 • DIMMs 19 through 24
Pwr rail G error	• Optional PCI adaptor power cable (if one is present) • Fan 3 • Hard disk drives • Hard disk drive backplane assembly
Pwr rail H error	• Optional PCI adaptor power cable (if one is present) • Optional adapter (if one is presented) installed in PCI riser-card assembly 2 • PCI riser-card assembly 2

    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 175 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.

Results

If the server does not start from the minimum configuration, see "Power-supply LEDs" on page 175 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.

About this task

Try the following procedures:

Procedure

- 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.

Results

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.

About this task

If you suspect that a software problem is causing failures (continuous or intermittent), see "Software problems" on page 210.

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 3 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 216.

If the power supplies are working correctly, complete the following steps:

Procedure

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.

Results

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.
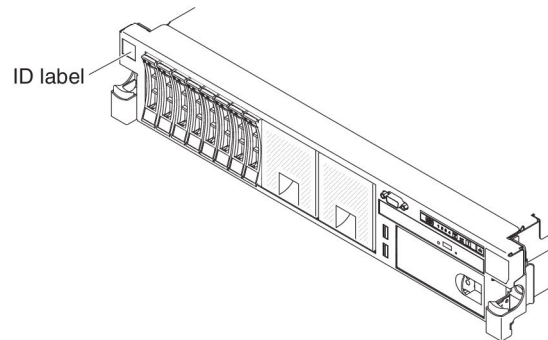
Figure 130. ID label

- 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 459 for information about calling IBM for service.

Recovering the server firmware (UEFI update failure)

Use this information to recover the server firmware.

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

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

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

This section details the in-band manual recovery method.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server, and disconnect all power cords and external cables.
3. Remove the cover (see "Removing the cover" on page 37).
4. Locate the UEFI boot backup jumper (JP2) on the system board.
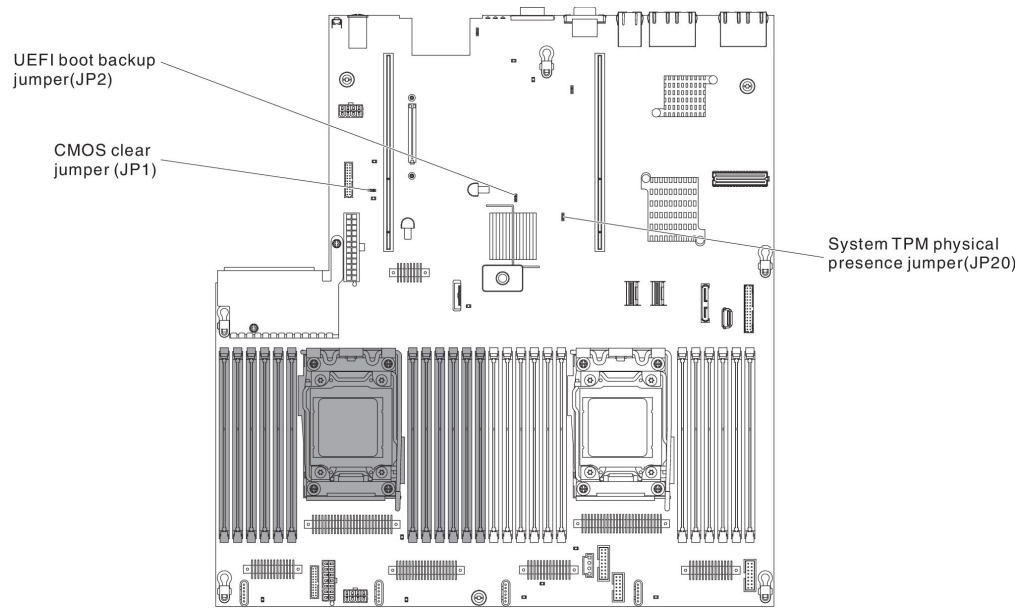
Figure 131. UEFI boot backup jumper (JP2) location

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 37).

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 244).

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 37).

16. Reset the CMOS by removing the system battery (see "Removing the system battery" on page 327).

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 329).

19. Reinstall the cover (see "Replacing the cover" on page 244).

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

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

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

Results

In-band automated boot recovery method

This section details the in-band automated boot recovery method.

About this task

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.

Procedure

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.

Results

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)

Use this information for Automated boot recovery (ABR).

About this task

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 216. After you have recovered the firmware in the primary bank, complete the following steps:

Procedure

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

Use this information for 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 x3650 M4 Type 7915

The parts listing of System x3650 M4 Type 7915

The following replaceable components are available for the System x3650 M4 Type 7915 server, except as specified otherwise in "Replaceable server components." For an updated parts listing, go to http://www.ibm.com/supportportal/.

Replaceable server components

The replaceable server components for System x3650 M4 Type 7915

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 229 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 459.

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 229.
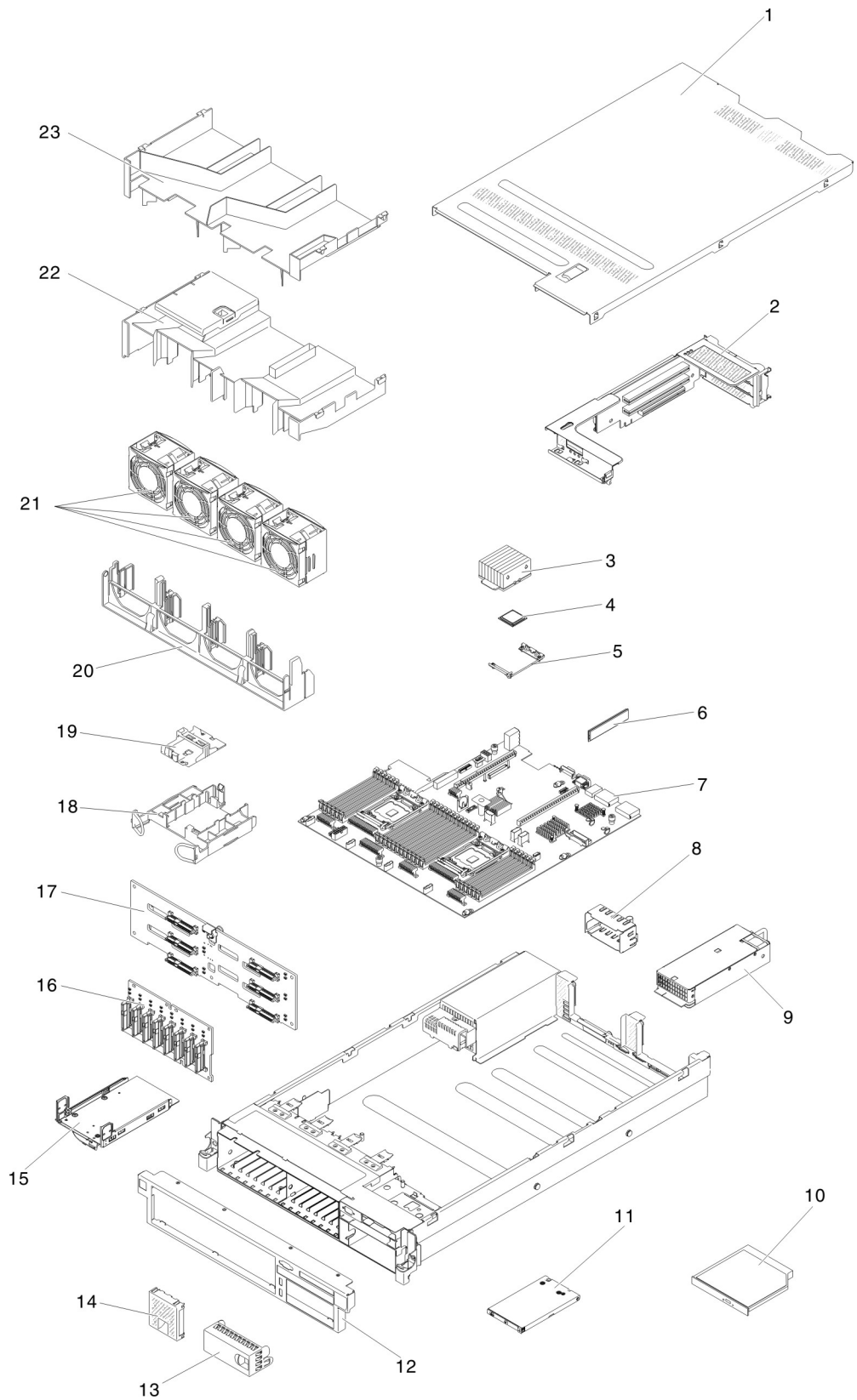
The following table lists the part numbers for the server replaceable components.

Table 18. Parts listing, Type 7915

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
2	PCI Express riser-card assembly (x 8)	94Y6704	
2	PCI Express riser-card assembly (x 16)	94Y6707	
2	PCI-X riser-card assembly	94Y6706	
2	PCI Express riser-card assembly (x 16)	00D9530	
3	Heat sink, 95 watt		94Y6618
3	Heat sink, 130 watt		94Y6614
3	Heat sink, 135 watt		94Y6696
	Microprocessor installation tool		94Y9955
4	Microprocessor, Intel Xeon E5-2690, 2.90 GHz, 20 MB, 135 W (8-core)		49Y8115
4	Microprocessor, Intel Xeon E5-2637 3.00 GHz, 5 MB, 80 W (2 core)		49Y8124
4	Microprocessor, Intel Xeon E5-2665 2.40 GHz, 20 MB, 115 W (8 core)		49Y8142
4	Microprocessor, Intel Xeon E5-2650L 1.80 GHz, 20 MB, 70 W (8 core)		81Y5160
4	Microprocessor, Intel Xeon E5-2603 1.80 GHz, 10 MB, 80 W (4 core)		81Y5161
4	Microprocessor, Intel Xeon E5-2609 2.40 GHz, 10 MB, 80 W (4 core)		81Y5163
4	Microprocessor, Intel Xeon E5-2620 2.00 GHz, 15 MB, 95 W (6 core)		81Y5164
4	Microprocessor, Intel Xeon E5-2630 2.30 GHz, 15 MB, 95 W (6 core)		81Y5165
4	Microprocessor, Intel Xeon E5-2640 2.50 GHz, 15 MB, 95 W (6 core)		81Y5166
4	Microprocessor, Intel Xeon E5-2650, 2.00 GHz, 20 MB, 95 W (8-core)		81Y5167
4	Microprocessor, Intel Xeon E5-2660 2.20 GHz, 20 MB, 95 W (8 core)		81Y5168
4	Microprocessor, Intel Xeon E5-2680 2.70 GHz, 20 MB, 130 W (8 core)		81Y5169
4	Microprocessor, Intel Xeon E5-2667 2.90 GHz, 15 MB, 130 W (6 core)		81Y5170
4	Microprocessor, Intel Xeon E5-2643, 3.30 GHz, 10 MB, 130 W (4-core)		81Y5171
4	Microprocessor, Intel Xeon E5-2630L 2.00 GHz, 15 MB, 60 W (6 core)		81Y5204
4	Microprocessor, Intel Xeon E5-2670 2.60 GHz, 20 MB, 115 W (8 core)		81Y9419
4	Microprocessor, Intel Xeon E5-2648L 1.8 GHz, 20 MB, 70 W (8 core)		95Y4671
4	Microprocessor, Intel Xeon E5-2658 2.1 GHz, 20 MB, 95 W (8 core)		95Y4676
5	Heat sink retention module		94Y7739
6	Memory, 8 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1415	
6	Memory, 8 GB quad-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1417	
6	Memory, 4 GB dual-rank 1.35 V, DDR3, 1333MHz, UDIMM	49Y1422	
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 dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1425	
6	Memory, 4 GB single-rank 1.5 V, DDR3, 1600MHz, RDIMM	49Y1561	
6	Memory, 16 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	49Y1565	
6	Memory, 32 GB dual-rank 1.35 V, DDR3, 1333MHz, RDIMM	90Y3107	
6	Memory, 8 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	90Y3111	
6	Memory, 4 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	90Y3180	
6	Memory, 16 GB 1.5V DDR3, 1333MHz LP HyperCloud DIMM	00D4966	

Table 18. Parts listing, Type 7915 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
6	Memory, 16 GB dual-rank 1.5 V, DDR3, 1600MHz, RDIMM	00D4970	
6	Memory, 32 GB 1.5V DDR3, 1066MHz LP HyperCloud DIMM	00D5006	
7	System board		00W2671
9	Power supply, 550 Watt, ac - Acbel	94Y8105	
9	Power supply, 750 Watt, ac - Delta (This part is interchangeable with part number 94Y8071)	94Y8079	
9	Power supply, 750 Watt, ac - Emerson (This part is interchangeable with part number 94Y8079)	94Y8071	
9	Power supply, 750 Watt, dc - Emerson	69Y5742	
9	Power supply, 900 Watt, ac - Delta (This part is interchangeable with part number 94Y8073)	94Y8067	
9	Power supply, 900 Watt, ac - Emerson (This part is interchangeable with part number 94Y8067)	94Y8073	
10	DVD drive, SATA	44W3254	
10	DVD drive, SATA	44W3256	
11	Operator information panel assembly	90Y5821	
	Filler, 3.5-inch hard disk drive bay for hot-swap	69Y5364	
	Filler, 3.5-inch hard disk drive bay for simple-swap	69Y5368	
14	Filler, hard disk drive bay for simple-swap	49Y5360	
15	Tape kit (optional) contains: • Assembly, mechanical (1) • Clamp, round cable (1) • Filler, tape kit 3.5 inch (1) • Screws, M3x6 MPC (4)	40K6449	
	Plus 8 pac 2.5-inch hard disk drive backplane	90Y5875	
16	8 pac 2.5-inch hard disk drive backplane	46W9187	
17	6 pac 3.5-inch hard disk drive backplane	90Y5091	
20	Fan cage	94Y6621	
21	Fan	94Y6620	
	Battery, ServeRAID-M5100 Series	81Y4491	
	Hard disk drive, 200 GB SATA	43W7721	
	Hard disk drive, 200 GB SSD	43W7745	
	Hard disk drive, 300 GB SAS	81Y9671	
	Hard disk drive, 2.5-inch hot-swap, 146 GB, 15 K	90Y8927	
	Hard disk drive, 2.5-inch hot-swap, 146 GB, 15 K, SED	90Y8945	
	Hard disk drive, 2.5-inch hot-swap, 250 GB, 7.2 K	81Y9723	
	Hard disk drive, 2.5-inch hot-swap, 300 GB, 10 K	90Y8878	
	Hard disk drive, 2.5-inch hot-swap, 300 GB, 10 K, SED	90Y8914	
	Hard disk drive, 2.5-inch hot-swap, 500 GB, 7.2 K	81Y9727	
	Hard disk drive, 2.5-inch hot-swap, 500 GB, 7.2 K	90Y8954	
	Hard disk drive, 2.5-inch hot-swap, 600 GB, 10 K	90Y8873	

Table 18. Parts listing, Type 7915 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Hard disk drive, 2.5-inch hot-swap, 900 GB, 10 K	81Y9651	
	Hard disk drive, 2.5-inch hot-swap, 1 TB, 7.2 K	81Y9691	
	Hard disk drive, 2.5-inch hot-swap, 1 TB, 7.2 K	81Y9731	
	Hard disk drive, 2.5-inch, hot-swap, 1 TB, 7.2K SAS SAP	90Y8866	
	Hard disk drive, 3.5-inch hot-swap, 500 GB, 7.2 K, NL SATA	81Y9787	
	Hard disk drive, 3.5-inch hot-swap, 1 TB, 7.2 K	81Y9791	
	Hard disk drive, 3.5-inch hot-swap, 1 TB, 7.2 K	90Y8568	
	Hard disk drive, 3.5-inch hot-swap, 2 TB, 7.2 K, NL SATA	81Y9795	
	Hard disk drive, 3.5-inch hot-swap, 2 TB, 7.2 K	90Y8573	
	Hard disk drive, 3.5-inch hot-swap, 3 TB, 7.2 K	81Y9799	
	Hard disk drive, 3.5-inch hot-swap, 3 TB, 7.2 K	90Y8578	
	Hard disk drive, 3.5-inch hot-swap, 4 TB, 7.2K, NL SATA	49Y6003	
	Hard disk drive, 3.5-inch simple-swap, 500 GB, 7.2 K	81Y9803	
	Hard disk drive, 3.5-inch simple-swap, 1 TB, 7.2 K	81Y9807	
	Hard disk drive, 3.5-inch simple-swap, 2 TB, 7.2 K	81Y9811	
	Hard disk drive, 3.5-inch simple-swap, 3 TB, 7.2 K	81Y9815	
	Hard disk drive, 3.5-inch simple-swap, 4 TB, 7.2K NL SATA	49Y6013	
	Solid state drive, 200 GB	40K6897	
	Solid state drive, 50 GB	43W7729	
	Solid state drive, 2.5-inch hot-swap, SATA, 256 GB	90Y8644	
	Solid state drive, 2.5-inch hot-swap, SATA, 128 GB	90Y8649	
	Solid state drive, 2.5-inch simple-swap, SATA, 256 GB	90Y8664	
	Solid state drive, 2.5-inch simple-swap, SATA, 128 GB	90Y8669	
	Solid state drive file, 1.8-inch	49Y4936	
	Solid state drive backpanel cage, 1.8-inch		59Y6222
	HBA 4 GB FC PCI-e single port adapter	39R6526	
	HBA 4 GB FC PCI-e dual port adapter	39R6528	
	NetXtreme II 1000 Express Ethernet adapter	39Y6070	
	PRO 1000 PF server adapter	42C1752	
	QLogic 10GB CNA	00Y3274	
	QLogic 10Gb dual port CNA	42C1802	
	Qlogic 10 GB SFP+ SR optical transceiver	42C1816	
	Qlogic dual-port 10GbE SFP+ Embedded VFA	90Y5099	
	Brocade 10GB SFP+ SR optical transceiver	42C1819	
	HBA 10 GB adapter	42C1822	
	Emulex 8 GB PCIe single port adapter	42D0491	
	Emulex 8 GB PCIe dual port adapter	42D0500	
	Qlogic 8 GB single port adapter	42D0507	
	HBA 8 GB adapter	42D0516	

Table 18. Parts listing, Type 7915 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Video adapter, NVIDIA Quadro 600	43V5931	
	Video adapter, NVIDIA Quadro 2000	43V5939	
	Video adapter, NVIDIA Quadro FX4000 PCI Express x 16		90Y2330
	Video adapter, NVIDIA Quadro 6000 PCI Express x 16	43V5921	
	FC 4 GB PCIe single port adapter	43W7510	
	FC 4 GB PCIe dual port adapter	43W7512	
	6 Gb SAS HBA	46C8935	
	IBM 6 Gb Performance Optimized HBA	46C8937	
	10 GB SFP+ SR optical transceiver	46C9297	
	6 Gb SSD HBA	46M0913	
	Brocade 8 GB single port adapter	46M6061	
	Brocade 9 GB dual port adapter	46M6062	
	10GbE SW SFP+ transceiver	46W4236	
	Dual port adapter	49Y4232	
	Quad port adapter	49Y4242	
	Broadcom NetXtreme II 10 GB dual port BaseT adapter	49Y7912	
	NetXtreme II 1000 Express dual port Ethernet adapter	49Y7947	
	NetXtreme II 1000 Express quad port Ethernet adapter	49Y7949	
	X520-DA2 10 GB Express dual port SFP+ adapter	49Y7962	
	Brocade HBA 4 GB FC single port	59Y1992	
	Brocade HBA 4 GB FC dual port	59Y1998	
	HBA 6 GB adapter SAS	68Y7354	
	IBM LLM-SM Dual Port 10Gbe SFP+ Adaptor	00D9502	
	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	
	6 GB performance optimized HBA	90Y4356	
	Emulex dual port 10GbE SFP+ Embedded VFA III adapter	90Y5100	
	Emulex 10GbE virtual fabric adapter III	95Y3766	
	Emulex dual-port 10 GBase-T embedded adapter	90Y5101	
	Dual-port FDR embedded adapter	00J6248	
	Mellanox ConnectX-3 VPI single-port QSFP FDR14 40GbE HCA	00W0039	
	Mellanox ConnectX-3 dual-port QDR/FDR10 mezz card	90Y4956	
	Mellanox ConnectX-3 EN dual-port QSFP+ 40GbE adapter	95Y3461	
	Adapter, DVI to VGA adapter	25R9043	
	ServeRAID-M1015	46C8933	
	ServeRAID-M1015 SAS/SATA adapter	46M0861	
	ServeRAID-B5015 SSD adapter	46M0970	

Table 18. Parts listing, Type 7915 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	ServeRAID M5120 SAS/SATA adapter	81Y4479	
	ServeRAID M5100 series 512 MB cache (RAID 5 upgrade)	81Y4485	
	ServeRAID M5100 series 512 MB flash (RAID 5 upgrade)	46C9027	
	ServeRAID M5100 series 1 GB flash (RAID 5 upgrade)	46C9029	
	ServeRAID M5110 SAS/SATA adapter	90Y4449	
	Battery, 3.0 volt	33F8354	
	Thermal grease kit		41Y9292
	Alcohol wipes		59P4739
	Battery, ServeRAID	81Y4579	
	USB module kit	94Y6629	
	Advanced operator information panel kit	00D3863	
	Power paddle card	69Y5787	
	Power adapter	44E8879	
	Tape, 160 GB cartridge	46C5393	
	Tape, 320 GB cartridge	46C5394	
	Tape, 500 GB cartridge	46C5395	
	Cord, power cord	39M5377	
	Cable, 24-inch SATA	25R5635	
	Cable, SAS Y-cable	44E8878	
	Cable, SAS Y-cable	49Y9901	
	Cable, USB	44E8883	
	Cable, USB 1 m	44E8893	
	Cable, USB	46M6475	
	Cable, USB	46M6477	
	Cable, USB	81Y3643	
	Cable, SAS 610 mm	00D3276	
	Cable, SAS	69Y2281	
	Cable, SAS 820 mm	81Y6674	
	Cable, SATA slimline	81Y6774	
	Cable, 2.5-inch HDD I2C	46W8469	
	Cable, Spec power assembly	00D3334	
	Cable, USB	81Y6770	
	Cable, 3.5-inch HDD power	81Y6771	
	Cable, 3.5-inch HDD backplane	81Y6773	
	Cable, 3.5-inch simple-swap panel	81Y6776	
	Cable, 2.5-inch HDD power	81Y6772	
	Cable, 2.5-inch HDD I2C	00D3049	
	Cable, 3-4 I2C	00D3910	
	Cable, power	00D3911	

Table 18. Parts listing, Type 7915 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)
	Cable, Q6000 power R2	00D4010	
	Cable, mini SAS	00D4012	
	Cable assembly, 2.5-inch HDD simple-swap	00D4016	
	Cable, 1.8-inch SSD hot-swap power	00D4021	
	Cable, Q6000 power R1	00D9507	
	Cable, VGA	81Y6775	
	Cable, 2 x 3 VGA 900 mm	90Y5906	
	Cable, operation panel	90Y4768	
	Cable, USB conversion	39M2909	
	Cable, USB 3.0	46C2598	
	Cable, USB A-B RDX	69Y5335	
	Cable, USB A-B DDS	94Y6675	
	Cable, mini SAS 1 m	39R6530	
	Cable, mini SAS 3 m	39R6532	
	Cable, serial conversion	46M4027	
	Cable, virtual media Gen 2	46M4028	
	Cable, power graphics	49Y4402	
	Cable, tape power	81Y6789	
	Cable, 130-155 Searay	90Y4661	
	Cable, iBBU09 remote	90Y7309	
	Cable, supercap	90Y7310	
	Drive, 5.25-inch, 36 GB, USB	99Y3868	
	Drive, 5.25-inch, 80 GB, USB	99Y3870	
	Internal RDX USB 3.0 drive dock	46C2346	
	External RDX USB 3.0 drive dock	46C2347	
	External RDX power adapter	81Y8905	
	Label, service for 3.5-inch hard disk drive model	94Y6720	
	Label, service for 2.5-inch hard disk drive model	94Y6722	
	Label, chassis	94Y6721	
	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	

Structural parts

Structural parts are not covered by the IBM Statement of Limited Warranty. You can place an order on the structural parts from the IBM retail store.

The following structural parts are available for purchase from the retail store.

Table 19. Structural parts, Type 7915

Index	Description	Part number
	3.5-inch top cover	94Y6616
1	2.5-inch top cover	94Y6622
8	Power supply bay filler	94Y7610
	Bezel, 6 hard disk drive with tape drive	94Y6613
12	Bezel, 16 hard disk drive with tape drive	94Y6623
13	Filler, tape drive bay	41Y8739
18	Remote battery tray	94Y6615
19	Remote RAID battery tray	94Y7609
22	Airflow baffle	94Y6624
23	Baffle	00D9458
	Filler, DVD blank	94Y6718
	Filler, EMC	44T2248
	Filler, fan blank	94Y6736
	EIA set kit	49Y5356
	4-drive filler panel, hot-swap	49Y5359
	3.5-inch mechanical chassis	94Y6617
	2.5-inch mechanical chassis	94Y6628
	2.5-inch bare chassis	00J6531
	3.5-inch bare chassis	00J6532
	Safety cover	94Y6619
	Slide rail kit, Gen-III	94Y6625
	Slide rail kit, universal	94Y6719
	CMA kit, Gen-III	94Y6626
	CMA kit, Gen-III 2U	94Y6627
	CMA kit, 2U/4U	68Y7213
	CMA kit	49Y4817
	Miscellaneous parts kit	94Y6746

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

Power cord part number	Used in these countries and regions
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
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 components

Use this information to remove and replace the server components.

The types of replaceable components are:

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

See Chapter 5, "Parts listing, System x3650 M4 Type 7915," on page 221 to determine whether a component is a structural part, Tier 1 CRU, or Tier 2 CRU.

For information about the terms of the warranty, 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 459.

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.

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

- To remove the 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 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.

General

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. Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.
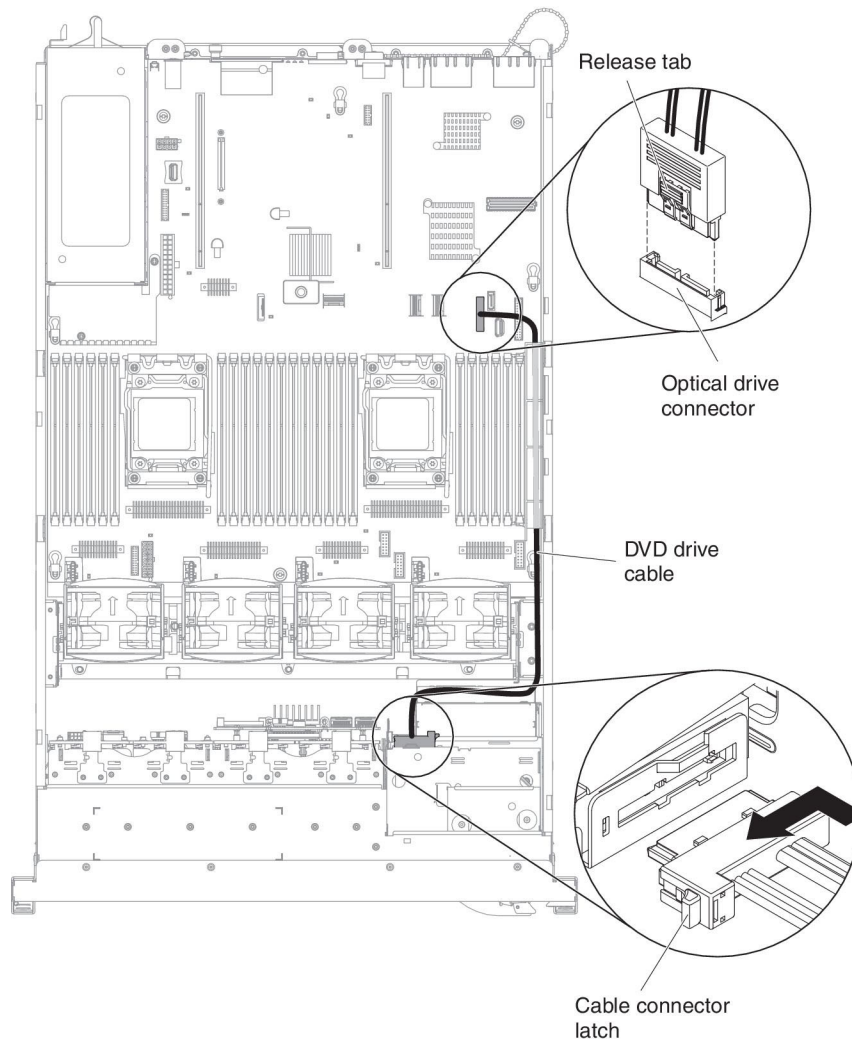
Figure 132. DVD drive cable connection

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.

USB cable   Video cable
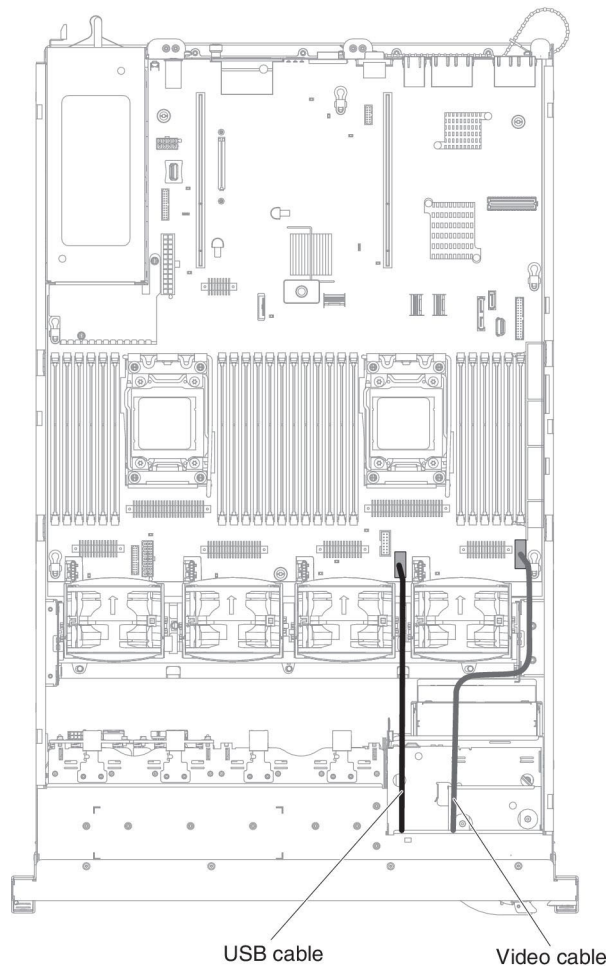
Figure 133. Front USB and video cables connection

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:

- You may remove the optional optical drive cable to obtain more room before 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.

Attention: Failing to install or remove the cable with care may damage the connectors on the system board. Any damage to the connectors may require replacing the system board.
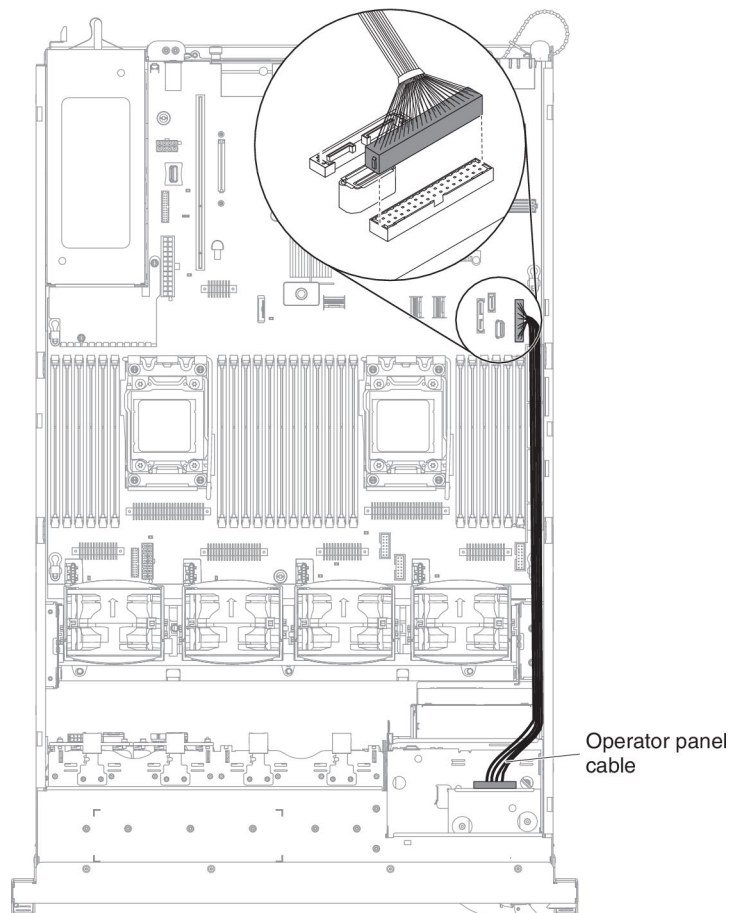
Figure 134. Operator information panel cable connection

Cabling VGA connector

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

The following illustration shows the internal routing and connectors for the video graphic adapter (VGA) cables:
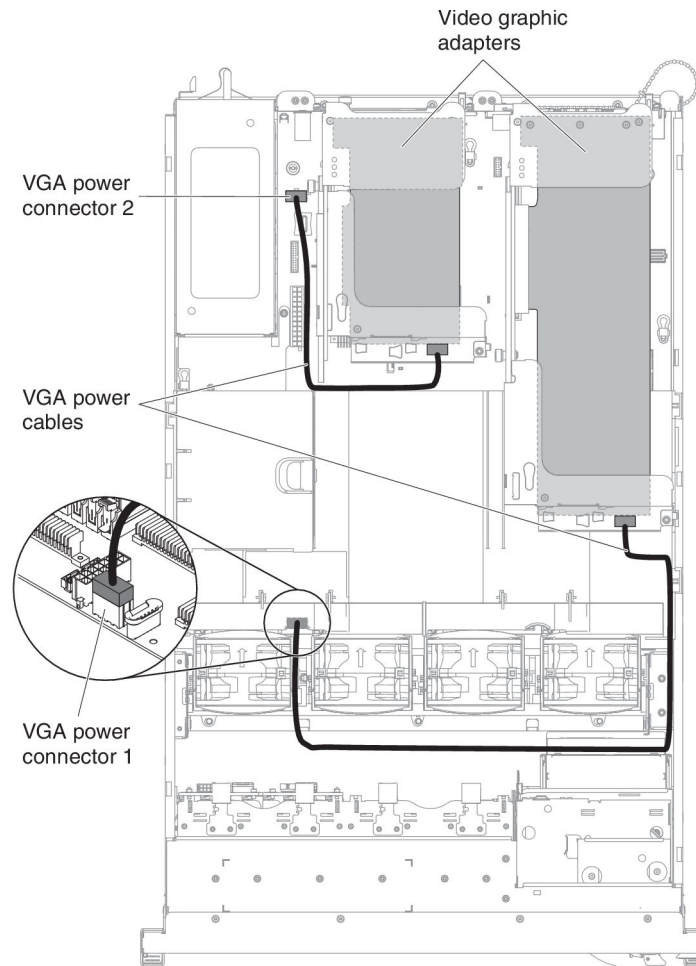
Figure 135. VGA cables connection

2.5-inch hard disk drive cable connection

8-drive-capable model

The following illustrations show the cabling information for the model of 8x2.5-inch hot-swap drive bays.

The following illustration shows the cabling information for the configuration cable in the server:
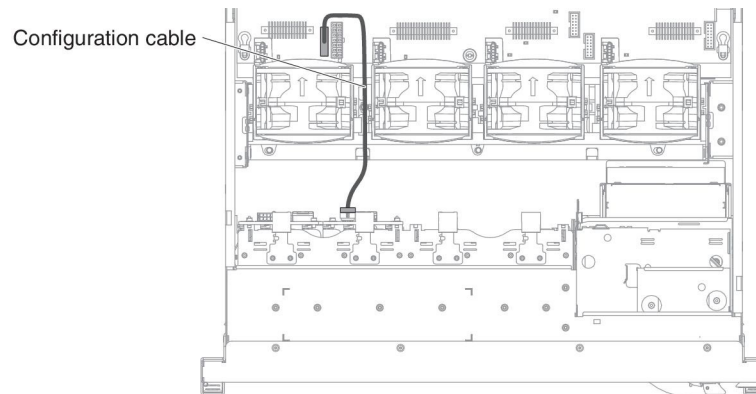
The following illustration shows the cabling information for the power cable in the server:
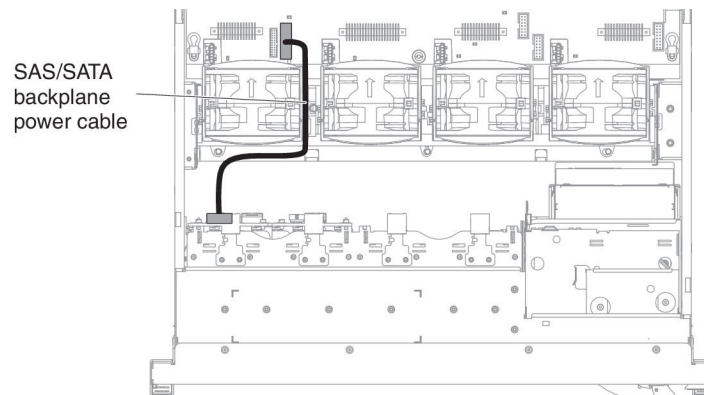
The following illustration shows the cabling information for the hardware RAID cable in the server:

Notes:

1. To connect the SAS signal cables, make sure that you first connect the signal cable, and then the power cable and configuration cable.
2. To disconnect the SAS signal cables, make sure that you first disconnect the power cable, and then the signal cable and configuration cable.
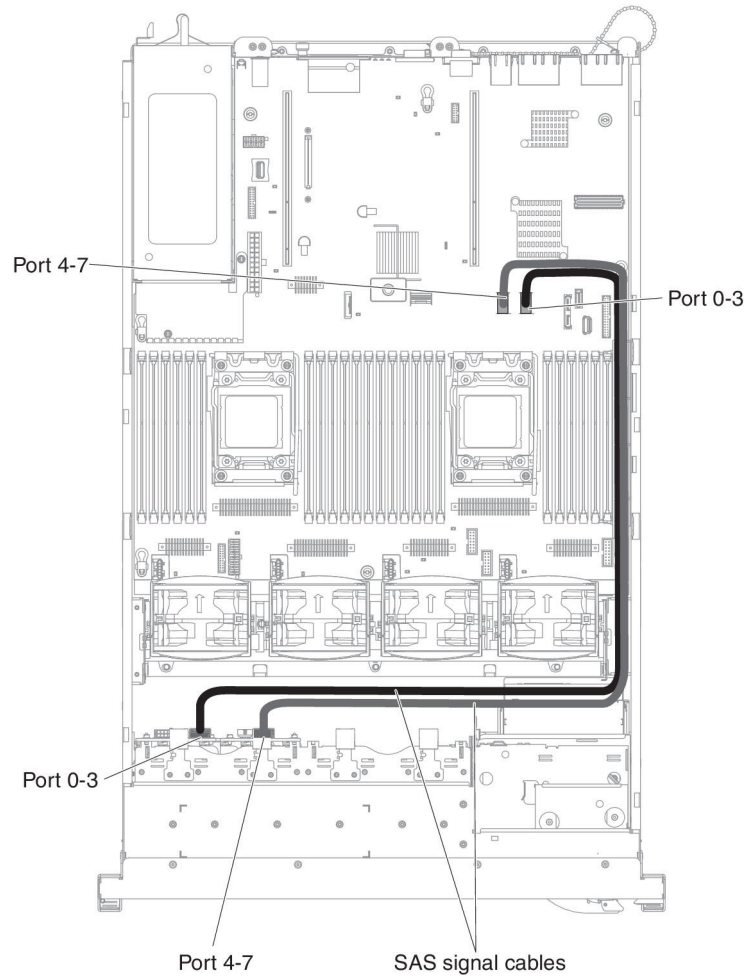
16-drive-capable model

The following illustrations show the cabling information for the 16x2.5-inch hot-swap drives model.

The following illustration shows the cabling information for the configuration cable in the server:

The following illustrations show the cabling information for the power cable in the server:

SAS/SATA backplane power cable

The following illustration shows the cabling information for the hardware RAID cable in the server:

Port 8-15

Port 0-7

SAS signal cables
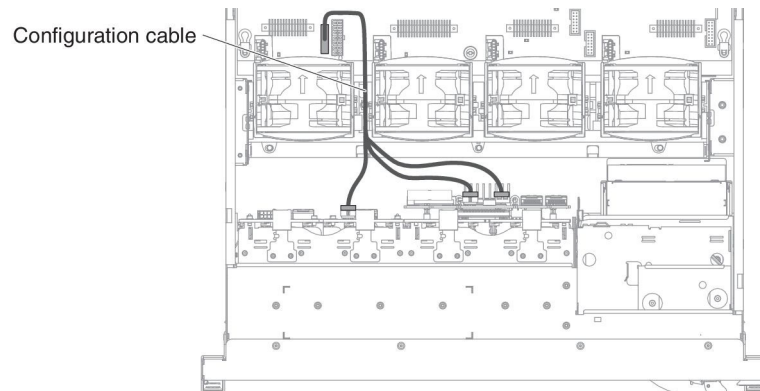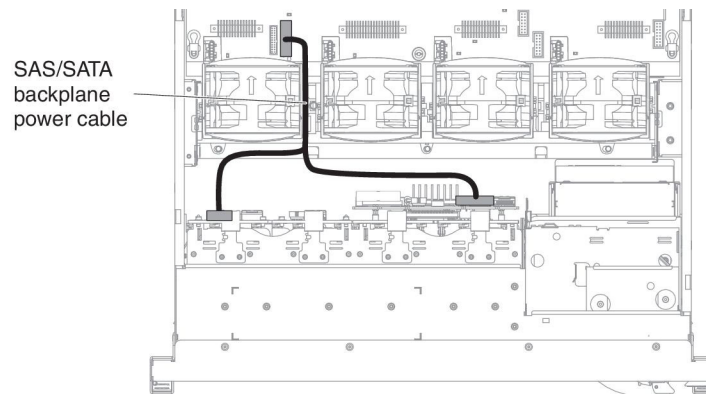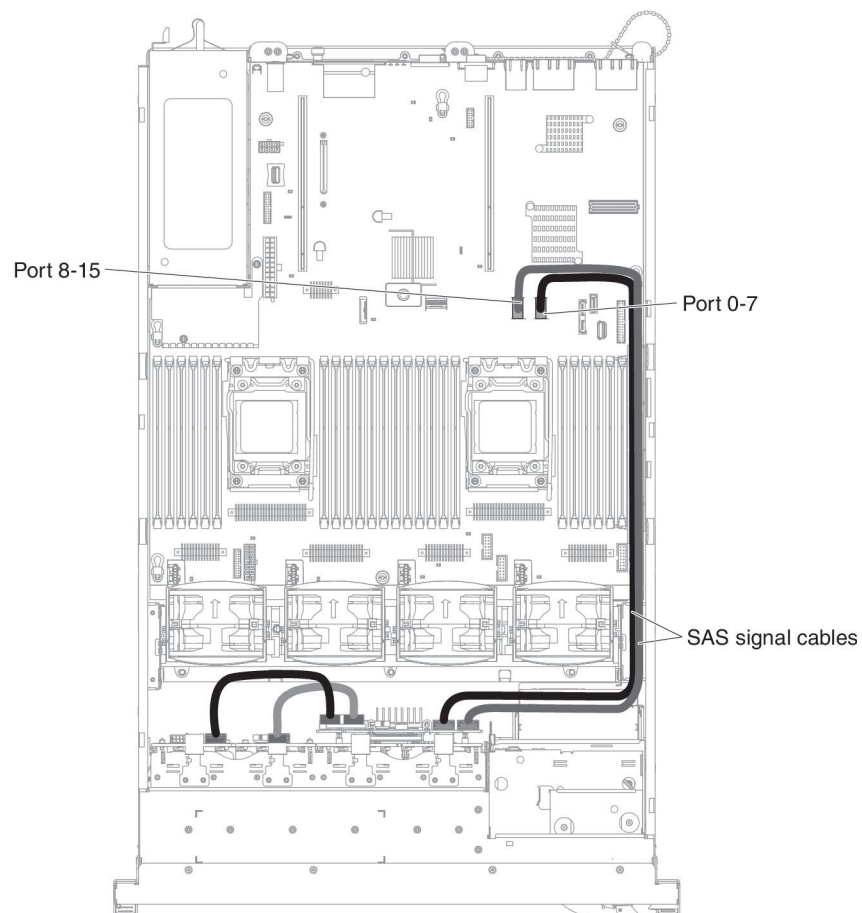
3.5-inch hard disk drive cable connection

The following illustrations show the cabling information for the 3.5-inch drives model:

The following illustration shows the cabling information for the configuration cable in the server:

Configuration cable

The following illustrations show the cabling information for the power cable in the server:

SAS/SATA
backplane
power cable

The following illustration shows the cabling information for the hardware RAID cable in the server:

Port 4-5

Port 0-3

Port 0-3

Port 4-5   SAS signal cables
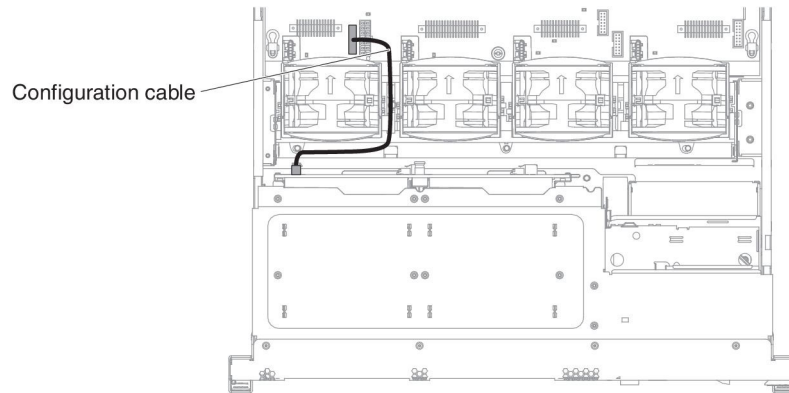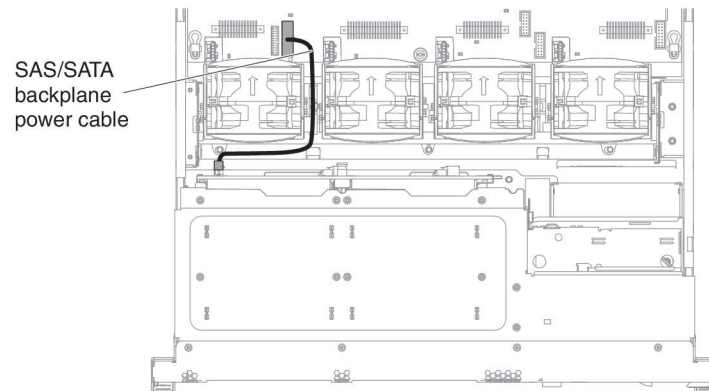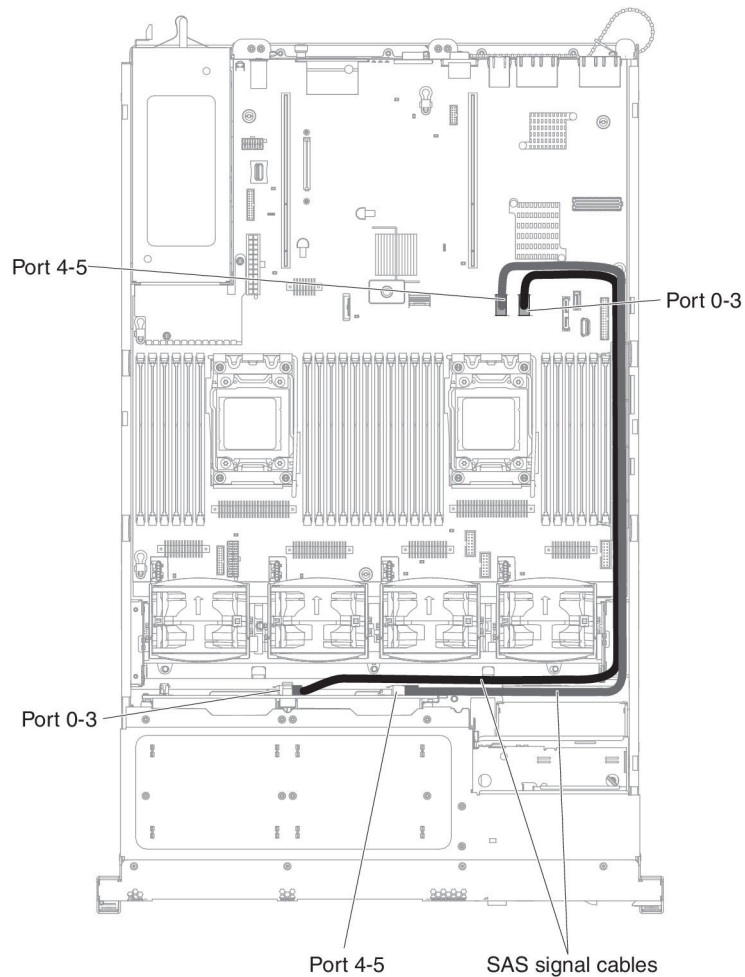
Removing and replacing server components

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

Use this information to remove the cover.

About this task

To remove the server cover, complete the following steps:

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
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.
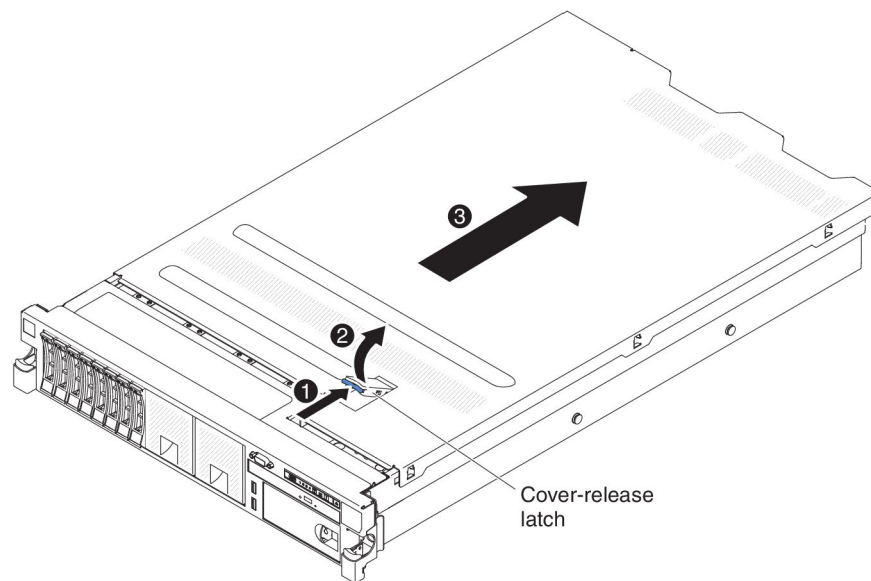
Figure 136. Cover removal

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.

Results

Replacing the cover

Use this information to replace the server cover.

About this task

To replace the server cover, complete the following steps:

Procedure

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 of the cover.
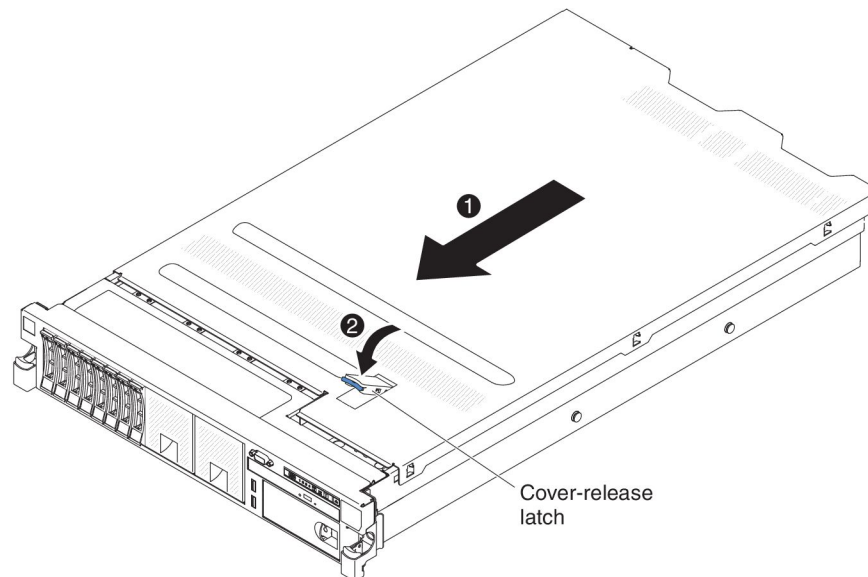
Figure 137. Cover installation

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

When you work with some optional devices, you must first remove the air baffle to access certain components or connectors on the system board. The following illustration shows how to remove the air baffle.

About this task
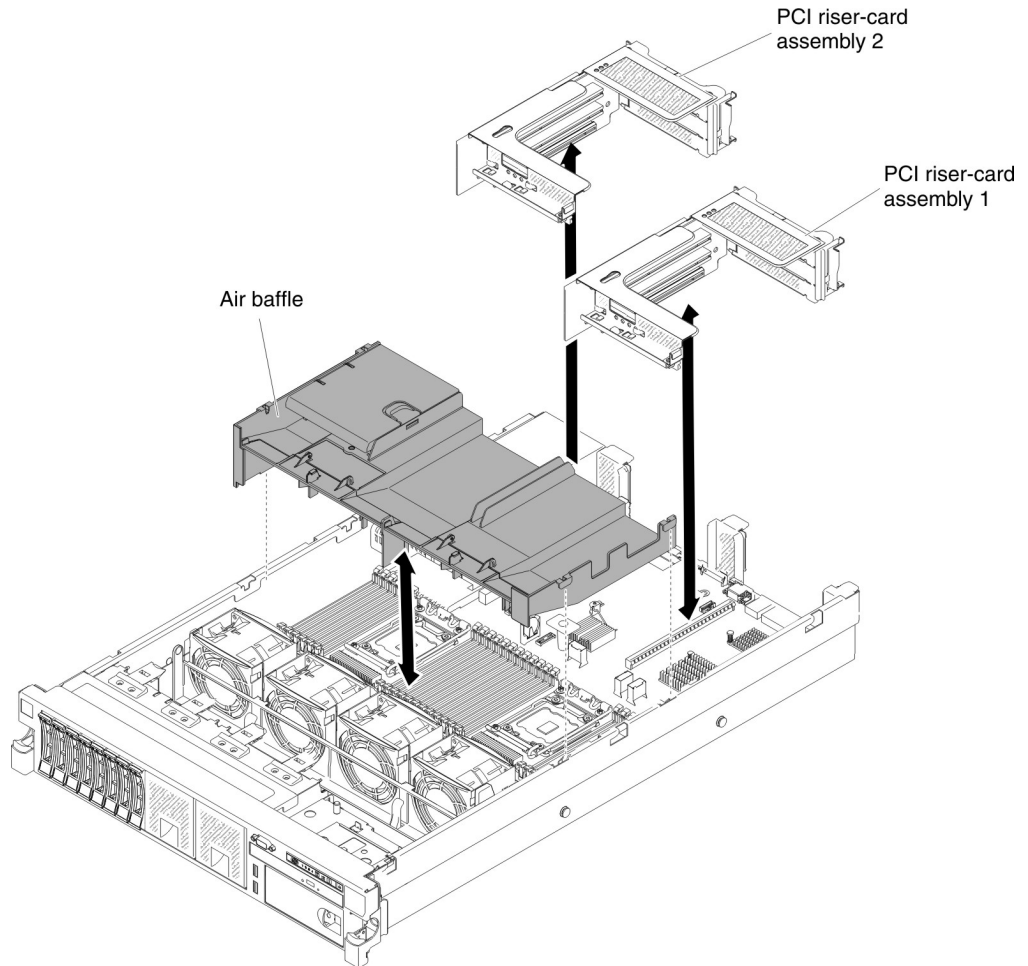
Figure 138. Air baffle removal

To remove the air baffle, complete the following steps:

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove PCI riser-card assemblies, if needed (see "Removing a PCI riser-card assembly" on page 38).
5. Place your fingers under the front and back of the top of the air baffle; then, lift the air baffle out of the server.

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

Use this information to replace the air baffle.

About this task

To replace the air baffle, complete the following steps:

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
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.
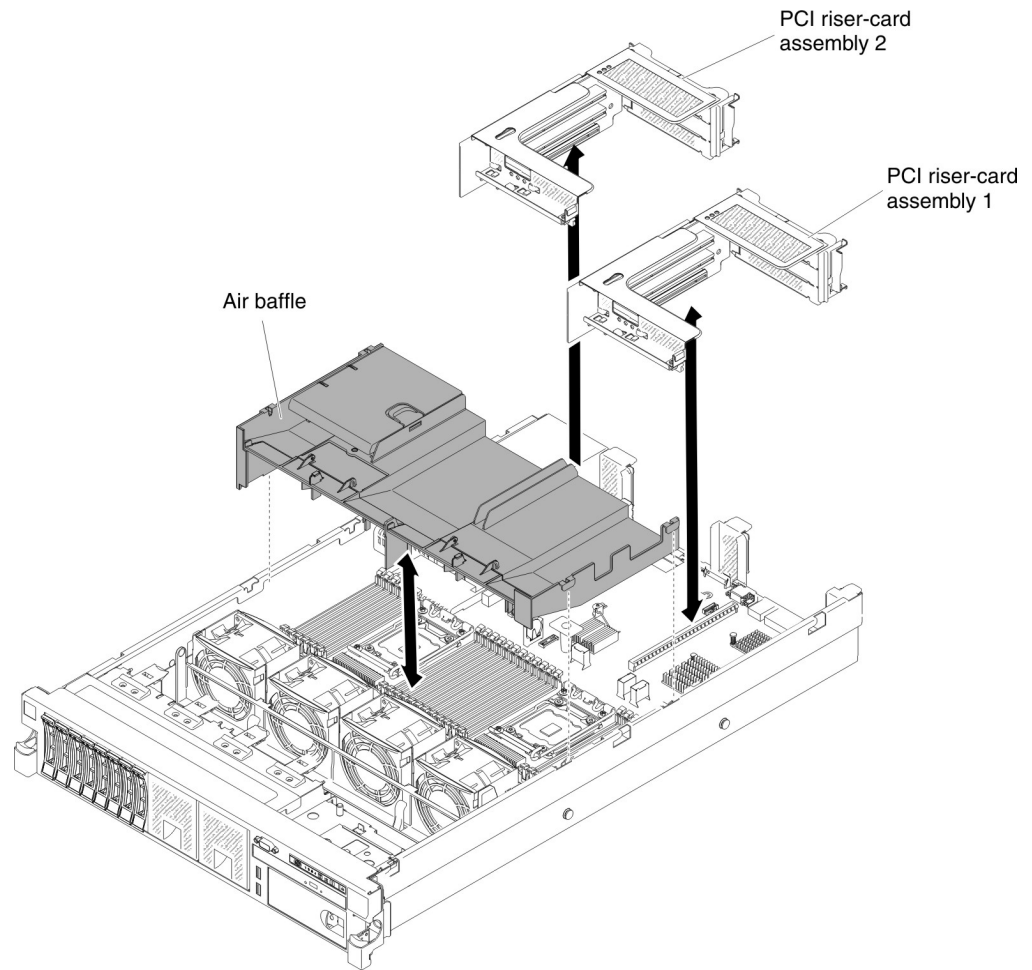
Figure 139. Air baffle installation

5. Replace PCI riser-card assemblies, if it is in long position.
6. Reinstall the cover (see "Replacing the cover" on page 244).
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 RAID adapter battery holder

Use this information to remove a RAID adapter battery holder.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing the cover" on page 37).
3. Remove the filler; then pull the loops of the battery holder toward each other; then, pull the cage out of the drive bay approximately 25 mm (1 inch).

Battery 4 / flash power module 4

Battery 3 / flash power module 3
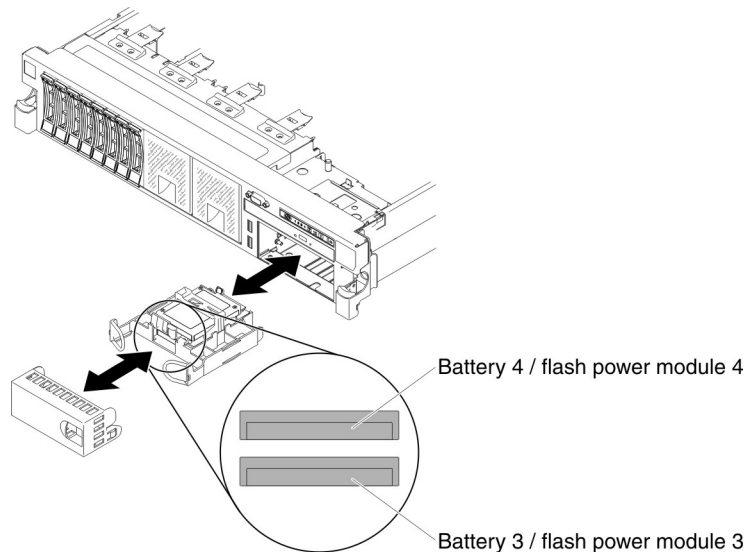
Figure 140. RAID adapter battery holder removal

4. Disconnect the battery power cables.
5. Pull the drive completely out of the bay.
6. If you are not installing another drive in the bay, insert the filler panel into the empty drive bay.

Results

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

Use this information to replace a RAID adapter battery holder.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
3. Install the optional ServeRAID adapter battery (see "Replacing a RAID adapter battery/flash power module remotely in the server" on page 297).
4. Grasp the handle and slide the holder most of the way into the bay.
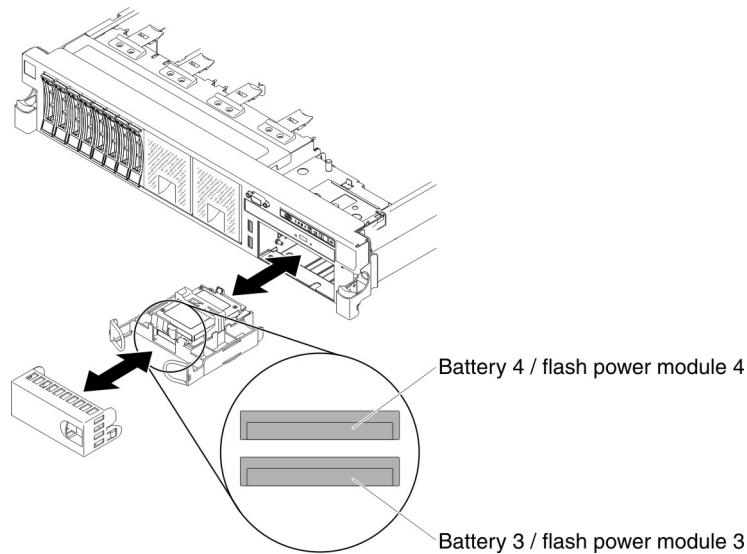
Figure 141. RAID adapter battery holder installation

5. Connect the battery power cables to the ServeRAID connector.
6. Make sure that the battery holder is secured firmly on the air baffle.
7. Install the filler.
8. Replacing the cover (see "Replacing the cover" on page 244).
9. Slide the server into the rack.
10. Reconnect the power cords and all external cables, and turn on the server and peripheral devices.

Removing the bezel

Use this information to remove the bezel.

About this task

To remove the bezel, complete the following steps:
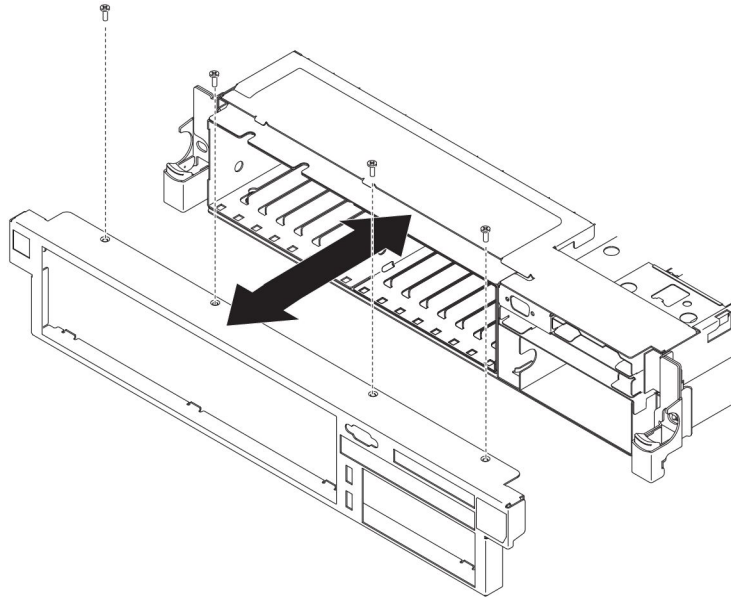
Figure 142. Bezel removal

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Remove all the cables that are connected to the front of the server.
3. Remove the screws from the bezel.
4. Rotate the top of the bezel away from the server.

Replacing the bezel

Use this information to replace the bezel.

About this task

To install the bezel, complete the following steps:
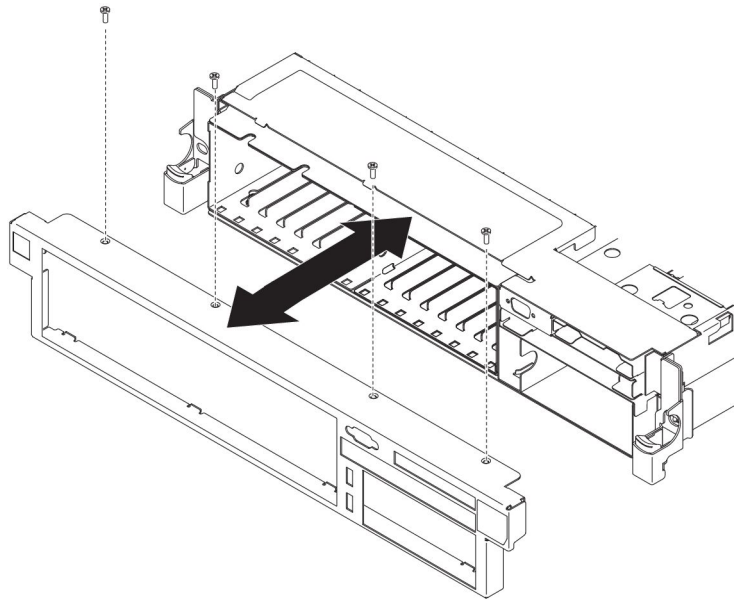
Figure 143. Bezel installation

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 bezel into the slots on the underside of the chassis and attach it with the screws.
4. Connect any cables you previously removed from the front of the server.

Removing the 240 VA safety cover

Use this information to remove the 240 VA safety cover.

About this task

To remove the 240 VA safety cover, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server, and disconnect all power cords and external cables.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove the screw from the safety cover.
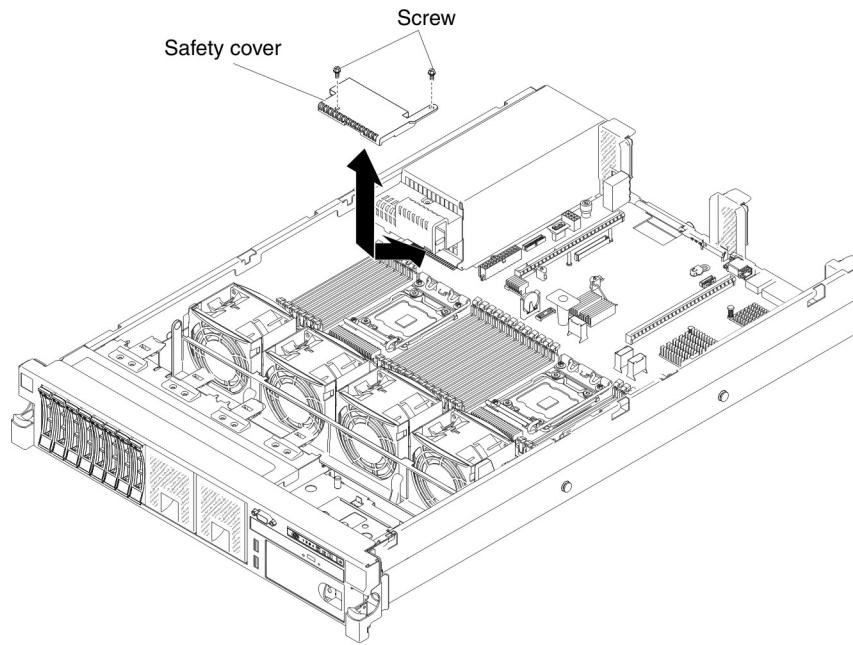
Figure 144. 240 VA safety cover removal

5. Disconnect the hard disk drive backplane power cables from the connector in front of the safety cover.

6. Slide the cover forward to disengage it from the system board, and then lift it out of the server.

7. If you are instructed to return the 240 VA safety cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the 240 VA safety cover

Use this information to install the 240 VA safety cover.

About this task

To install the 240 VA safety cover, complete the following steps:
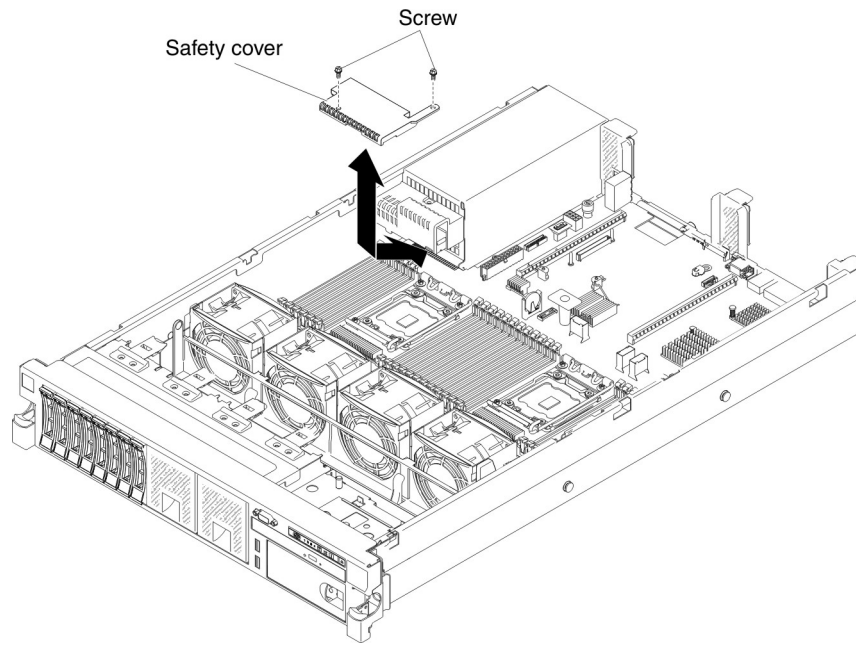
Figure 145. 240 VA safety cover installation

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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

3. Line up and insert the tabs on the bottom of the safety cover into the slots on the system board.

4. Slide the safety cover toward the back of the server until it is secure.

5. Connect the hard disk drive backplane power cables to the connector in front of the safety cover.

6. Install the screw into the safety cover.

7. Replacing the cover (see "Replacing the cover" on page 244).

8. Slide the server into the rack.

9. 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 a hot-swap hard disk drive

Use this information to remove a hot-swap hard disk drive.

About this task

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.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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.
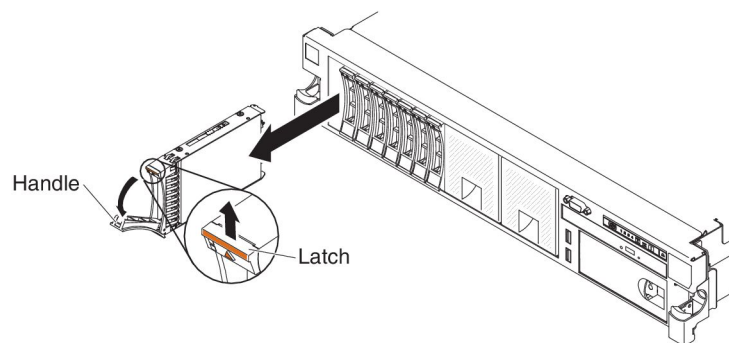
Figure 146. 2.5-inch hot-swap hard disk drives removal

3.5-inch hot-swap
hard disk drive

Latch

Handle   Filler panel
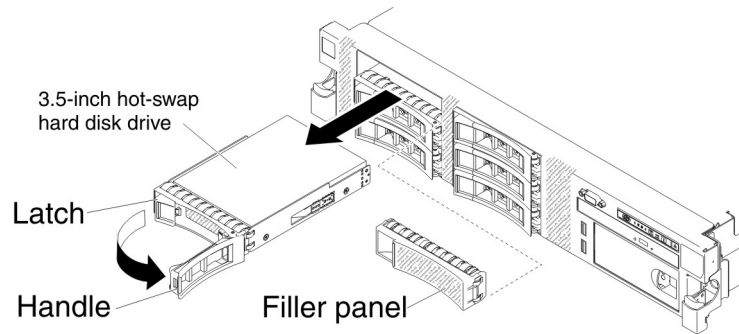
Figure 147. 3.5-inch hot-swap hard disk drives removal

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 a hot-swap hard disk drive

Use this information to install a hot-swap hard disk drive.

About this task

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/.
- Before you install an additional hot-swap hard disk drive, go to Table 2 on page 10 for detailed power supply configurations.

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).

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 148. 2.5-inch hot-swap hard disk drives installation
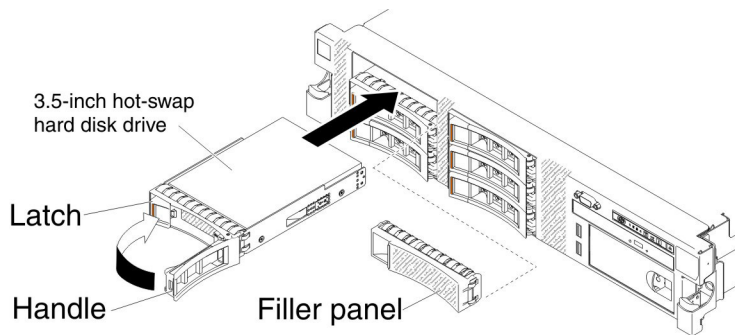
Figure 149. 3.5-inch hot-swap hard disk drives installation

   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.

Removing a simple-swap hard disk drive

Use this information to remove a simple-swap hard disk drive.

About this task

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.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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.
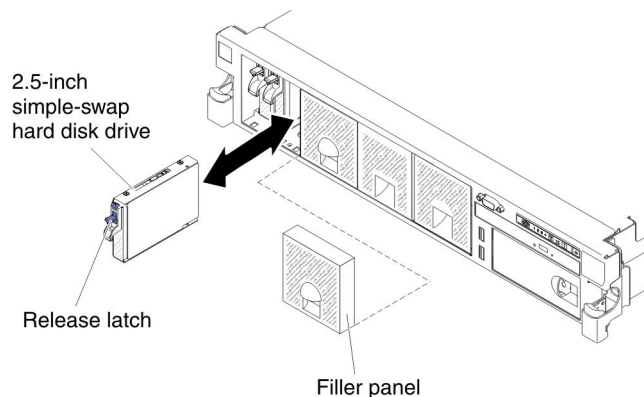
Figure 150. 2.5-inch simple-swap hard disk drive removal

3.5 inch simple-swap
hard disk drive
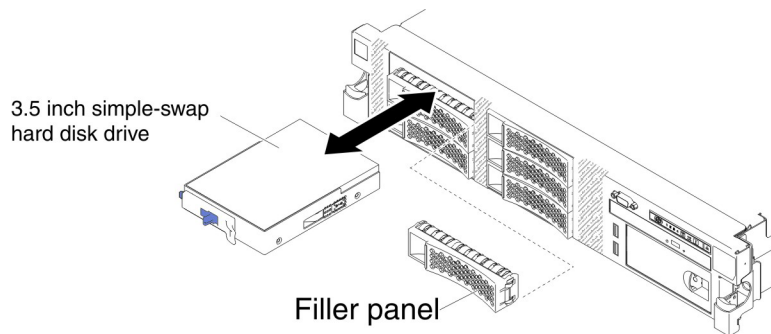
Filler panel

Figure 151. 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 a simple-swap hard disk drive

Use this information to install a simple-swap hard disk drive.

About this task

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 six 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.
- Before you install an additional simple-swap hard disk drive, go to Table 2 on page 10 for detailed power supply configurations.

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 152. 2.5-inch simple-swap hard disk drive installation
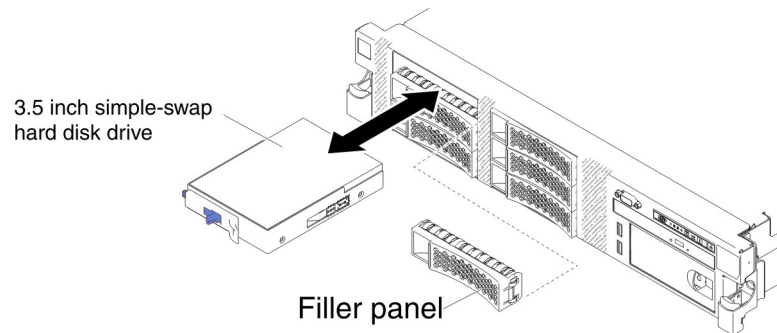
Figure 153. 3.5-inch simple-swap hard disk drive installation

   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.

Removing a 1.8-inch hot-swap solid state drive

Use this information to remove a 1.8-inch hot-swap solid state drive.

About this task

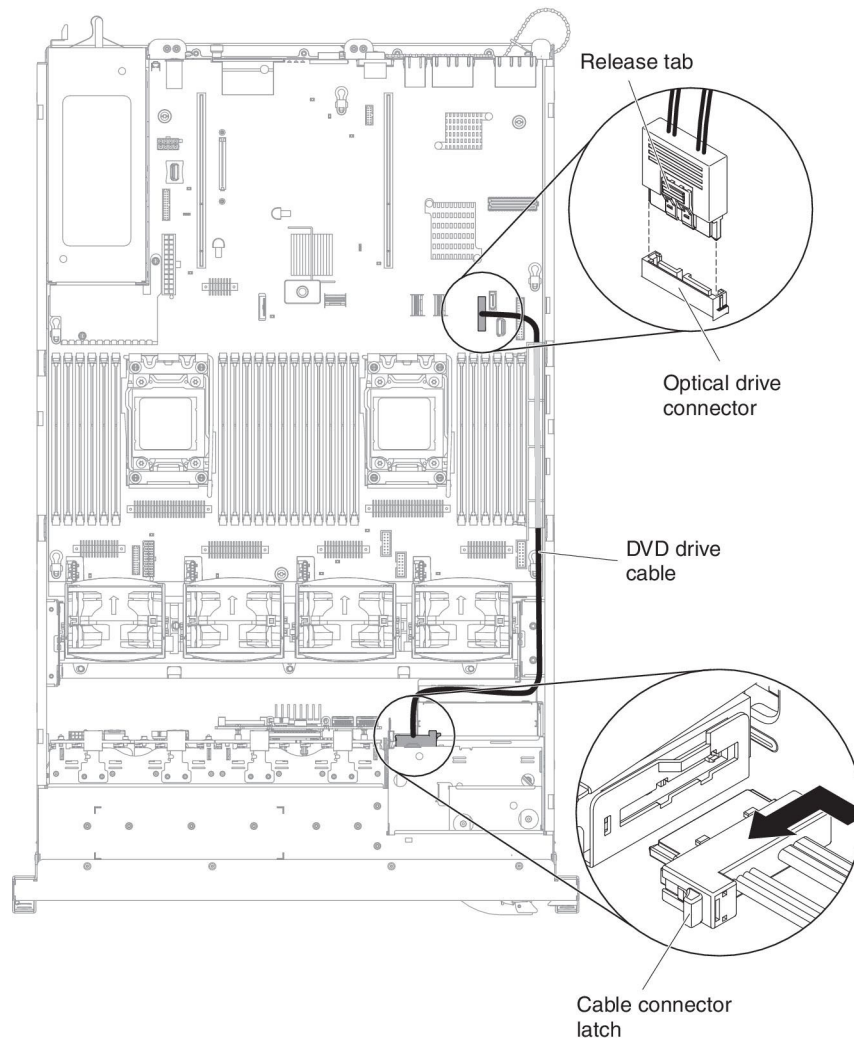To remove a 1.8-inch hot-swap solid state drive, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Remove the filler panel. Keep the filler panel in a safe place.
3. Press the release latch (orange) gently to unlock the drive handle.
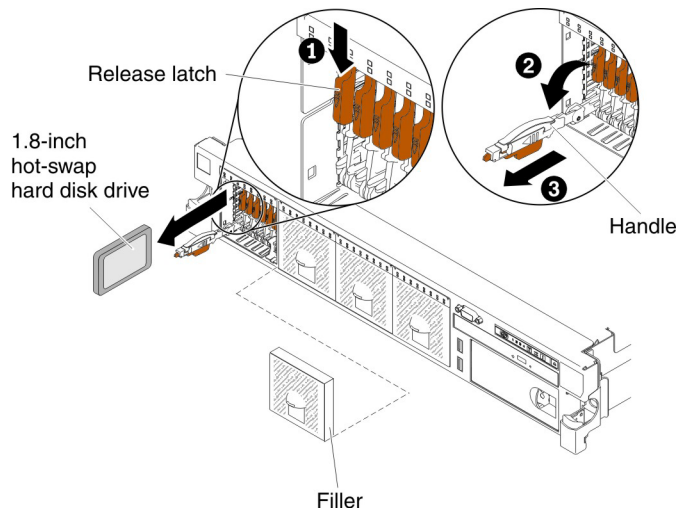
Figure 154. 1.8-inch hot-swap solid state drives removal

4. Pull the tray handle until the handle stops.
5. Slide the drive out of the drive bay.
6. Rotate the tray handle to the closed (locked) position.
7. Reinstall the filler panel.
8. 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 a 1.8-inch hot-swap solid state drive

Use this information to install a 1.8-inch hot-swap solid state drive.

About this task

To install a 1.8-inch hot-swap solid state drive, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Remove the filler panel. 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 handle is in the open (unlocked) position.
   b. Align the drive with the guide rails in the bay.

1.8-inch hot-swap hard disk drive

Filler

Figure 155. 1.8-inch hot-swap solid state drives installation

   c. Gently push the drive into the bay until the drive stops.
   d. Rotate the handle to the closed (locked) position.
   e. Check the solid state drive status LED to verify that the solid state drive is operating correctly. If the yellow solid state drive status LED of a drive is lit continuously, that drive is faulty and must be replaced. If the green solid state 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 solid 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 solid state drives, do so now.
6. Turn on the peripheral devices and the server.

Removing a DVD drive

Use this information to remove a DVD drive.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the server cover (see "Removing the cover" on page 37).
4. Press and hold the release tab down as you push the drive from the rear to slide it out of the bay.
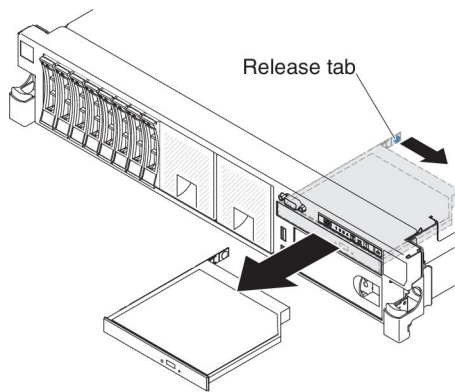
Figure 156. DVD drive removal

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.
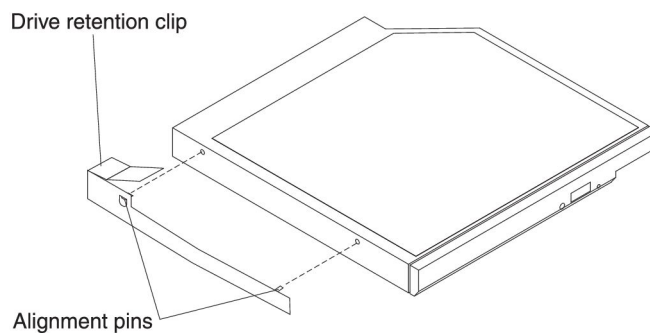
Figure 157. DVD drive retention clip removal

6. Attach the drive retention clip to the side of the DVD drive filler panel that you removed in step 4 on page 263.
7. Slide the DVD drive filler panel into the DVD drive bay until the DVD drive filler panel clicks into place.
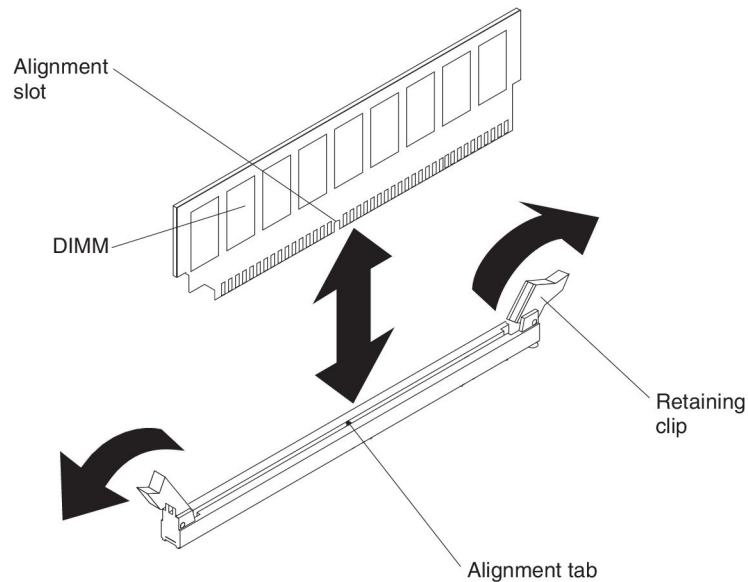8. If you are instructed to return the DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a DVD drive

Use this information to install a DVD drive.

About this task

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
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.
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.
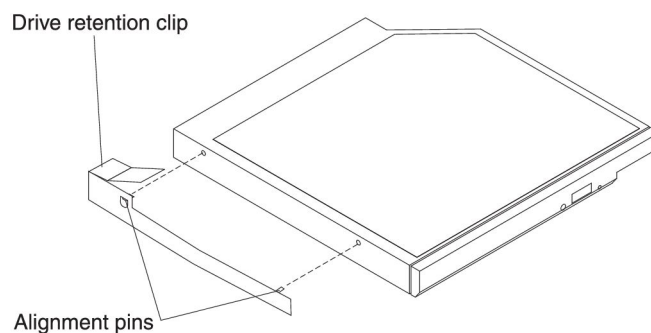
Figure 158. DVD drive retention clip installation

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.

10. Connect the DVD drive cable (see "Replacing the DVD drive cable" on page 267). The following illustration shows the cable routing for the DVD drive:
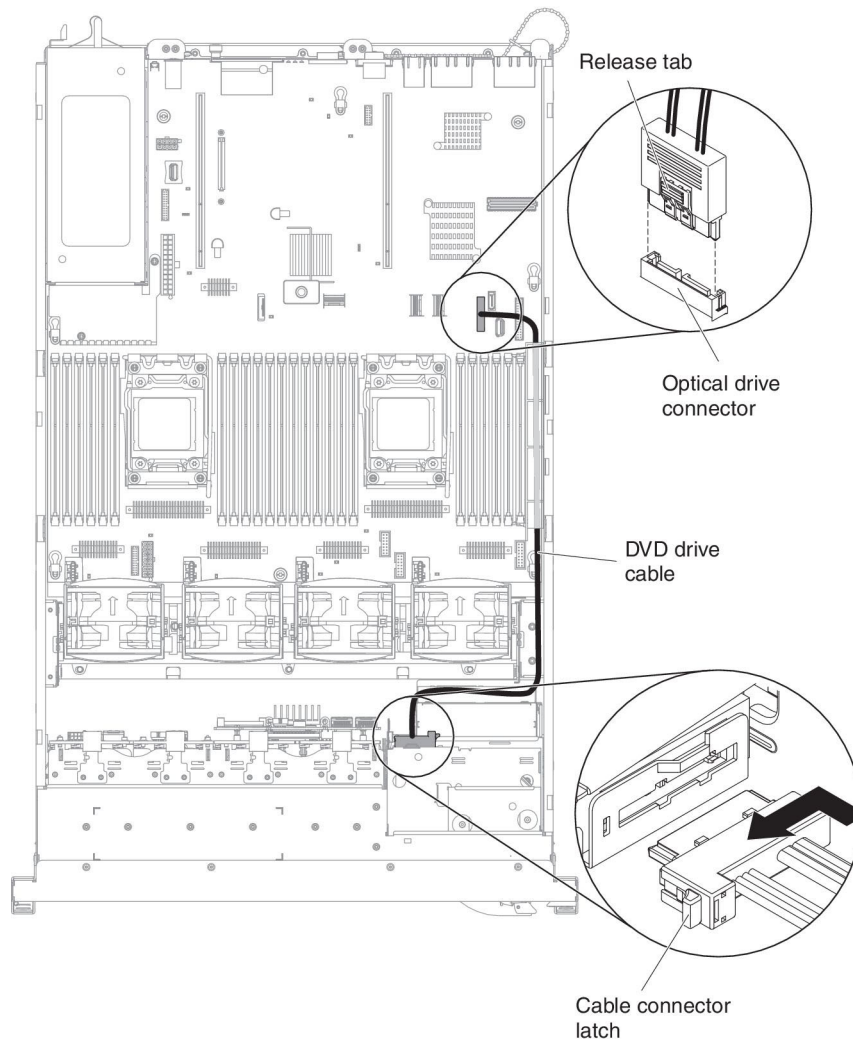
Figure 159. DVD drive cable connection

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

Use this information to remove the DVD drive cable.

About this task

To remove the DVD cable, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
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.
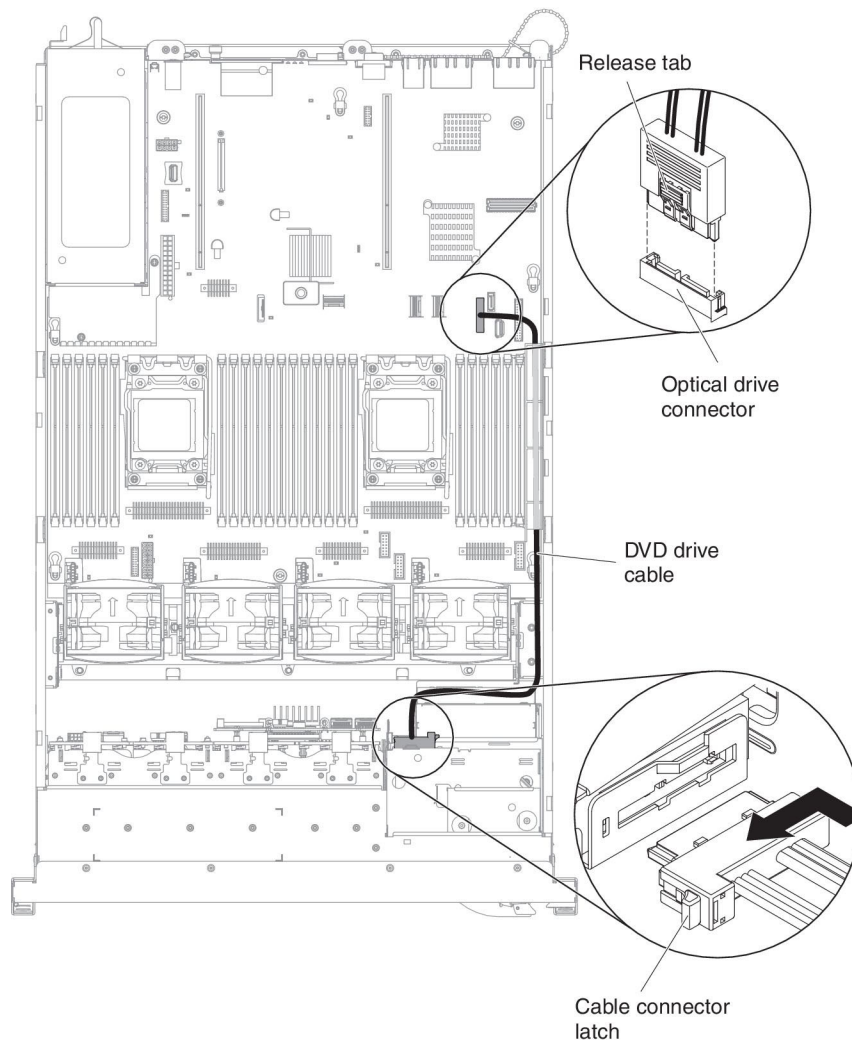
Figure 160. DVD drive cable connection

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.
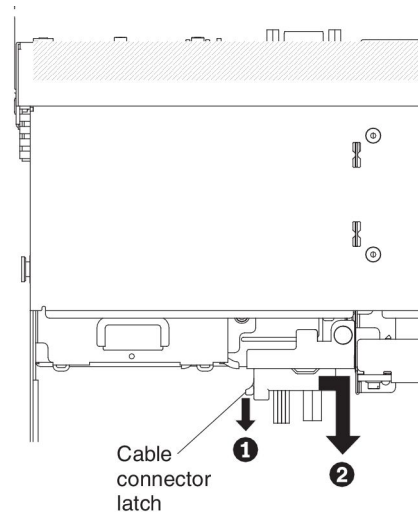
Figure 161. DVD drive cable latch

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

Use this information to install the DVD drive cable.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
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 162. 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 163. DVD drive cable routing

6. Replace the air baffle (see "Replacing the air baffle" on page 246).
7. Replace the cover (see "Replacing the cover" on page 244).
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 tape drive

Use this information to remove a tape drive.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the server cover (see "Removing the cover" on page 37).
4. Open the tape drive tray release latch and slide the drive tray out of the bay approximately 25 mm (1 inch).
5. Disconnect the power and signal cables from the rear of the tape drive.
6. Pull the drive completely out of the bay.
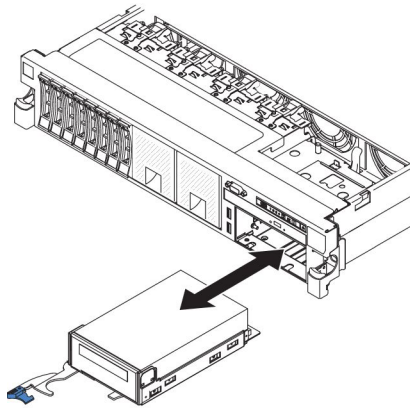
Figure 164. Tape drive removal

7. Remove the tape drive from the drive tray by removing the four screws on the sides of the tray.
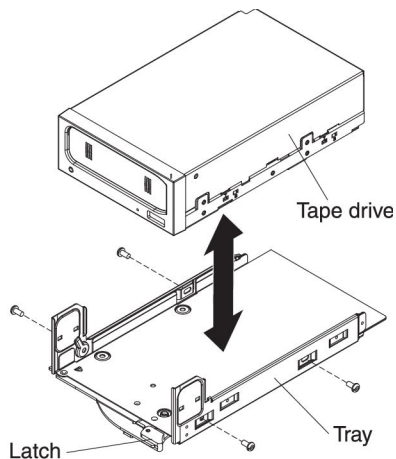
Figure 165. Screws removal

8. If you are not installing another drive in the bay, insert the tape drive filler panel into the empty tape drive bay.

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

Replacing a tape drive

Use this information to install a tape drive.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 37).

4. If the tape drive came with metal spacers on the installed on the sides, remove the spacers.

5. Install the drive tray on the new tape drive as shown, using the four screws that you removed from the former drive.
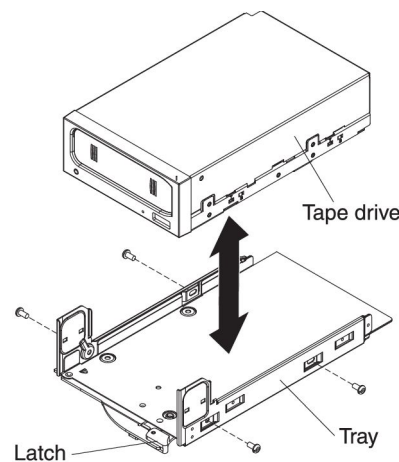
Figure 166. Screws installation

6. Prepare the drive according to the instructions that come with the drive, setting any switches or jumpers.

7. Slide the tape-drive assembly most of the way into the tape-drive bay.
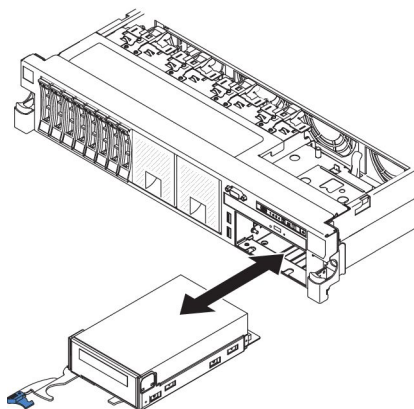
Figure 167. Tape drive installation

8. Using the cables from the former tape drive, connect the signal and power cables to the back of the tape drive.

9. Make sure all the cables are out of the way, and slide the tape-drive assembly the rest of the way into the tape-drive bay.

10. Push the tray handle to the closed (locked) position.

11. Replace the cover (see "Replacing the cover" on page 244).

12. Slide the server into the rack.

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

14. Turn on the peripheral devices and the server.

Removing a memory module

Use this information to remove a memory module.

About this task

To remove a dual inline memory module (DIMM), complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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

3. Remove the cover (see "Removing the cover" on page 37).

4. Remove the air baffle (see "Removing the air baffle" on page 40).

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 168. 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
24	HCDIMMs	16 GB	384 GB
24	HCDIMMs	32 GB	768 GB
16	Quad-rank RDIMMs	8 GB	128 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 HCDIMM options that are available for the server are 16 GB and 32 GB. The server supports a minimum of 16 GB and a maximum of 768 GB of system memory using HCDIMMs.

  Note: Do not mix the 16 GB HCDIMM and the 32 GB HCDIMM in the server.
- 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 134.
- 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, HCDIMM, 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 169. 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 138. 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 170. 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 138. 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 171. 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:

Use this information to replace a memory module.

About this task

Note: Before you install an additional memory module, go to Table 2 on page 10 for detailed power supply configurations.

Procedure
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
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 172. DIMM installation

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 246).

    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 244).

13. Turn on the peripheral devices and the server.

Removing the fan bracket

Use this information to remove the fan bracket.

About this task

To replace some components or to create working room, you might have to remove the fan-bracket assembly.

Note: To remove or install a fan, it is not necessary to remove the fan bracket. See "Removing a hot-swap fan" on page 318 and "Replacing a hot-swap fan" on page 319.

To remove the fan bracket, complete the following steps:
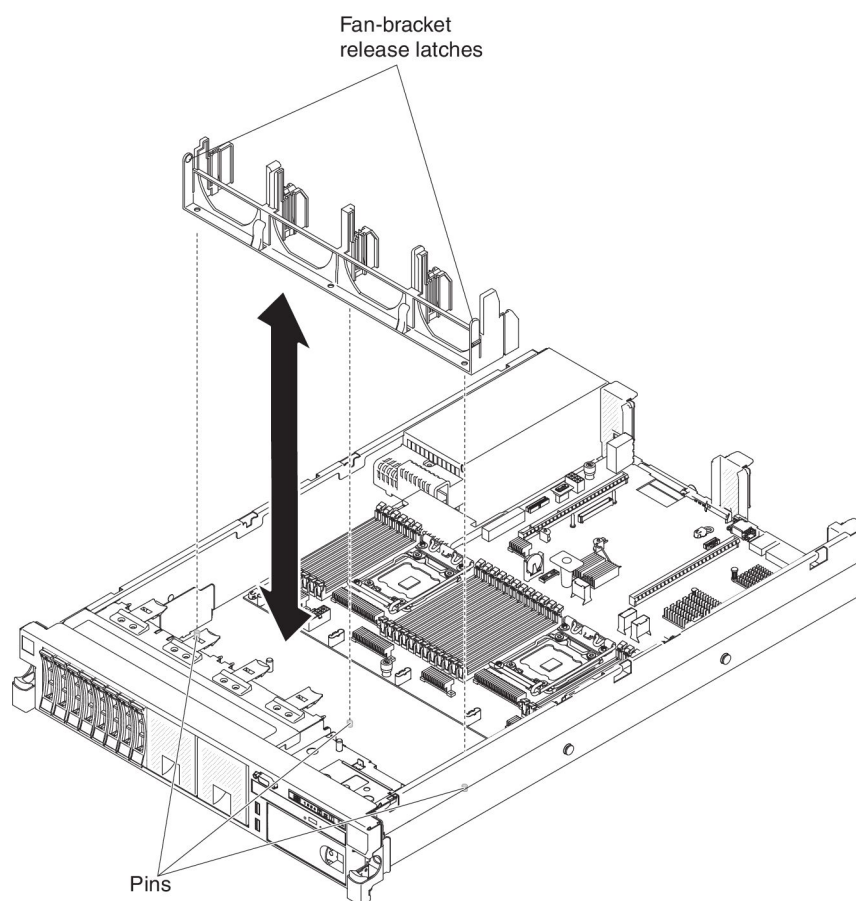
*Figure 173. Fan bracket removal*

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the fans (see "Removing a hot-swap fan" on page 318).
5. Press the fan-bracket release latches toward each other and lift the fan bracket out of the server.

Replacing the fan bracket

Use this information to replace the fan bracket.

About this task

To install the fan bracket, complete the following steps:
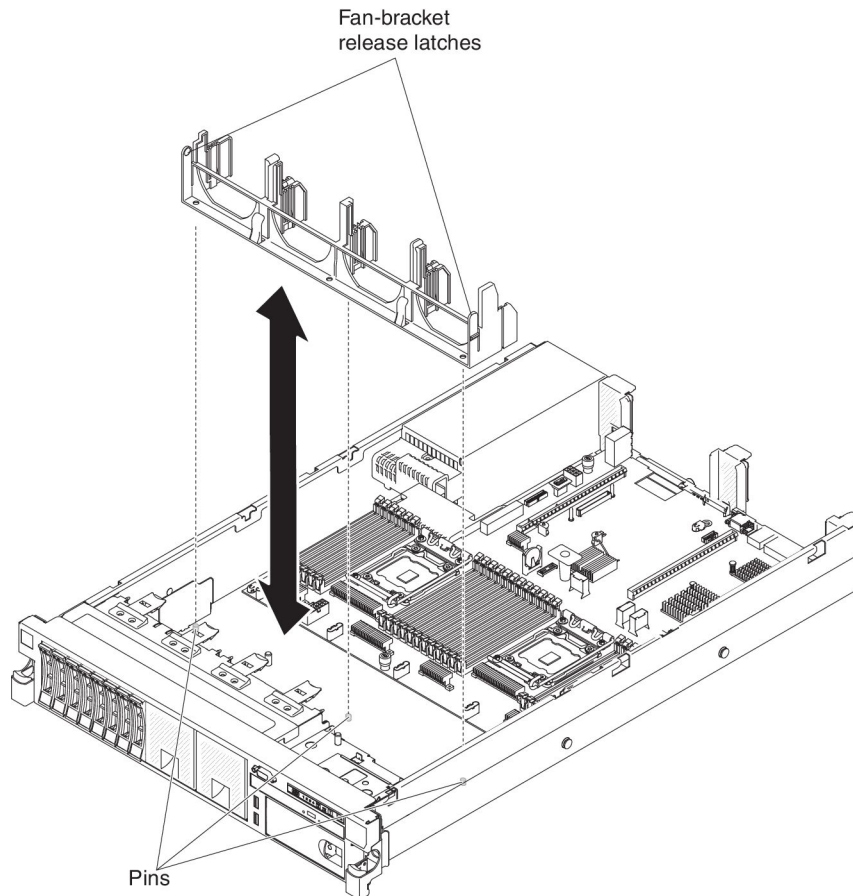
Figure 174. Fan bracket removal

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Lower the fan bracket into the chassis.
5. Align the holes in the bottom of the bracket with the pins in the bottom of the chassis.
6. Press the bracket into position until the fan-bracket release levers click into place.
7. Replace the fans (see "Replacing a hot-swap fan" on page 319).
8. Replace the cover (see "Replacing the cover" on page 244).
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 a PCI riser-card assembly

Use this information to remove a PCI riser-card assembly.

About this task

The server comes with one riser-card assembly (with option to add one more) that each contains two to three PCI slots. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of riser-card assemblies that you can use with the server.

To remove a PCI riser-card assembly, complete the following steps:
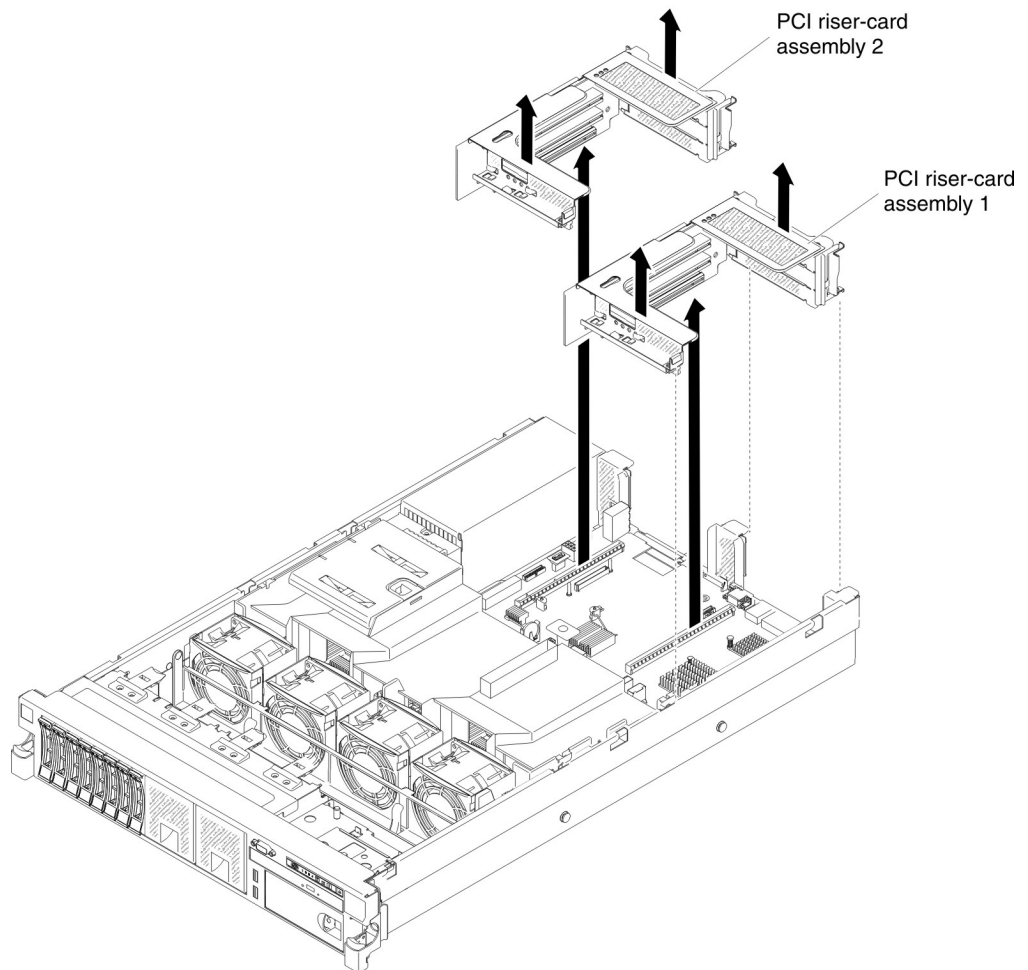
Figure 175. Removing PCI riser-card assembly

Procedure

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see "Removing the cover" on page 37).
4. Grasp the assembly at the front tab and rear edge and lift it to remove it from the server. Place the riser-card assembly on a flat, static-protective surface.

Replacing a PCI riser-card assembly

Use this information to replace a PCI riser-card assembly.

About this task

The server provides two PCI riser-card slots on the system board. The following information indicates the riser-card slots:

- Standard models of the server come with one PCI Express riser-card assembly installed. If you want to replace them with PCI-X riser-card assemblies, you must order the PCI-X riser-card assembly option, which includes the bracket.
- A PCI Express riser-card assembly has a black connector and supports PCI Express adapters, and a PCI-X riser-card assembly has a white (light in color) connector and supports PCI-X adapters.
- PCI riser slot 1 (the farthest slot from the power supplies). You must install a PCI riser-card assembly in slot 1 with microprocessor 1.
- PCI riser slot 2 (the closest slot to the power supplies). You must install a PCI riser-card assembly in slot 2 with microprocessor 2.
- 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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Reinstall any adapters and reconnect any internal cables you might have removed in other procedures (see "Replacing an adapter" on page 287 and "Internal cable routing and connectors" on page 233).
5. Align the PCI riser-card assembly with the selected PCI connector on the system board:
   a. PCI connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets in the side of the chassis.
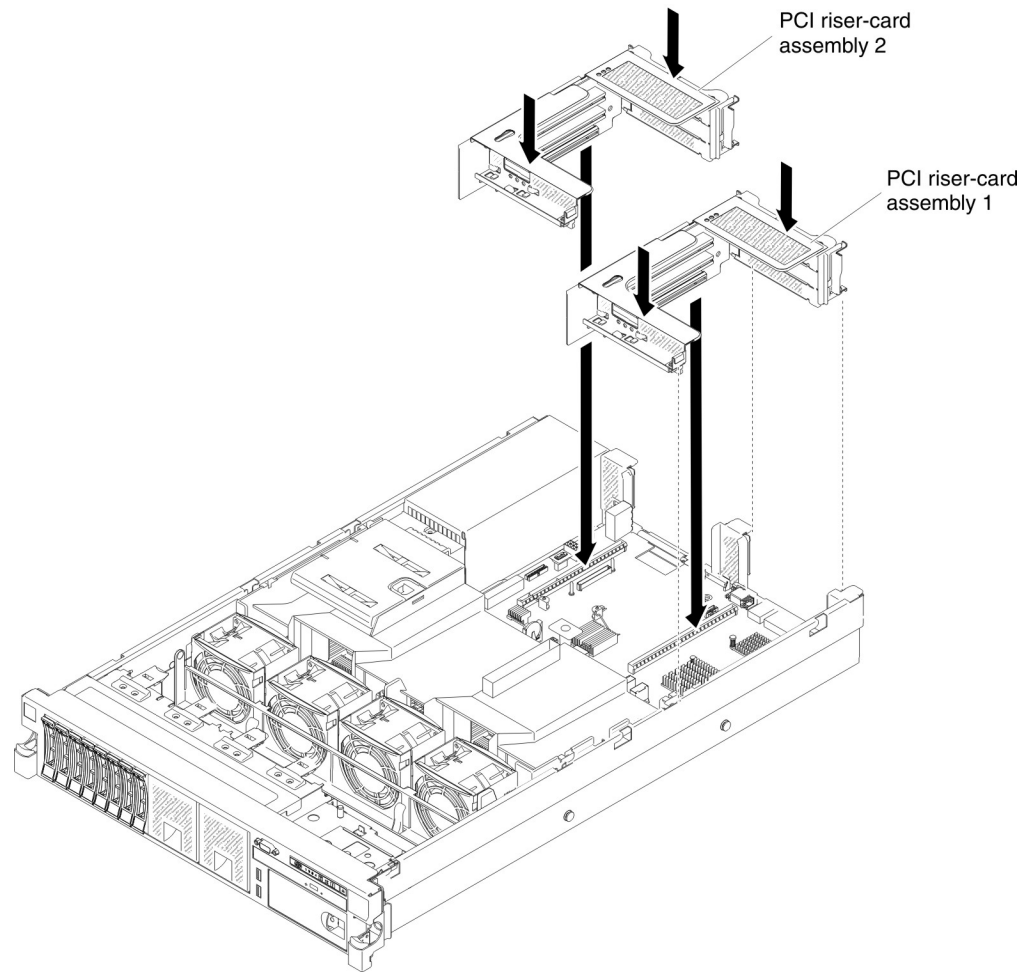
Figure 176. PCI riser-card assembly installation

      b. PCI connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the riser-card connector on the system board.

6. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.

7. Replace the cover (see "Replacing the cover" on page 244).

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 an adapter

Use this information to remove an adapter.

About this task

This topic describes removing an adapter from a PCI expansion slot in a PCI riser-card assembly. These instructions apply to PCI adapters such as video graphic adapters and network adapters.

The following illustration shows the locations of the adapter expansion slots from the rear of the server.

Maximal card dimension supported in each slot (rear view)

1	Full height , up to full length	4	Full height , up to full length
2	Full height, half length	5	Full height , up to full length
3	Full height, half length	6	Full height, half length

(Riser 1)   (Riser 2)

Note: If you are replacing a high power graphics adapter, you might need to disconnect the internal power cable from the system board before removing the adapter.

To remove an adapter, complete the following steps:
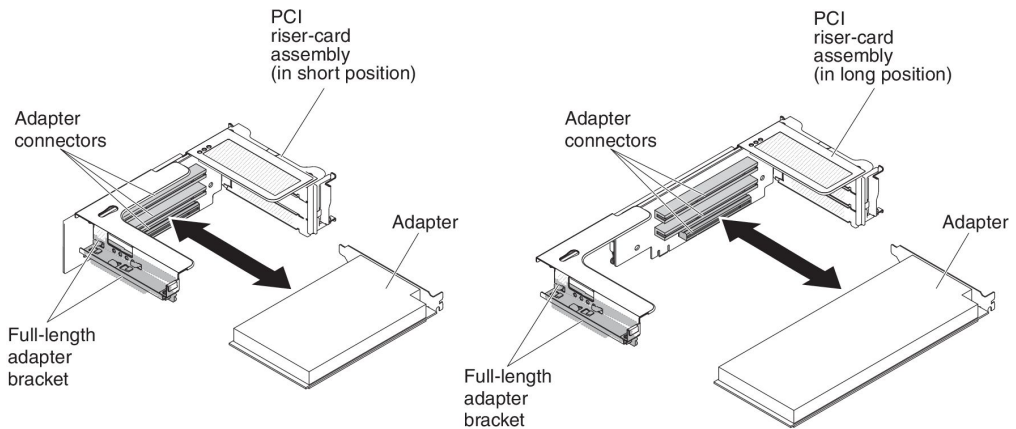
Figure 177. Adapter removal

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the cover (see "Removing the cover" on page 37).
3. Press down on the left and right side latches and slide the server out of the rack enclosure until both slide rails lock; then, remove the cover (see "Removing the cover" on page 37).
4. Remove the PCI riser-card assembly that contains the adapter (see "Removing a PCI riser-card assembly" on page 38).

- If you are removing an adapter from PCI expansion slot 1, 2, or 3, remove PCI riser-card assembly 1.
- If you are removing an adapter from PCI expansion slot 4, 5, or 6, remove PCI riser-card assembly 2.

5. Disconnect any cables from the adapter (make note of the cable routing, in case you reinstall the adapter later).

6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the PCI expansion slot.

7. If the adapter is a full-length adapter in the upper expansion slot of the PCI riser-card assembly and you do not intend to replace it with another full-length adapter, remove the full-length-adapter bracket and store it on the underside of the top of the PCI riser-card assembly.

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 an adapter

Use this information to replace an adapter.

About this task

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
Quadro 4000 adapter	512 GB
Quadro 6000 adapter	512 GB

- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported
- The server does not support 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. If you want to install a PCI Express or PCI-X adapter, you must order the PCI riser-card option.
- If you are installing a ServeRAID-M5110, ServeRAID-M5120, or an IBM LLM-SM dual port 10GbE SFP+ adapter, it can only be installed in PCI slot 1, 2, 4, or 5.
- Before you install an additional adapter, go to Table 2 on page 10 for detailed power supply configurations.

The following illustration shows the locations of the adapter expansion slots from the rear of the server.

Maximal card dimension supported in each slot (rear view)

1	Full height , up to full length	4	Full height , up to full length
2	Full height, half length	5	Full height , up to full length
3	Full height, half length	6	Full height, half length

(Riser 1)   (Riser 2)

To install an adapter, complete the following steps:
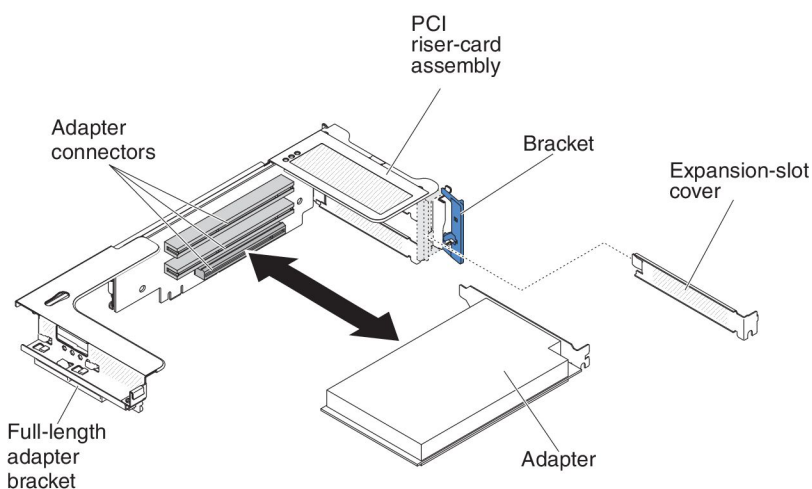
Figure 178. Adapter installation

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Follow the cabling instructions, if any come with the adapter. Route the adapter cables before you install the adapter.
5. Install the adapter in the expansion slot.
   a. For riser 1: if the adapter is a full-length adapter for the upper expansion slot in the riser card, remove the full-length-adapter bracket from

underneath the top of the riser-card assembly and insert it in the end of the upper expansion slot of the riser-card assembly. See "Stretching a PCI riser-card assembly" on page 41 for instructions.

   b. For riser 2: if the adapter is a full-length adapter for the upper expansion slot in the riser card, the bracket is on the cage by default. Insert it in the end of the upper expansion slot of the riser-card assembly. See "Stretching a PCI riser-card assembly" on page 41 for instructions.

   c. Align the adapter with the PCI connector on the riser card and the guide on the external end of the riser-card assembly.

   d. Press the adapter firmly into the PCI connector on the riser card.
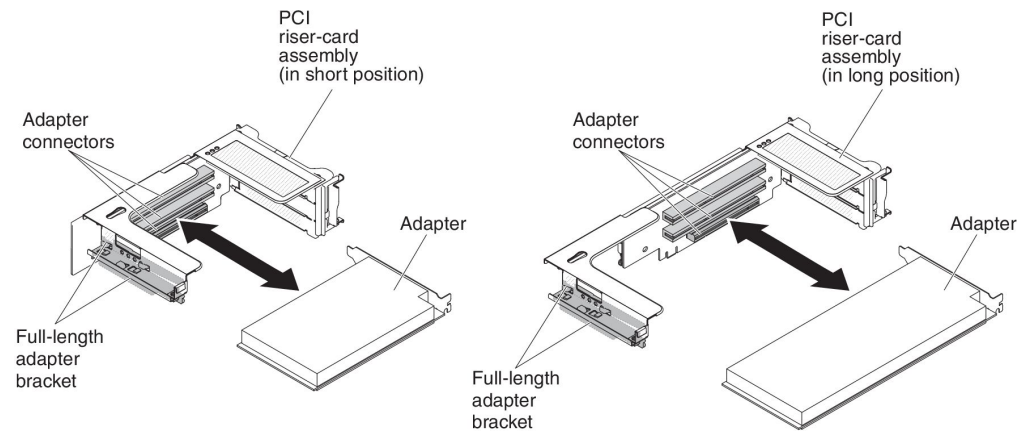
6. Connect any required cables to the adapter (see "Internal cable routing and connectors" on page 233

Attention:

- When you route cables, do not block any connectors or the ventilated space around any of the fans.
- Make sure that cables are not routed on top of components under the PCI riser-card assembly.
- Make sure that cables are not pinched by the server components.

7. Align the PCI riser-card assembly with the selected PCI connector on the system board:
   - PCI-riser connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets on the side of the chassis; align the rear of the assembly with the guides on the rear of the server.
   - PCI-riser connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the riser-card connector on the system board; align the rear of the assembly with the guides on the rear of the server.

8. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.

9. Install the PCI riser-card assembly in the server (see "Replacing a PCI riser-card assembly" on page 284).

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

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

12. Reinstall the cover (see "Replacing the cover" on page 244).

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 an optional ServeRAID upgrade adapter memory module

Use this information to remove an optional ServeRAID upgrade adapter memory module.

About this task

Before removing an optional ServeRAID upgrade adapter memory module, complete the following steps for correct configuration:

1. Boot to webbios and delete all configurations.

2. In controller properties of Web-bios, reset to factory defaults.

3. Turn off AC power supply.

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

To remove an optional ServeRAID upgrade adapter memory module, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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

3. Remove the cover (see "Removing the cover" on page 37).

4. Disconnect the battery/flash power module cable from the battery.
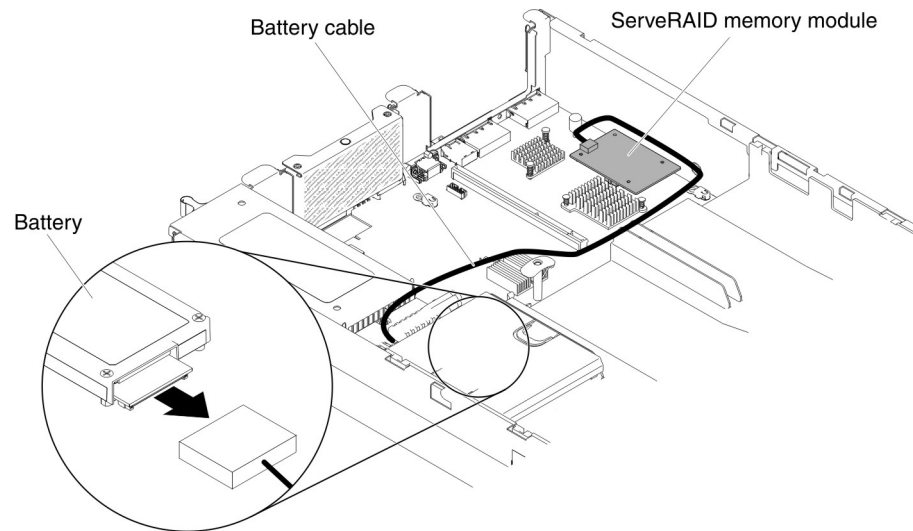
Figure 179. Disconnecting the battery cable
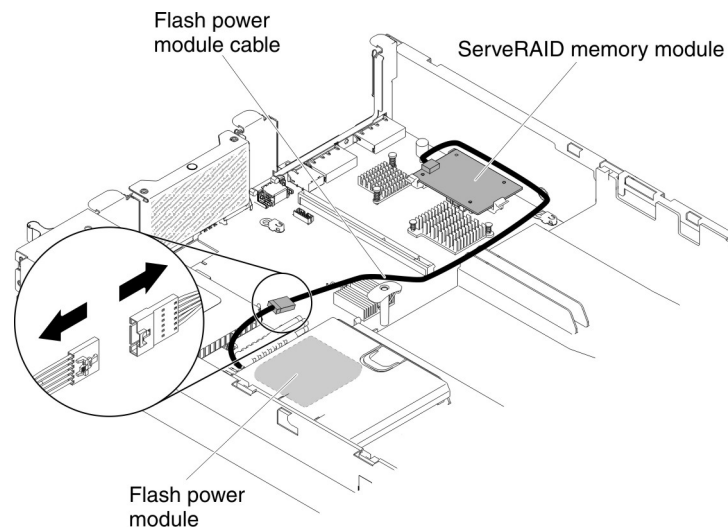
Figure 180. Disconnecting the flash power module cable

5. Remove the ServeRAID upgrade adapter memory module and the three pegs from the system board.
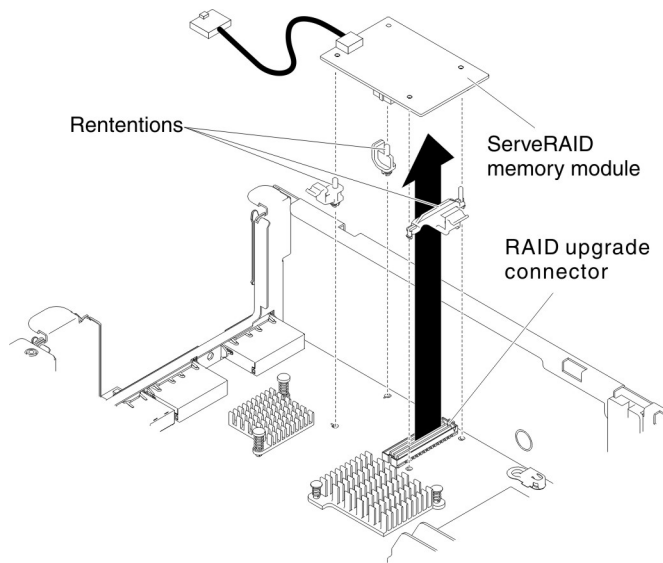
Figure 181. Removing ServeRAID upgrade adapter memory module

6. Disconnect the battery/flash power module cable from the ServeRAID upgrade adapter memory module.
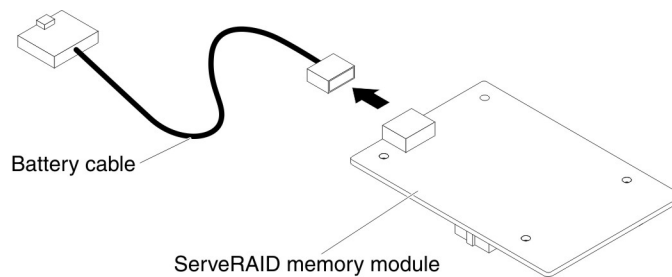
Figure 182. Disconnecting the battery cable
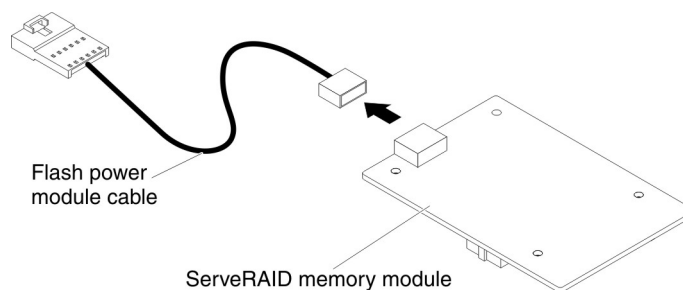
Figure 183. Disconnecting the flash power module cable

7. If you are instructed to return the feature key, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing an optional ServeRAID upgrade adapter memory module

Use this information to replace an optional ServeRAID upgrade adapter memory module.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Connect the battery/flash power module cable to the ServeRAID upgrade adapter memory module.
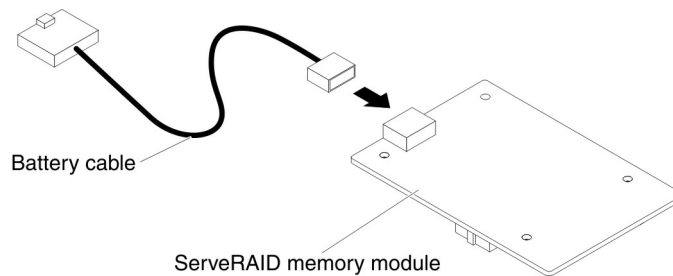
Figure 184. ServeRAID upgrade adapter memory module and battery cable
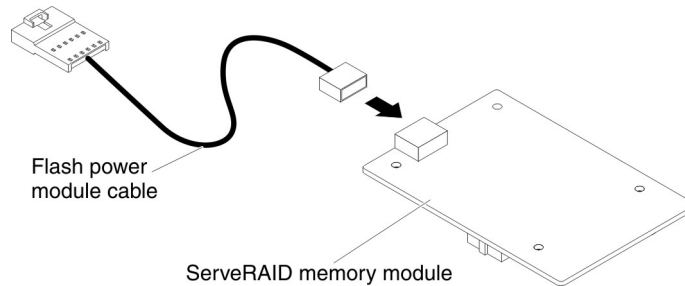
Figure 185. ServeRAID upgrade adapter memory module and flash power module cable

5. Attach the three pegs to the ServeRAID upgrade adapter memory module and install the ServeRAID upgrade adapter memory module into the system board.
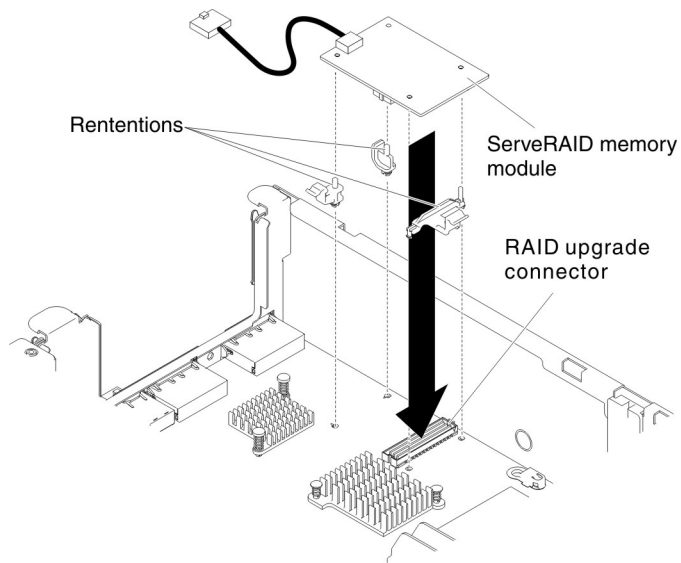
Figure 186. Installing ServeRAID upgrade adapter memory module and battery/flash power module cable

6. Connect the other end of the battery/flash power module cable to the battery/flash power module.
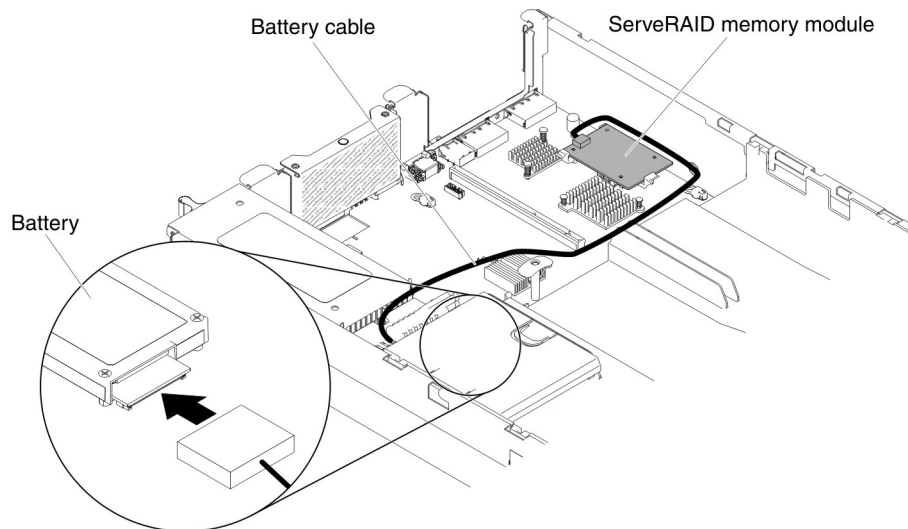
Figure 187. Connecting the battery cable
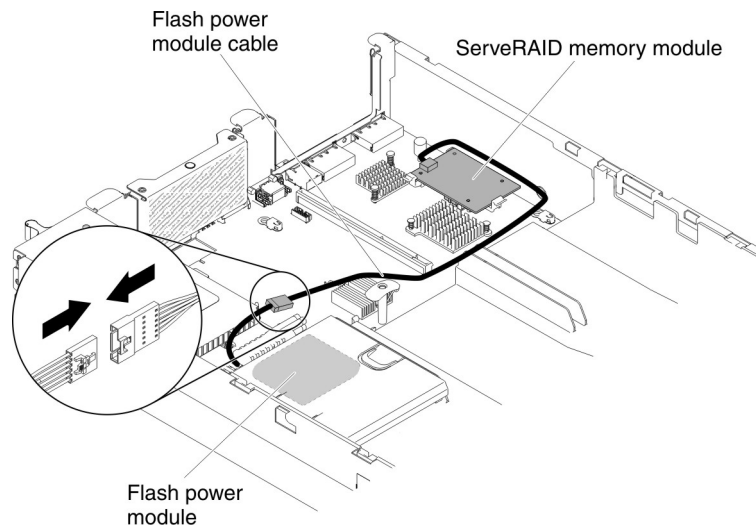
Figure 188. Connecting the flash power module cable

> **Note:** Make sure the battery/flash power module is seated properly (see "Installing a ServeRAID SAS controller battery on the remote battery tray" on page 68).

7. Reconnect the power cord and any cables that you removed.
8. Reinstall the cover (see "Replacing the cover" on page 244).
9. Slide the server into the rack.
10. Turn on the peripheral devices and the server.

Removing a remotely installed RAID adapter battery/flash power module

Use this information to remove a remotely installed RAID adapter battery/flash power module.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove any cable covering or obstructing the battery/flash power module holder before opening the battery/flash power module holder.
5. Pull the release tab toward the fan cage and unlock the retention clip.

Battery / Flash power module

Battery / Flash power module cable connector
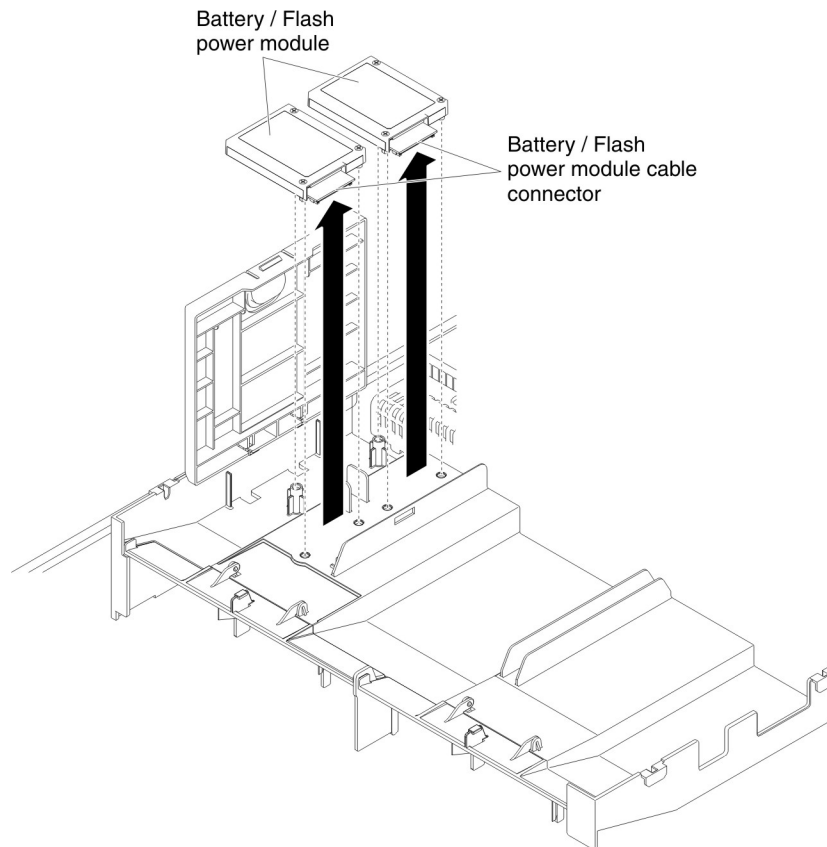
Figure 189. RAID adapter battery/flash power module removal

> **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/flash power module cable from the connector on the battery/flash power module.
7. Lift the battery/flash power module up to remove the battery/flash power module from the holder.
8. If you are instructed to return the RAID adapter battery/flash power module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a RAID adapter battery/flash power module remotely in the server

Use this information to replace a RAID adapter battery remotely in the server.

About this task

When you install any ServeRAID adapter that comes with a battery/flash power module, it is necessary to install the battery/flash power module in another location in the server to prevent the batteries/flash power modules from overheating.

Note:

1. The battery/flash power module must be installed near the fan cage first. If you have more than two batteries/fan power modules, the battery/fan power module should be installed in ServeRAID SAS controller remote retention (see "Replacing a RAID adapter battery holder" on page 249). Install your batteries/flash power modules orderly as the following illustration.
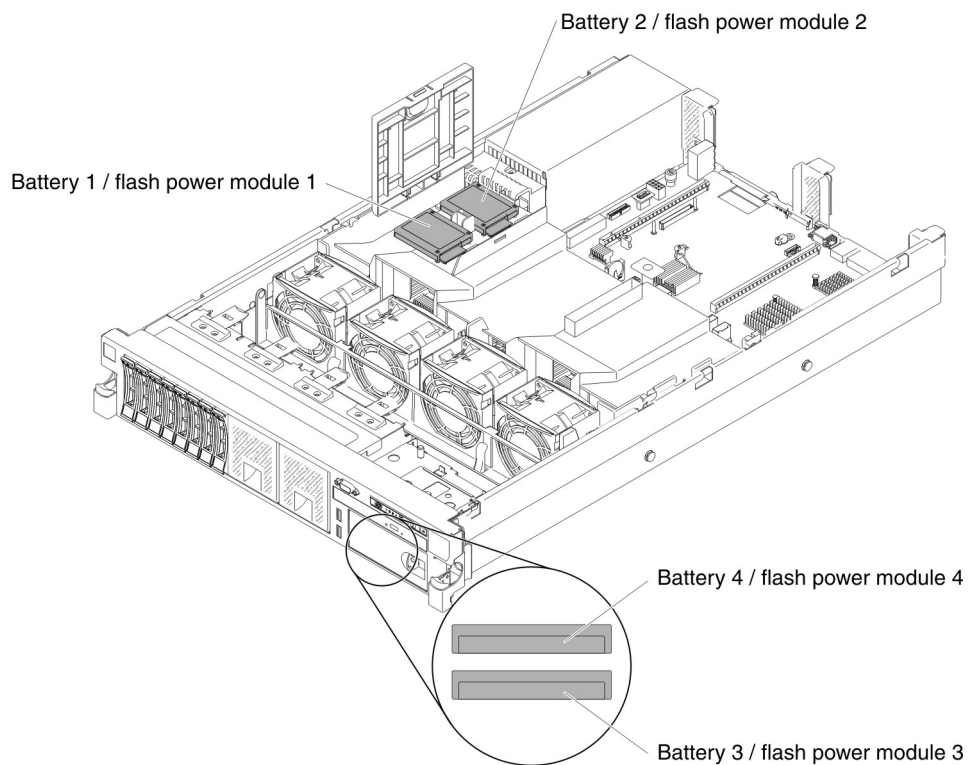
Figure 190. RAID adapter battery/flash power module installation

2. If you are installing ServeRAID-M5100 Series RAID 5 upgrade that comes with a battery/flash power module, you must install the battery/flash power module in ServeRAID SAS controller remote retention instead (see "Replacing a RAID adapter battery holder" on page 249).

Battery 4 / flash power module 4

Battery 3 / flash power module 3
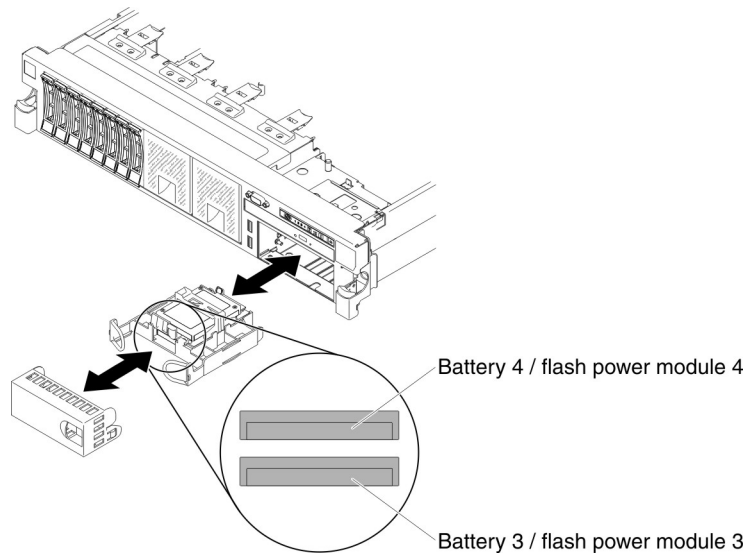
Figure 191. RAID adapter battery/flash power module installation

To install a RAID adapter battery/flash power module in the server, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 37).

4. Install the ServeRAID adapter on the system board (see "Replacing an adapter" on page 287) or install the ServeRAID adapter on the riser card and install the riser-card assembly in the server (see "Replacing an adapter" on page 287).

5. Connect one end of the battery/flash power module cable to the RAID adapter battery/flash power module connector.

6. Route the remote battery/flash power module cable along the chassis.

   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/flash power module holder before opening the battery/flash power module holder.

8. Install the battery/flash power module near the fan cage:

   a. Release the retention clip in the open position.

   b. Align the battery/flash power module cable connector with the slot on the battery/flash power module holder. Place the battery/flash power module into the holder and make sure that the holder engages the battery/flash power module securely.
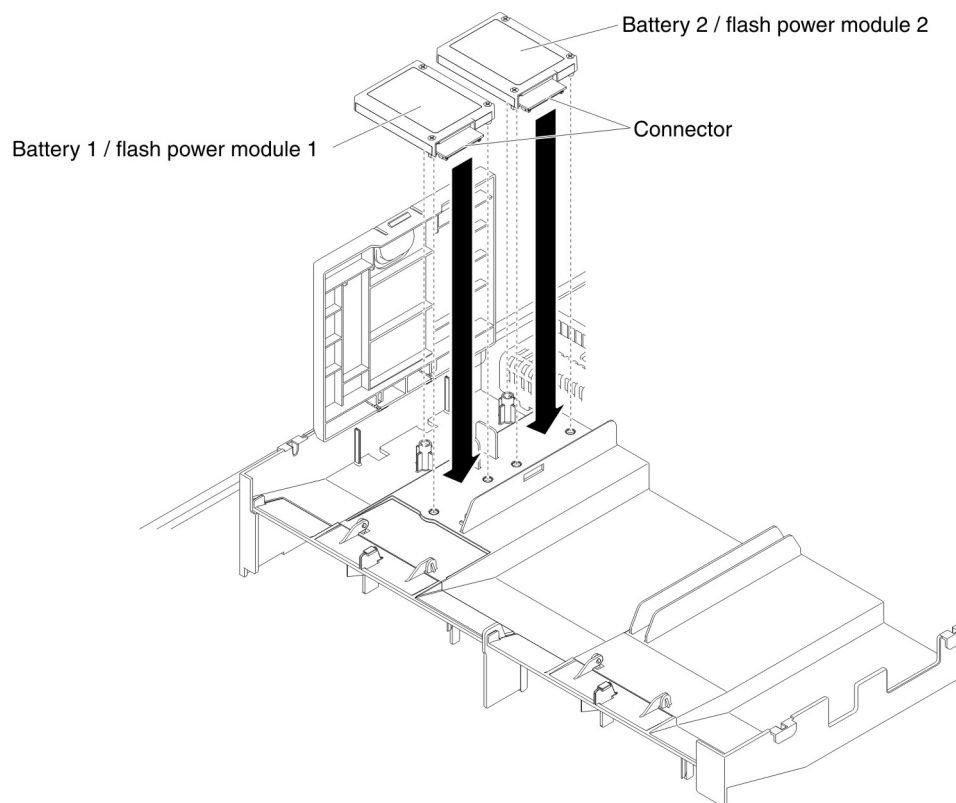
Figure 192. RAID adapter battery/flash power module installation

> **Note:** The positioning of the remote battery/flash power module depends on the type of the remote batteries/flash power modules that you install.

c. Connect the other end of the battery/flash power module cable to the connector on the battery/flash power module.
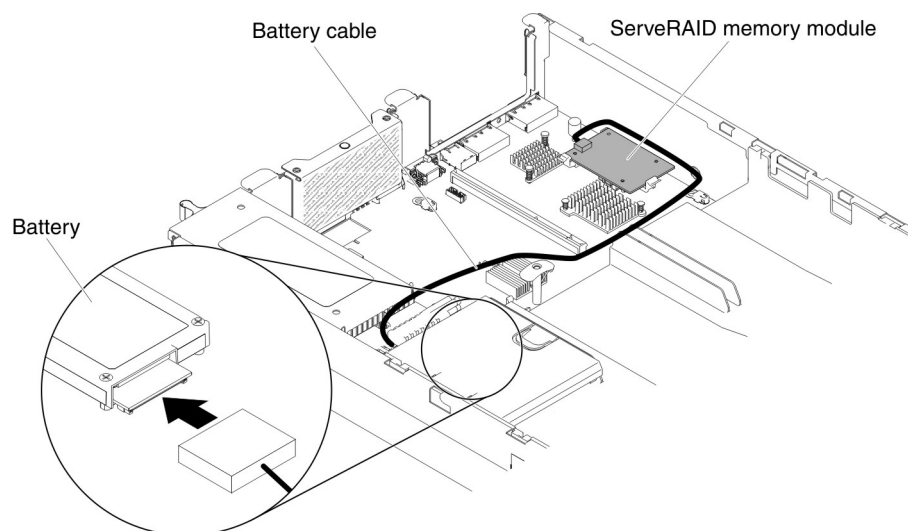
Figure 193. RAID adapter battery/flash power module installation

> **Note:** Make sure the battery/flash power module is seated properly.

d. Place the retention clip underneath while pressing the release tab toward the front of the server until it snaps in place to hold the retention clip firmly in place.

9. Reinstall the cover (see "Replacing the cover" on page 244).

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 the dual-port network adapter

Use this information to remove the dual-port network adapter.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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 37).

4. Remove the PCI riser-card assembly (if installed) from PCI riser connector 2 (see "Removing a PCI riser-card assembly" on page 283).

5. Loosen the two captive screws on the network adapter from the screw holes on the system board.
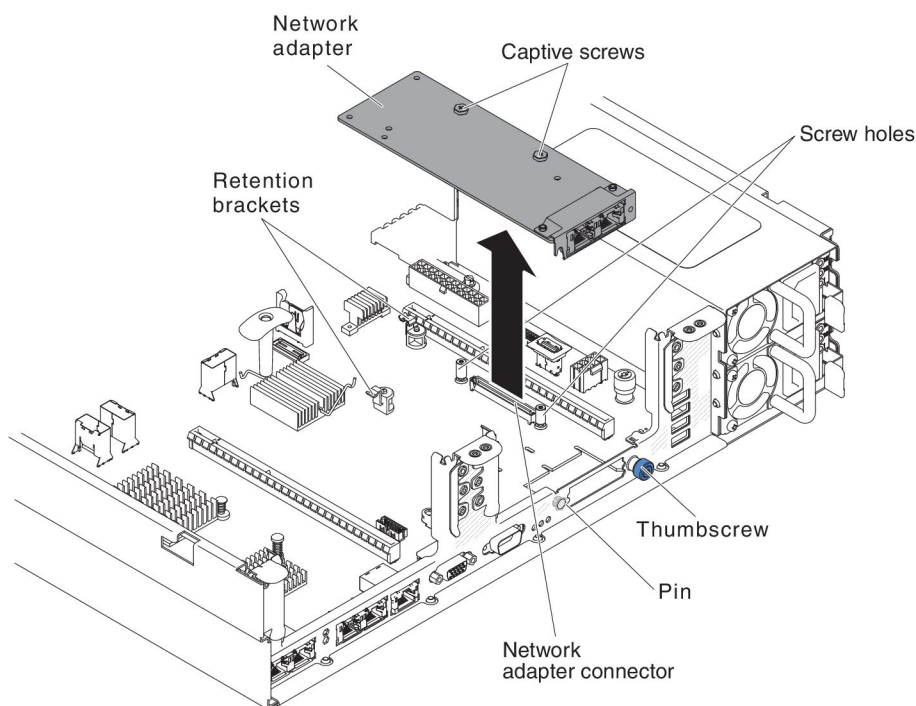
Figure 194. Screws disengagement

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.

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

Use this information to replace the dual-port network adapter.

About this task

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 25. 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	Four fans installed required.
Emulex dual-port 10GbE SFP+ Embedded VFA III	90Y6456	90Y5100	
Dual-port FDR embedded adapter	00D4143	90Y6606	
Note: You can purchase IBM System x3650 M4 Thermal Solution Kit (option part number 46W8422) to acquire an additional fan for your server.			

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 138), 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 138), 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 x3650 M4** > **7915**.
    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:

Procedure
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the PCI riser-card assembly (if installed) from PCI riser connector 2 (see "Removing a PCI riser-card assembly" on page 283).
5. Remove the adapter filler panel on the rear of the chassis (if it has not been removed already).

Figure 195. 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.
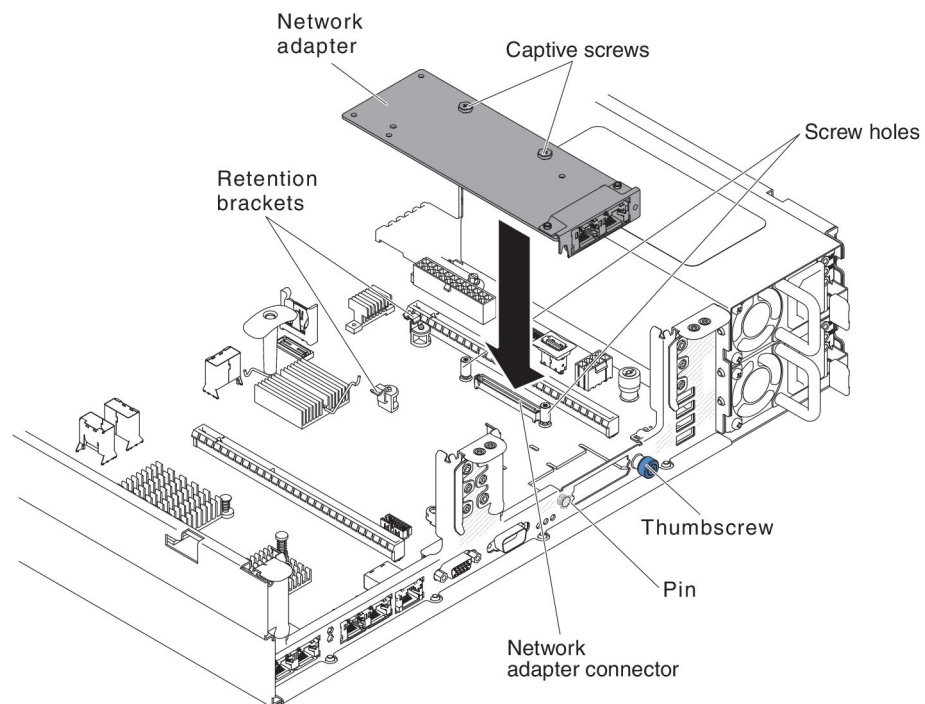
Figure 196. Network adapter installation

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.

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 284).

12. Replace the cover (see "Replacing the cover" on page 244).

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

Use this information to remove a hot-swap ac power supply.

About this task

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.
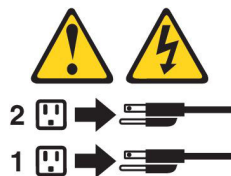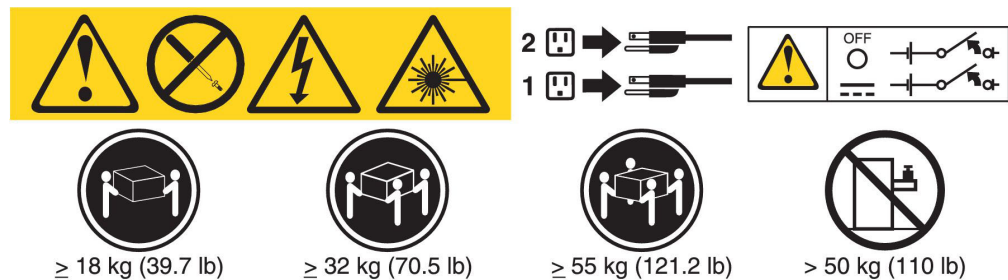

Statement 8

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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.
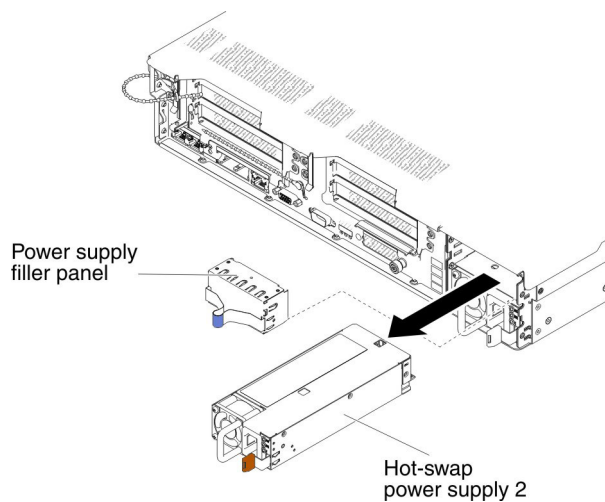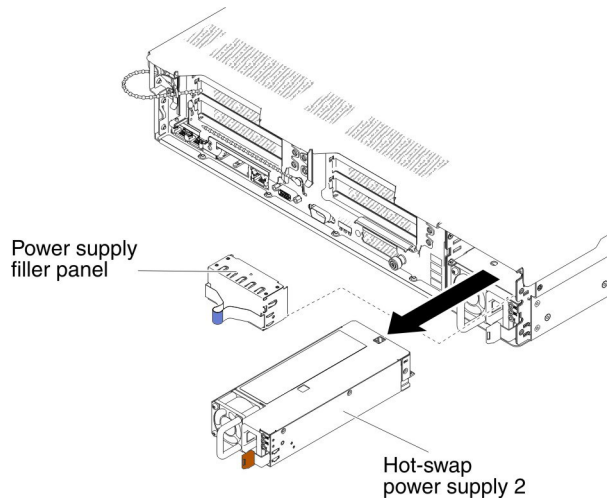

Figure 197. Power supply removal

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

Use this information to replace a hot-swap ac power supply.

About this task

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.
- Before you install an additional power supply or replace a power supply with one of a different wattage, go to Table 2 on page 10 for detailed configurations.
- 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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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.
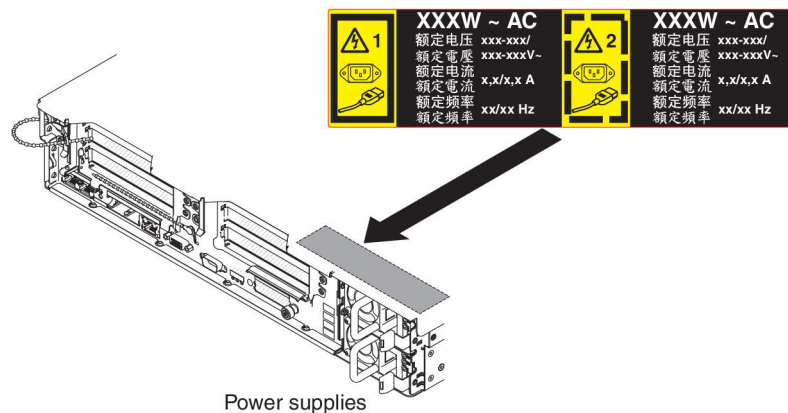
Figure 198. Power supply installation

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 install the different power rating or wattage of power supplies, high-efficiency and non-high-efficiency power supplies in the server.
5. Connect the power cord for the new power supply to the power-cord connector on the power supply. The following illustration shows the power-cord connectors on the back of the server.

Power cord connectors
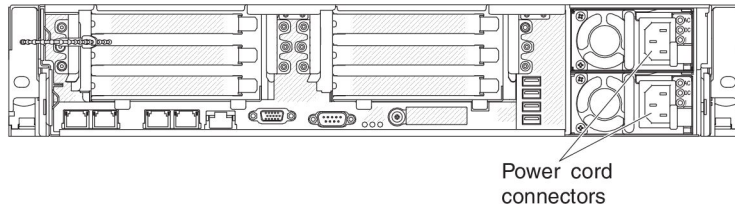
6. Route the power cord through the clip next to power-supply and through any cable clamps on the rear of the server, to prevent the power cord from being accidentally pulled out when you slide the server in and out of the rack.

7. Connect the power cord for the new power supply to the power-cord connector on the power supply.

8. Connect the other end of the power cord to a properly grounded electrical outlet.

9. 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.

10. 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.
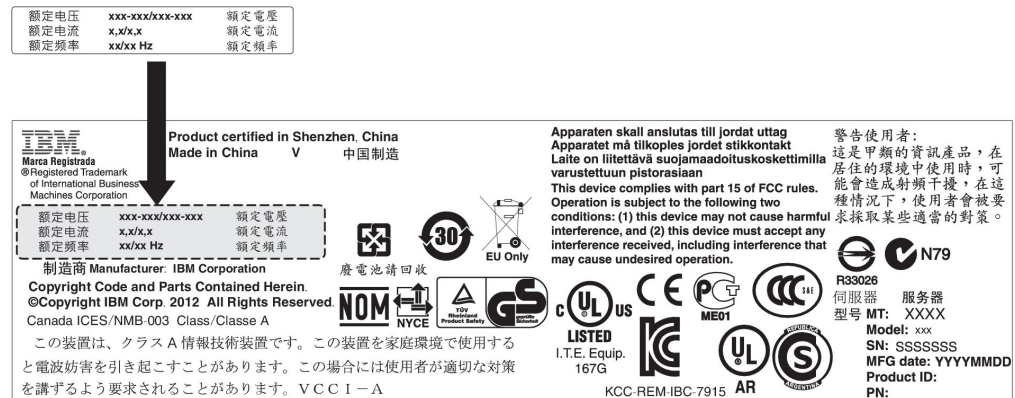
Figure 199. Power information label

Removing a hot-swap dc power supply

Use this information to remove a hot-swap dc power supply.

About this task

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 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.	2. Remove the signal cables from the connectors.
• 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.	3. Remove all cables from the devices.
4. Attach signal cables to other devices.	
5. Connect power cords to their sources.	
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 remove a hot-swap dc power supply, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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.

Power supply filler panel

Hot-swap power supply 2

Figure 200. 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

Use this information to replace a hot-swap dc power supply.

About this task

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.
- Before you install an additional power supply or replace a power supply with one of a different wattage, go to Table 2 on page 10 for detailed configurations.
- 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 mm² (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 below.

- 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, disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the dc cables.
• 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.	
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.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 201. 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.
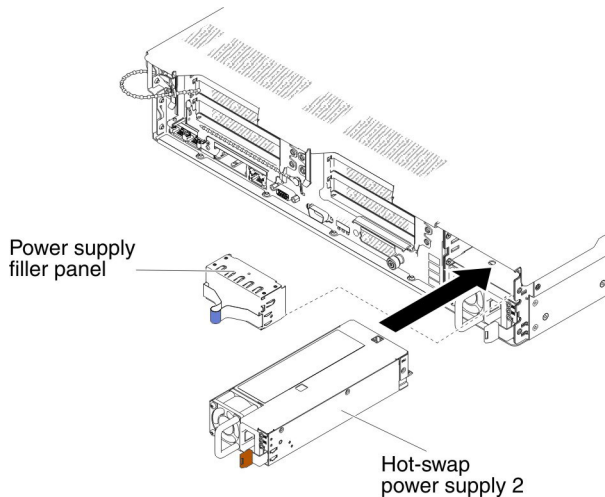
Figure 202. Power supply installation

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 "Installing a hot-swap dc power supply" on page 77. 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 203. 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 204. Redundant power information label

Removing a hot-swap fan

Use this information to remove a hot-swap fan.

About this task

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Remove the cover (see "Removing the cover" on page 37). The LED on the system board near the connector for the failing dual-motor hot-swap fan will be lit.

   Attention: To ensure proper system cooling, do not remove the top cover for more than 30 minutes during this procedure.
3. Grasp the dual-motor hot-swap fan by the finger grips on the sides of the dual-motor hot-swap fan.
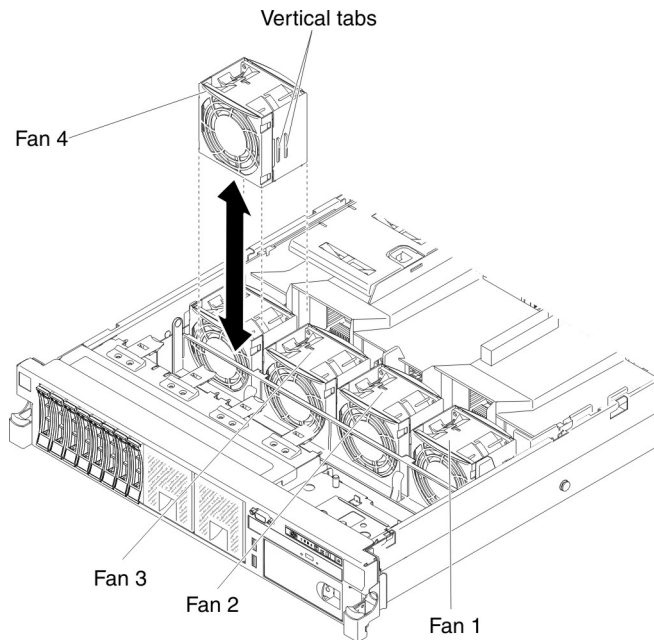
Figure 205. Fan removal

4. Rotate the air baffle up.
5. Lift the dual-motor hot-swap fan out of the server.

   Attention: To ensure proper operation, replace a failed hot-swap fan within 30 seconds.
6. 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

Use this information to replace a hot-swap fan.

About this task

For proper cooling, the server requires that all four dual-motor hot-swap fans be installed at all times.

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

To replace a hot-swap fan, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Remove the cover (see "Removing the cover" on page 37).
3. Rotate the air baffle up.
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.
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.
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.
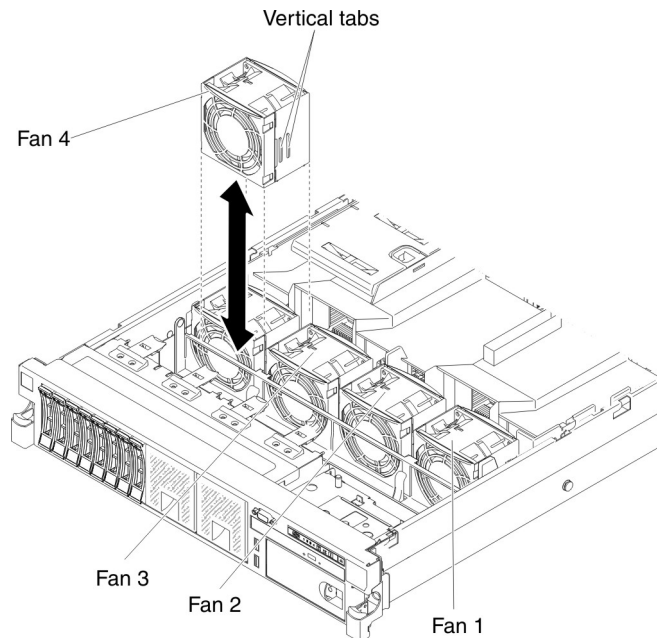
Figure 206. Fan installation

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

7. Replace the cover (see "Replacing the cover" on page 244).
8. Slide the server into the rack.

Removing the 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane

Use this information to remove the 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane.

About this task

To remove the 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Pull the hard disk drives out of the server slightly to disengage them from the hard disk drive backplate assembly/backplane (see "Removing a hot-swap hard disk drive" on page 254).
5. To obtain more working room, remove the fans (see "Removing a hot-swap fan" on page 318).
6. Lift the two front tabs and rotate the backplate assembly/backplane toward the rear of the server to remove the backplate assembly/backplane.
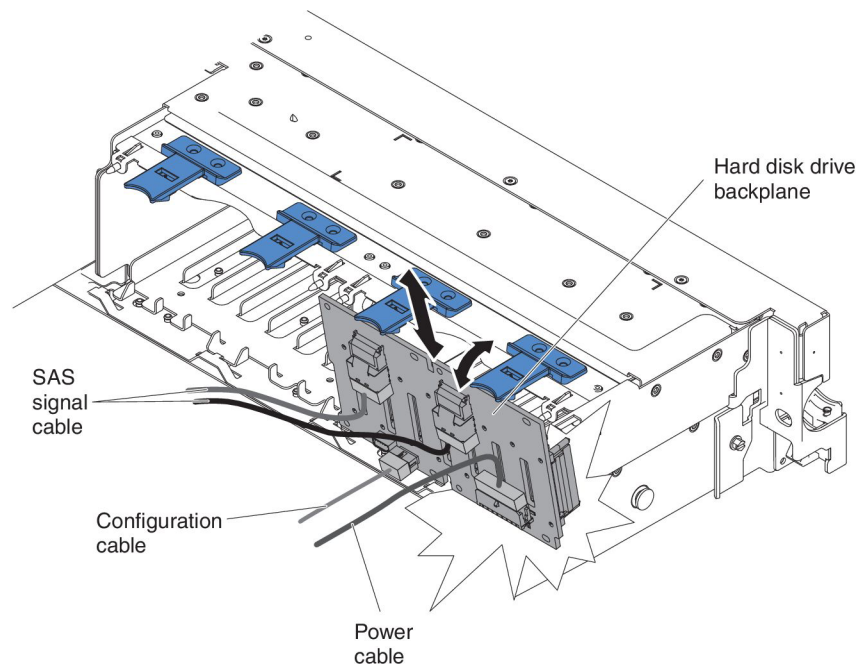
Figure 207. 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane removal

7. Disconnect all cables from the hard disk drive backplane.
8. If you are instructed to return the hard disk drive backplate assembly/backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane

Use this information to replace the 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane.

About this task

To install the 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Reconnect 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 backplate assembly along the chassis and connect it to the **Simple-swap SATA power connector**. See "2.5-inch hard disk drive cable connection" on page 238.
3. Align the backplate assembly/backplane with the backplate assembly/backplane slot in the chassis and the small slots on top of the hard disk drive cage.
4. Lower the backplate assembly/backplane into the slots on the chassis.
5. Rotate the top of the backplate assembly/backplane until the front tab clicks into place into the latches on the chassis.
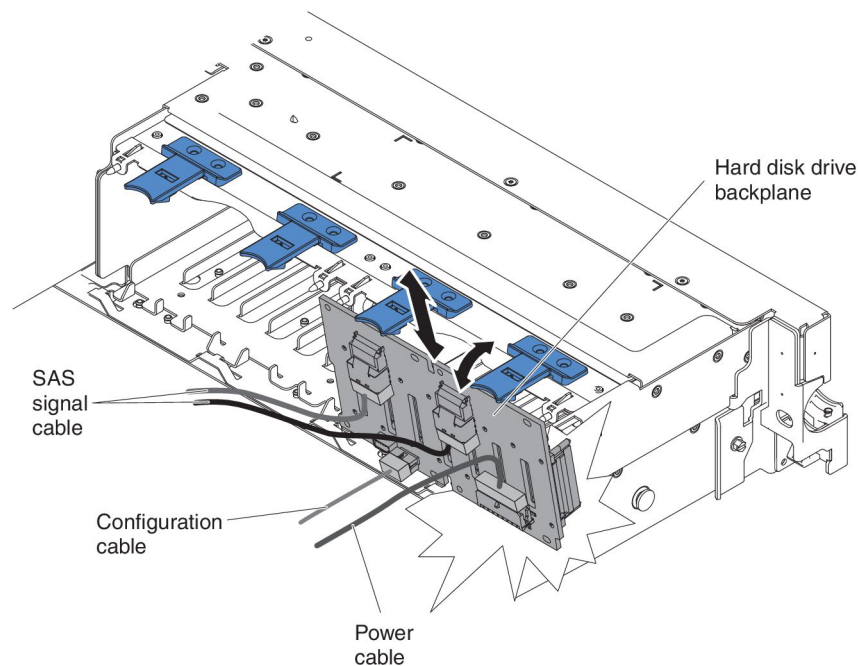
Figure 208. 2.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane installation

6. Replace the fan bracket and fans if you removed them (see "Replacing the fan bracket" on page 282 and "Replacing a hot-swap fan" on page 319).
7. Reinstall the hard disk drives (see "Replacing a hot-swap hard disk drive" on page 255).
8. Install the cover (see "Replacing the cover" on page 244).

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 the 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane

Use this information to remove the 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane.

About this task

To remove the 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.

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

3. Remove the cover (see "Removing the cover" on page 37).

4. Pull the hard disk drives or fillers out of the server slightly to disengage them from the backplate assembly/backplane. See "Removing a simple-swap hard disk drive" on page 257 for details.

5. To obtain more working room, remove the fans (see "Removing a hot-swap fan" on page 318).

6. Lift the backplate assembly/backplane out of the server by pulling the latch and lifting it up.
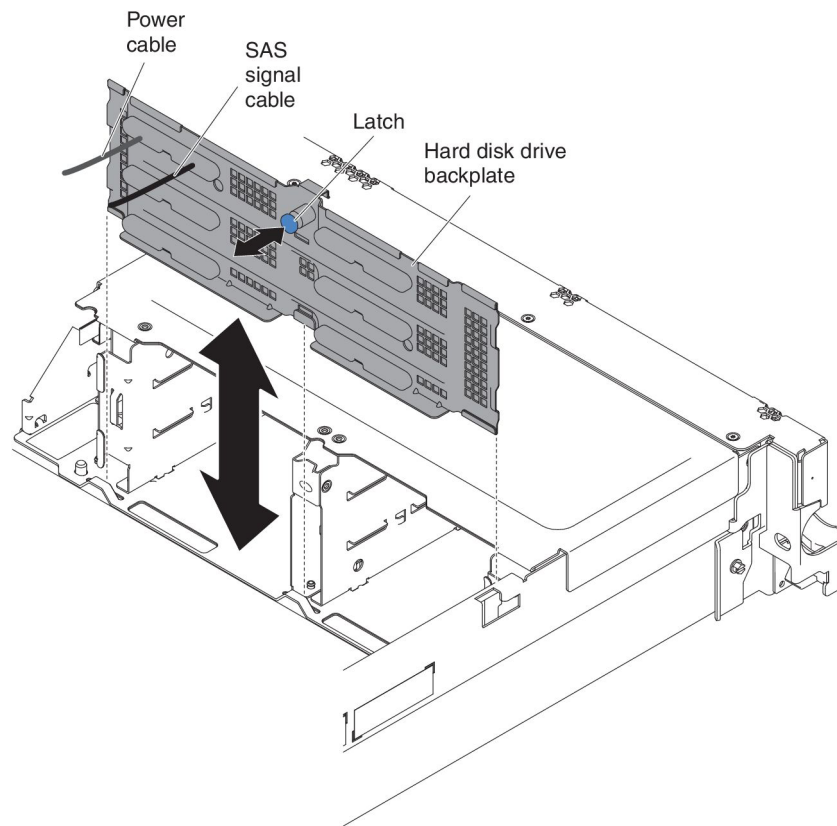
Figure 209. 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane removal

7. Disconnect the power and signal cables from the system board.
8. If you are instructed to return the hard disk drive backplate assembly/backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing the 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane

Use this information to replace the 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane.

About this task

To install the 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Align the sides of the drive backplate assembly/backplane with the slots on the bracket.
3. Lower the backplate assembly/backplane into the slots on the chassis.
4. Rotate the top of the backplate assembly/backplane until the front tab clicks into place into the latches on the chassis.

Power
cable

SAS
signal
cable

Latch

Hard disk drive
backplate
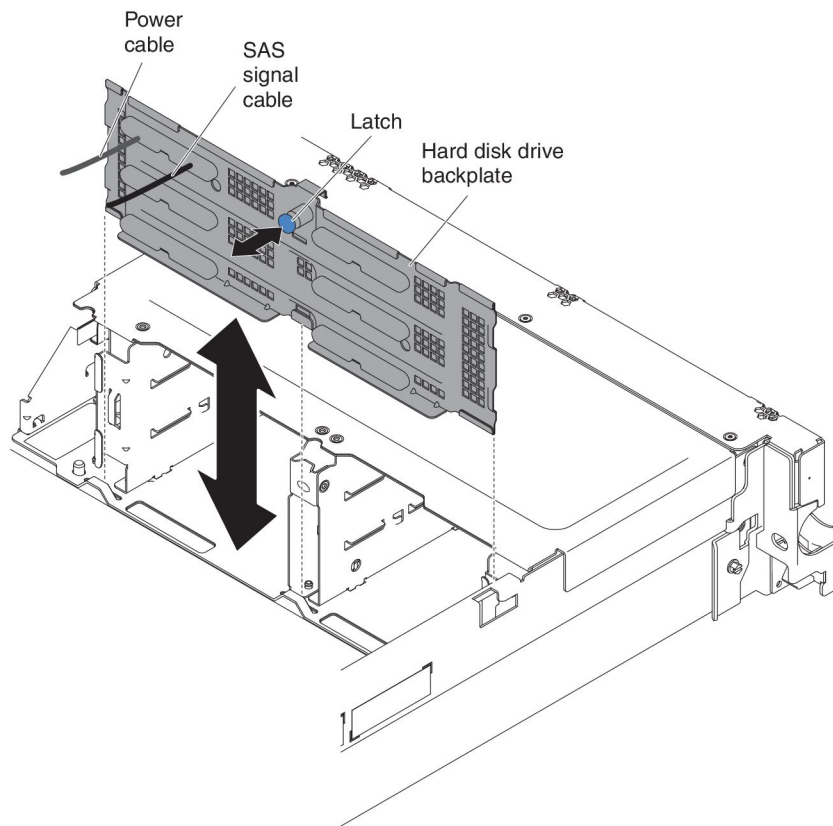
*Figure 210. 3.5-inch simple-swap/hot-swap hard disk drive backplate assembly/backplane
installation*

5. 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
   backplate assembly along the chassis and connect it to the **Simple-swap SATA
   power connector**. See "3.5-inch hard disk drive cable connection" on page 241
   for more information.

6. Reinstall the hard disk drives and filler panels (see "Replacing a simple-swap
   hard disk drive" on page 258).

7. Replace the fan bracket and fans if you removed them (see "Replacing the fan
   bracket" on page 282 and "Replacing a hot-swap fan" on page 319).

8. Install the cover (see "Replacing the cover" on page 244).

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 a USB embedded hypervisor flash device

Use this information to remove a USB embedded hypervisor flash device.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove the flash device:
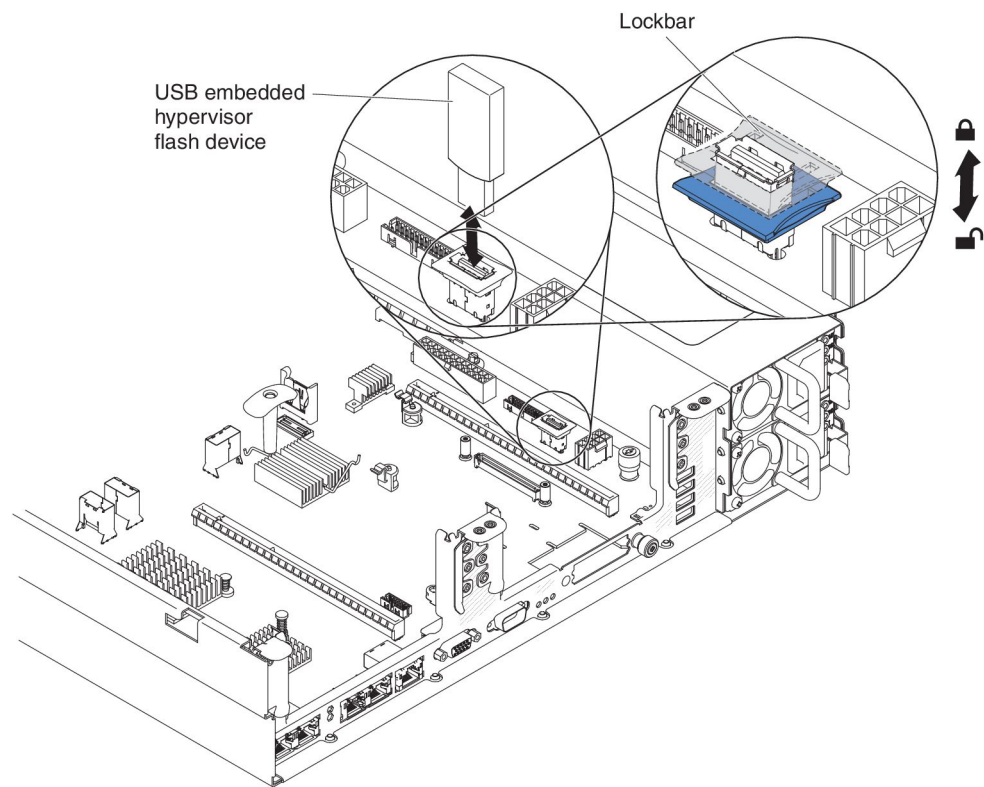
Figure 211. USB hypervisor flash device removal

   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

Use this information to replace a USB embedded hypervisor flash device.

About this task

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

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect the power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove the PCI riser-card assembly (see "Removing a PCI riser-card assembly" on page 283).
5. Install the flash device:
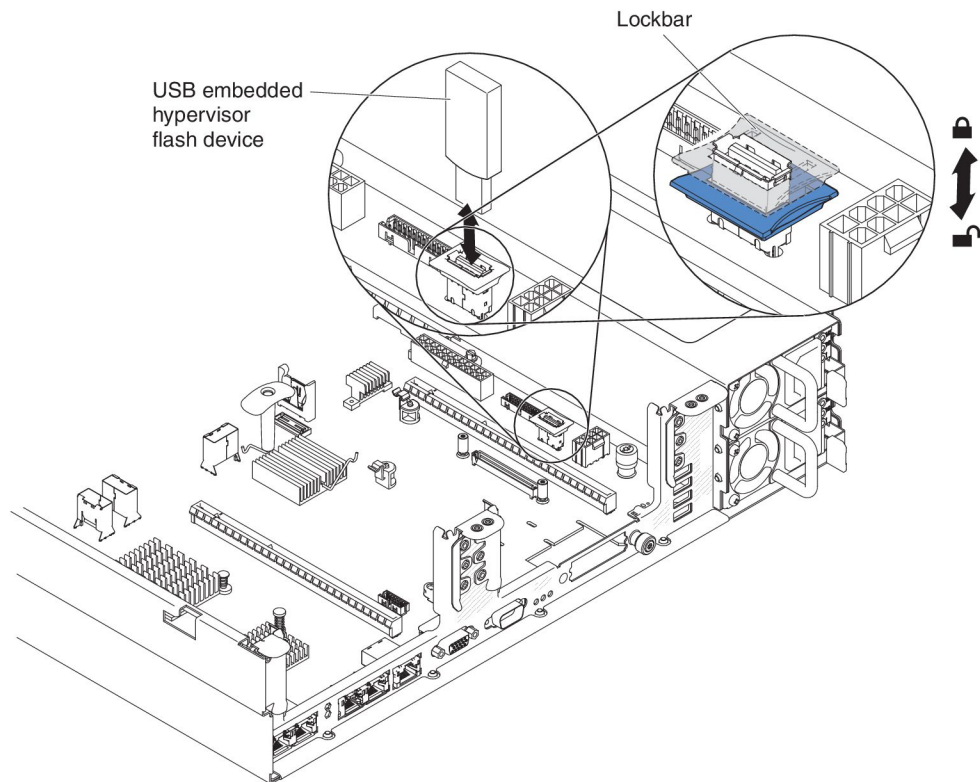
Figure 212. USB hypervisor flash device installation

   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.
6. Reconnect the power cords and any cables that you removed.
7. Replace the cover (see "Replacing the cover" on page 244).
8. Slide the server into the rack.
9. 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.

About this task

- 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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. If necessary, lift the PCI riser-card assembly 2 out of the way (see "Removing a PCI riser-card assembly" on page 283).
5. Remove the system battery:
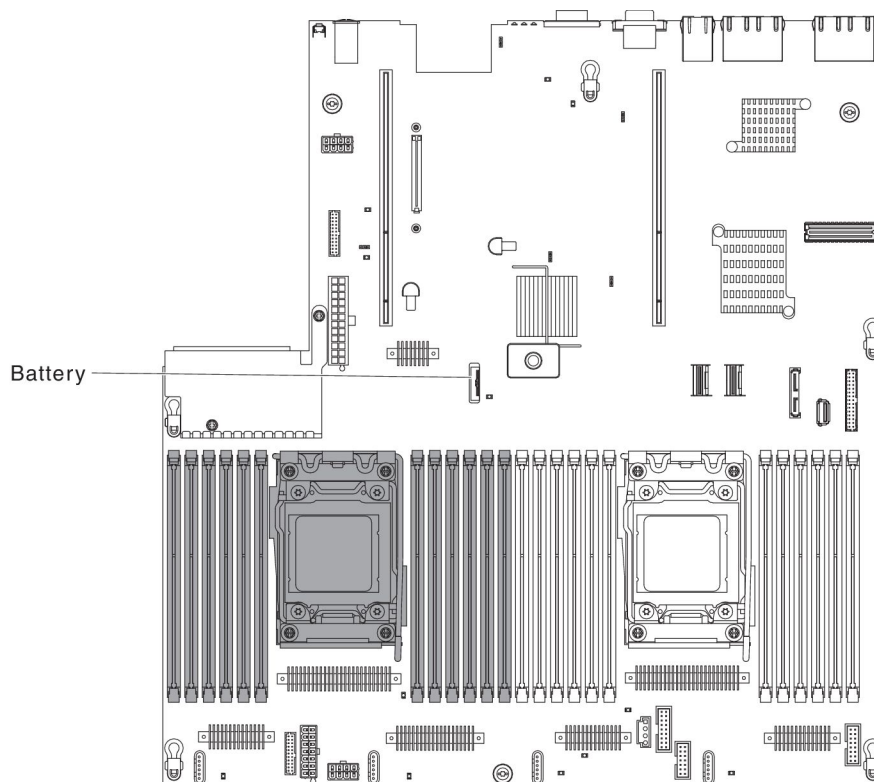
Figure 213. System battery removal

    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.
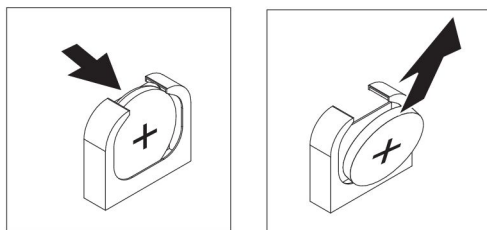
Figure 214. System battery removal

    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.

About this task

- 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:

Procedure

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 34.
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 37).
5. If necessary, lift the PCI riser-card assembly 2 out of the way (see "Removing a PCI riser-card assembly" on page 283).
6. Insert the new battery:
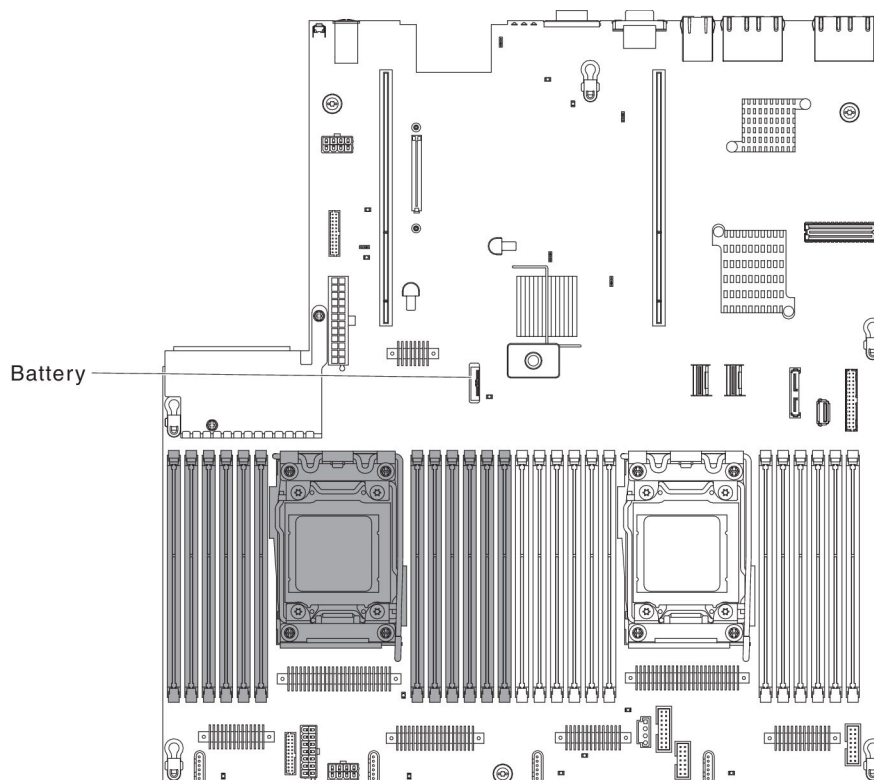
Figure 215. System battery installation

> a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
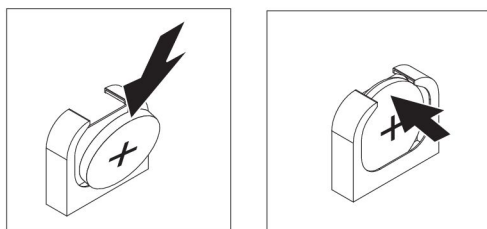
Figure 216. System battery installation

> 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 284), if necessary.

8. Install the cover (see "Replacing the cover" on page 244).

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 138 for details.

Removing the operator information panel assembly

Use this information to remove the operator information panel assembly.

About this task

To remove the operator information panel, complete the following steps.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
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
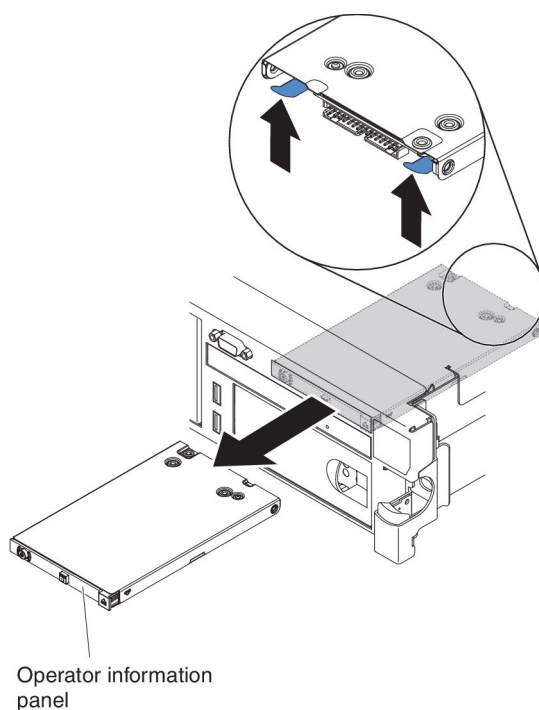
Figure 217. Operator information panel removal

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

Use this information to replace the operator information panel assembly.

About this task

To install the operator information panel, complete the following steps.

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. From the front of the server, slide the operator information panel into the server until it clicks into place.

Operator information panel
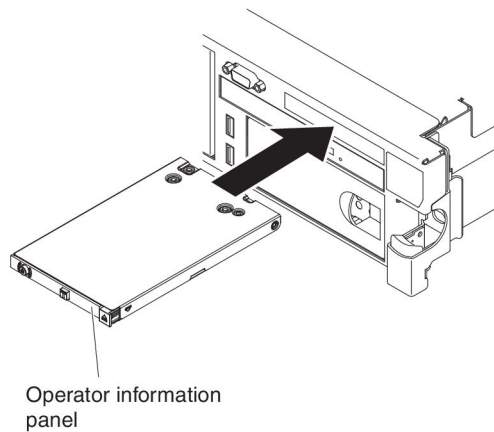
Figure 218. Operator information panel installation

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.

   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 244).
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

Use this information to remove a microprocessor and heat sink.

About this task

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
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.
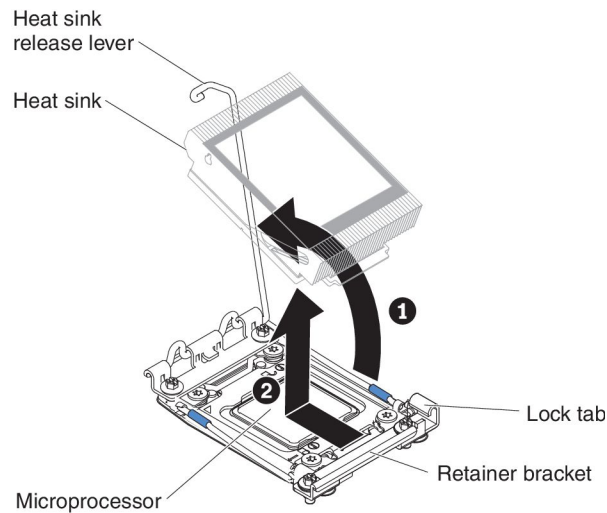
Figure 219. Heat sink removal

7. Open the microprocessor socket release levers and retainer.
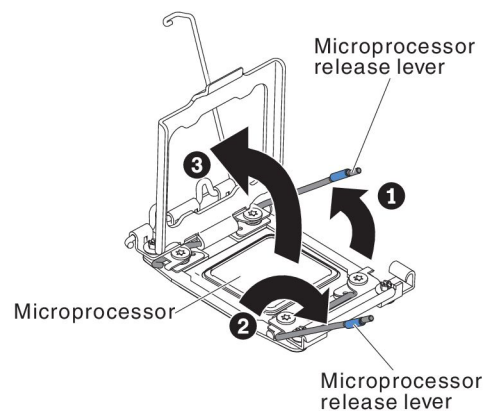
Figure 220. Microprocessor socket levers and retainer disengagement

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.
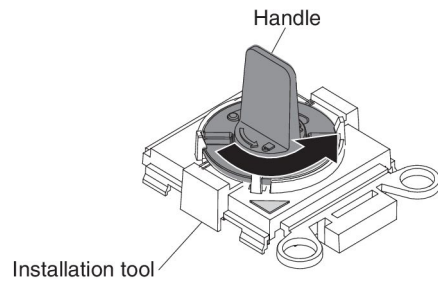
Figure 221. Installation tool handle adjustment

    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.
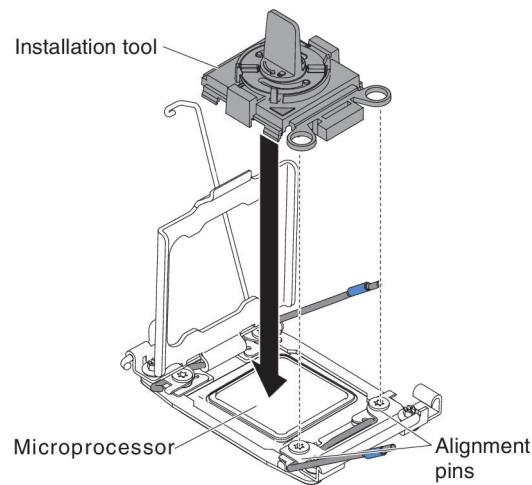
Figure 222. Microprocessor installation

    c. Twist the handle on the installation tool clockwise.
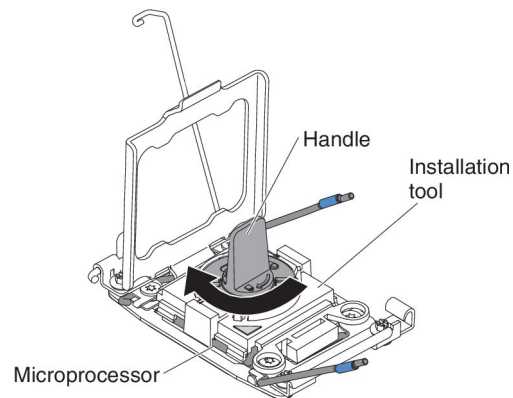
Figure 223. Installation tool handle adjustment

    d. Lift the microprocessor out of the socket.
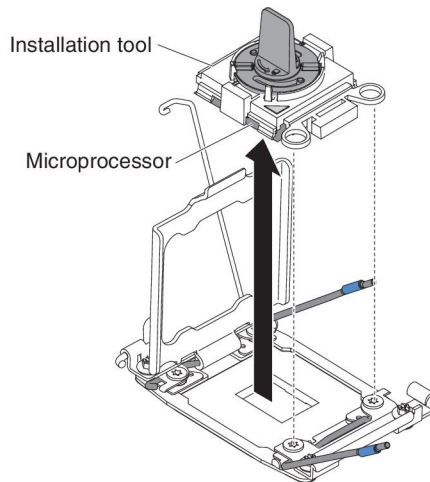
Figure 224. Installation tool removal

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 340 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

Use this information to replace a microprocessor and heat sink.

About this task

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.

- Before you install the microprocessor, go to Table 2 on page 10 for detailed power supply configurations.

- When you install the second microprocessor, you must also install additional memory and the fourth fan. See "Installing a memory module" on page 53 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 126.

  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:

Procedure
1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37.
3. Remove the cover (see "Removing the cover" on page 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
5. Rotate the heat sink retention module release lever to the open position.

Figure 225. Heat-sink lever rotation

6. Open the microprocessor socket release levers and retainer:
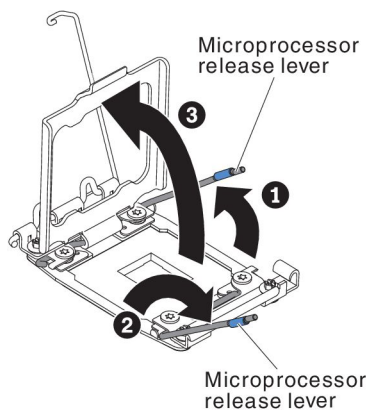
Figure 226. Microprocessor socket levers and retainer disengagement

   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 227. 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.
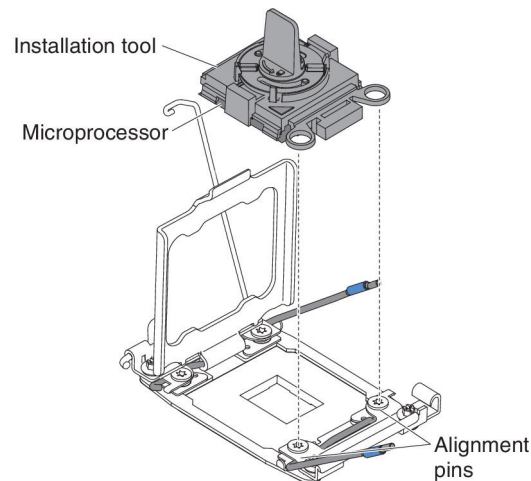
Figure 228. Installation tool alignment

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.
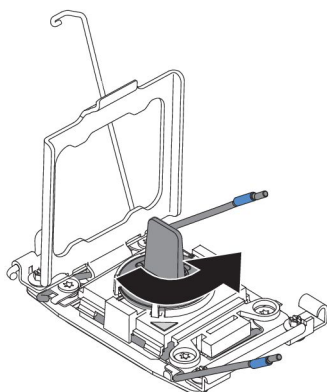
Figure 229. Installation tool handle adjustment

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.
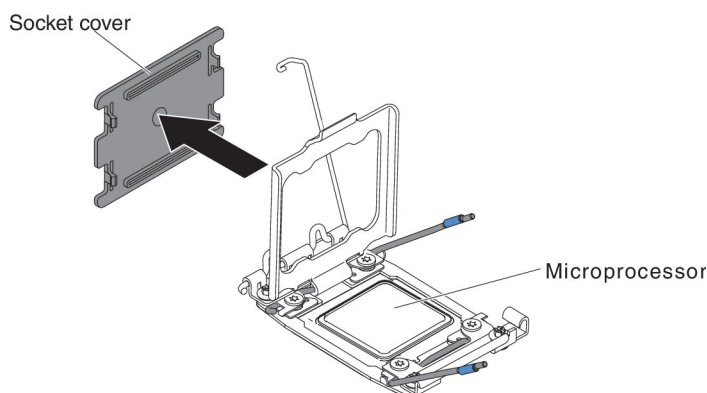
Figure 230. Socket cover removal

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 37.

9. Close the microprocessor socket release levers and retainer:
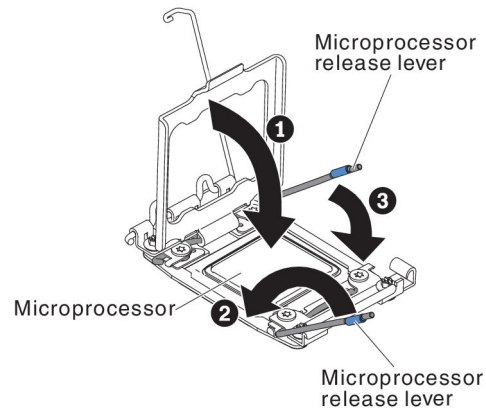
Figure 231. Microprocessor socket levers and retainer engagement

> 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 126 for more information.
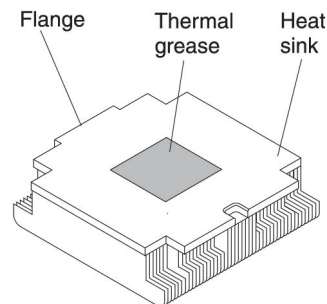
Figure 232. Thermal grease

> 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.

Heat sink
release lever

Heat sink

❶

❷

Lock tab

Retainer bracket
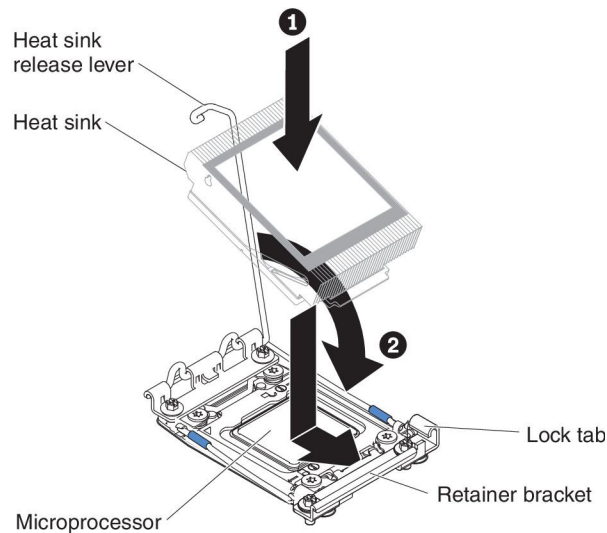
Microprocessor

Figure 233. 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 246).

12. Install the cover (see "Replacing the cover" on page 244).

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.

Results

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. Use this information to replace damaged or contaminated thermal grease on the microprocessor and heat sink.

About this task

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 34.
- Read "Handling static-sensitive devices" on page 37.

To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

Procedure

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 234. Thermal grease distribution

> **Note:** If the grease is properly applied, approximately half of the grease will remain in the syringe.

Figure 235. Syringe

6. Install the heat sink onto the microprocessor as described in 10 on page 341.

Removing the heat-sink retention module

Use this information to remove the heat-sink retention module.

About this task

To remove a heat-sink retention module, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
5. Remove the heat sink (see "Removing a microprocessor and heat sink" on page 333).

   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.

Heat-sink retention module
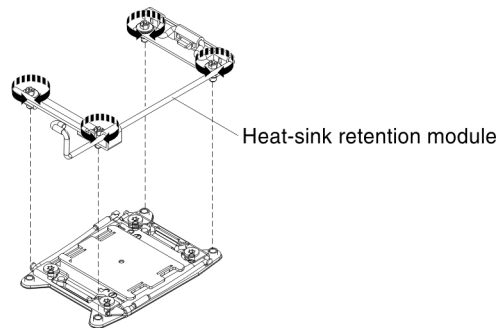
Figure 236. Heat-sink retention module removal

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

Use this information to replace the heat-sink retention module.

About this task

To install a heat-sink retention module, complete the following steps:

Procedure

1. Read the safety information that begins on "Safety" on page vii and "Installation guidelines" on page 34.
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 37).
4. Remove the air baffle (see "Removing the air baffle" on page 40).
5. Align the retention module with the holes on the system board.
6. Use a screwdriver to reinstall the four screws.
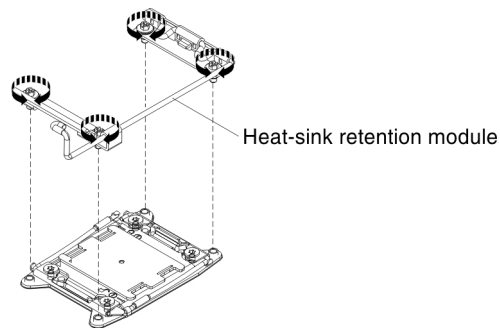
Figure 237. Heat-sink retention module installation

7. Reinstall the heat sink (see "Replacing a microprocessor and heat sink" on page 336).

   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 246).
9. Install the cover (see "Replacing the cover" on page 244).
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

Use this information to remove the system board.

About this task

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 147.

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:

Procedure

1. Read the safety information that begins on "Safety" on page vii, "Handling static-sensitive devices" on page 37, and "Installation guidelines" on page 34.

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 37).

6. Remove all PCI riser-card assemblies and adapters (see "Removing a PCI riser-card assembly" on page 283 and "Removing an adapter" on page 286).

7. Remove the air baffle (see "Removing the air baffle" on page 40).

8. Remove the ServeRAID SAS/SATA controller (see "Removing an adapter" on page 286).

9. Remove the dual-port network adapter (see "Removing the dual-port network adapter" on page 300).

10. Remove the memory modules and set them aside on a static-protective surface for reinstallation (see "Removing a memory module" on page 272).

    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 333).

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 327).

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 233 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 318).

15. Pull out and lift up the pin and the thumbscrews on each side of the system board.
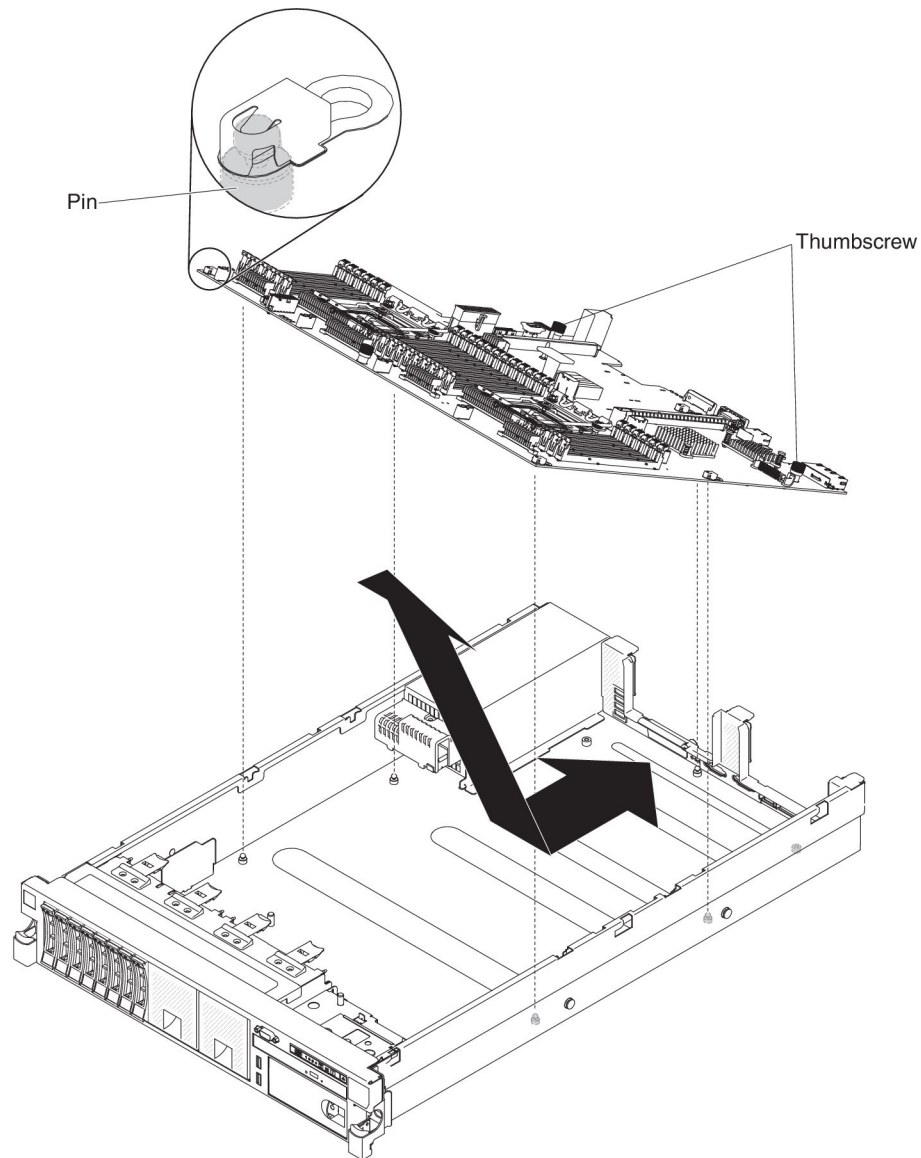
Figure 238. System board removal

16. 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.

17. 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

Use this information to replace the system board.

About this task

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 133, "Updating the Universal Unique Identifier (UUID)" on page 154, and "Updating the DMI/SMBIOS data" on page 156 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 147.
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:

Procedure

1. Read the safety information that begins on "Safety" on page vii, "Handling static-sensitive devices" on page 37, and "Installation guidelines" on page 34.
2. Align the system board at an angle, as shown in the illustration; then, rotate and lower it flat and slide it back toward the rear of the server. Make sure that the rear connectors extend through the rear of the chassis.
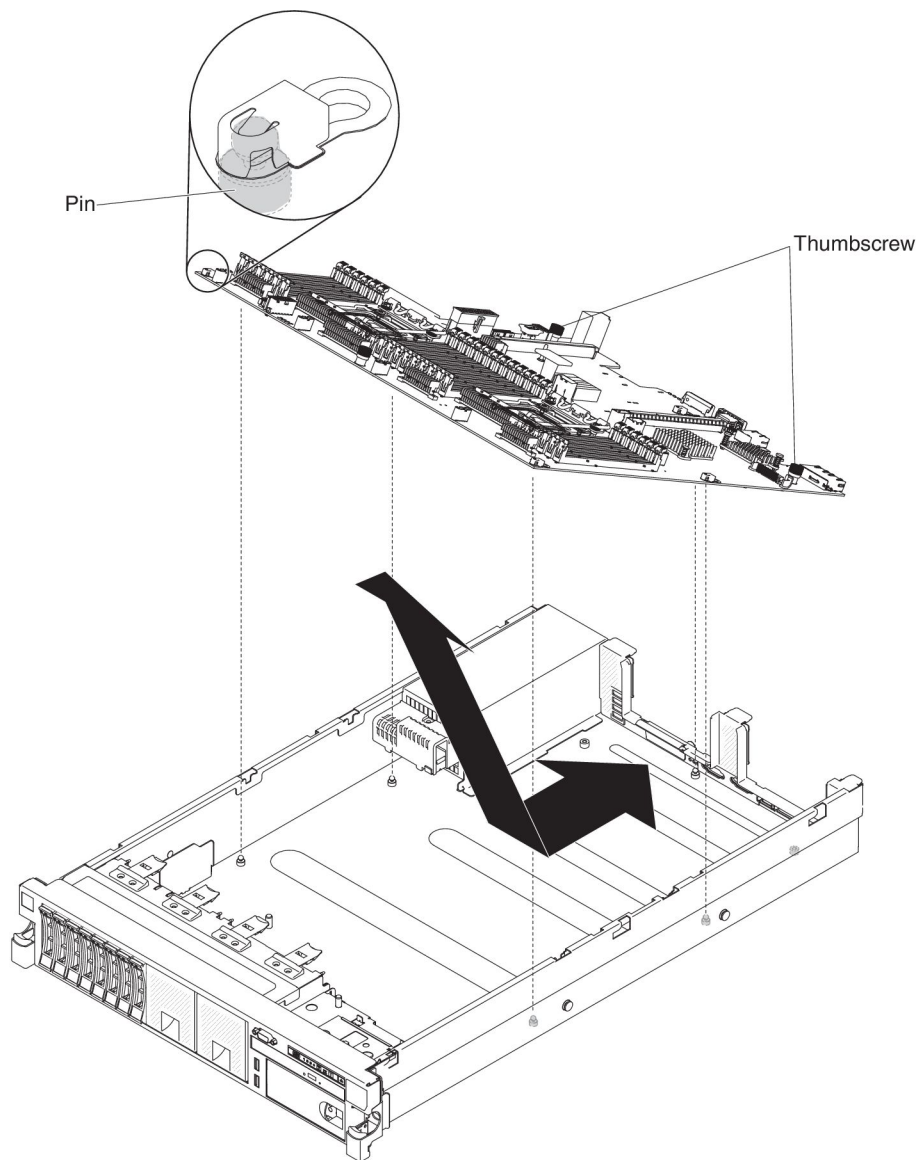
Figure 239. System board installation

3. Reconnect to the system board the cables that you disconnected in step 13 of "Removing the system board" on page 346 (see "Internal cable routing and connectors" on page 233).

4. Rotate the system-board thumbscrews toward the rear of the server until the latch clicks into place.

5. Install the hot-swap fans (see "Replacing a hot-swap fan" on page 319).

6. (Trained technician only) Install the microprocessor and heat sink (see "Replacing a microprocessor and heat sink" on page 336).

7. Install the memory modules (see "Installing a memory module" on page 53).

8. If necessary, install the virtual media key.

9. Install the system battery (see "Replacing the system battery" on page 329).

10. Install the air baffle (see "Replacing the air baffle" on page 246).

11. Install the PCI riser-card assemblies and adapters, if any were installed (see "Replacing an adapter" on page 287 and "Replacing a PCI riser-card assembly" on page 284).

12. Install the cover (see "Replacing the cover" on page 244).
13. Push the power supplies back into the server.
14. Slide the server into the rack.
15. Reconnect the power cords and any cables that you removed.
16. Turn on the peripheral devices and the server.
17. 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 138 for more details.
18. Either update the server with the latest RAID firmware or restore the pre-existing firmware from a diskette or CD image.
19. Update the UUID (see "Updating the Universal Unique Identifier (UUID)" on page 154).
20. Update the DMI/SMBIOS (see "Updating the DMI/SMBIOS data" on page 156).
21. Reactivate any Features on Demand features.

Appendix A. Diagnostic messages

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

Table 26. DSA Preboot 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
089-802-xxx	CPU	CPU Stress Test	Aborted	System resource availability error.	1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 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. For more information, see *Updating the firmware*. 9. Run the test again. 10. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
089-901-xxx	CPU	CPU Stress Test	Failed	Test failure.	1. Turn off and restart the system if necessary to recover from a hung state. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-801-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-802-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-803-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-804-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-805-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-806-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-807-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-808-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware.* 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-809-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware.* 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-810-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware.* 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-811-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware.* 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-812-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-813-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-814-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-815-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-816-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-817-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-818-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-819-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-820-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-821-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-822-xxx	IMM	IMM I2C Test	Aborted	IMM I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
166-823-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
166-824-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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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 I2C Test	Failed	The IMM indicates a failure in the HBS 2117 bus (Bus 0)	1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. Disconnect the system from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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 I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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 I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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 I2C Test	Failed	The IMM indicates a failure in the PCA bus (Bus 6).	1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. 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 at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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 I2C 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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 6. Run the test again. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. 8. (Trained technician only) Reseat the system board. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-801-xxx	Memory	Memory Test	Aborted	Test 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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-803-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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-804-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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-806-xxx	Memory	Memory Test	Aborted	Test 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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-807-xxx	Memory	Memory Test	Aborted	Test 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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*. 4. Run the test again. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
201-809-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. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Message number	Component	Test	State	Description	Action
201-810-xxx	Memory	Memory Test	Aborted	Test stopped: unknown error code xxx received in COMMON_EXIT procedure.	1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 5. Run the test again. 6. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
201-901-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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
202-801-xxx	Memory	Memory Stress Test	Aborted	Internal program error.	1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 4. Run the test again. 5. Turn off and restart the system if necessary to recover from a hung state. 6. Run the memory diagnostics to identify the specific failing DIMM. 7. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
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. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Run the test again. 4. Run the standard memory test to validate all memory. 5. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
202-901-xxx	Memory	Memory Stress Test	Failed	Test failure.	1. Run the standard memory test to validate all memory. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Turn off the system and disconnect it from power. 4. Reseat the DIMMs. 5. Reconnect the system to power and turn on the system. 6. Run the test again. 7. Run the standard memory test to validate all memory. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
215-801-xxx	Optical Drive	• Verify Media Installed • Read/Write Test • Self-Test Messages and actions apply to all three tests.	Aborted	Unable to communicate with the device driver.	1. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 8. Run the test again. 9. Replace the DVD drive. 10. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
215-802-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • Self-Test Messages and actions apply to all three tests.	Aborted	The media tray is open.	1. Close the media tray and wait 15 seconds. 2. Run the test again. 3. Insert a new CD/DVD into the drive and wait for 15 seconds for the media to be recognized. 4. Run the test again. 5. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 6. Run the test again. 7. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 8. Run the test again. 9. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 10. Run the test again. 11. Replace the CD/DVD drive. 12. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
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 at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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
215-901-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. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.
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. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For the latest level of DSA code, go to http://www.ibm.com/support/ docview.wss?uid=psg1SERV-DSA. 6. Run the test again. 7. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 8. Run the test again. 9. Replace the DVD drive. 10. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
215-904-xxx	Optical Drive	• Verify Media Installed • Read/ Write Test • 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. For additional troubleshooting information, go to http://www.ibm.com/support/ docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the DVD drive. 8. If the failure remains, go to the IBM website for more troubleshooting information at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*.
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 at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
405-901-xxx	Ethernet Device	Test MII Registers	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*.
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 at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
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. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
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. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

Table 26. DSA Preboot 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. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.
405-907-xxx	Ethernet Device	Test LEDs	Failed		1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see *Updating the firmware*. 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 at http://www.ibm.com/systems/support/ supportsite.wss/docdisplay?brandind=5000008 &lndocid=SERV-CALL.

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-947.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=MIGR-5086346.

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

Table 27. IMM2 error messages

Event ID	Message	Severity	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.				
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.
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.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80010701-1401ffff 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	Numeric 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.
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.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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.
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)
Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
800b010a-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)
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 SysBrd 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 SysBrd 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 SysBrd 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 SysBrd 5V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained technician only) Replace the system board.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80010902-0701ffff	Numeric sensor SysBrd 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)
80010202-0701ffff	Numeric sensor SysBrd 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 OVER SPEC LED in *Light path diagnostics LEDs*. 4. (Trained technician only) Replace the system board. (*n* = power supply number)
80010002-0701ffff	Numeric sensor SysBrd VBAT going low (lower non-critical) has asserted.	Warning	A lower critical sensor going low has asserted.	Replace the system battery.
80010202-0701ffff	Numeric sensor SysBrd VBAT 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 higher rated power. 2. Reduce the total power consumption by removing newly added or unused option like drives or adapters.
800b0309-1301ffff	Non-redundant: Sufficient Resources from Redundancy Degraded or Fully Redundant for Power Resource has asserted.	Warning	A change to the sufficiency status of the power supply has happened.	1. 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 higher rated power.

Table 27. IMM2 error messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.				
• If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.				
800b0509-1301ffff	Non-redundant: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 to 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 newly added or unused options like drives or adaptors. 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 higher rated power.
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	The Power Supply *n* has failed. (*n* = power supply number)	Error	Power supply *n* has failed. (*n* = power supply number)	1. Reseat power supply *n*. 2. If the power-on LED is not lit and the power-supply error LED is lit, replace power supply *n*. 3. If both the power-on LED and the power-supply error LED are not lit, see *Power problems* for more information (*n* = power supply number)
806f0109-1301ffff	The 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.
806f011b-0701ffff	The connector PwrPaddle Cable has encountered a configuration error.	Error	The connector PwrPaddle Cable has encountered a configuration error.	1. Reseat the power paddle cable on the system board. 2. Replace the power paddle cable. 3. (Trained technician only) Replace the system board.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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* 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 in *Light path diagnostics LEDs* and Pwr Rail (A, B, C, D, E, F, G, and H) error has been recorded in the IMM2 event log (see *Power problems* on page 125 for more information).
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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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 in *Light path diagnostics LEDs*. 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*.
806f0608-1301xx03	Power supply PS Configuration error with rating mismatch.	Error	A power supply configuration error (rating mismatch) has occurred.	1. Make sure that the power supplies installed are with the same rating or wattage. 2. Reinstall the power supplies with the same rating or wattage.
80070603-0701ffff	Sensor Pwr Rail A Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* 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.
80070603-0701ffff	Sensor Pwr Rail B Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* for more information. 2. Turn off the server and disconnect it from power. 3. (Trained technician only) Remove the microprocessor from socket 2. 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.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80070603-0701ffff	Sensor Pwr Rail C Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* 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, fan 1, 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.
80070603-0701ffff	Sensor Pwr Rail D Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* for more information. 2. Turn off the server and disconnect it from power. 3. Remove the dual-port network adaptor, fan 2, 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 E Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* for more information. 2. Turn off the server and disconnect it from power. 3. Remove optional DVD drive, 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
80070603-0701ffff	Sensor Pwr Rail F Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* for more information. 2. Turn off the server and disconnect it from power. 3. Remove the adapter from the PCI riser-card assembly 1, PCI riser-card assembly 1, fan 4, 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.
80070603-0701ffff	Sensor Pwr Rail G Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* for more information. 2. Turn off the server and disconnect it from power. 3. Remove the optional PCI adaptor power cable, fan 3, the hard disk drives, and the hard disk drive backplane. 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 H Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. See *Power problems* for more information. 2. Turn off the server and disconnect it from power. 3. Remove the optional PCI adaptor power cable, the adaptor from the PCI riser-card assembly 2, and the PCI riser-card assembly 2. 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				

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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. Remove microprocessor. 2. Check microprocessor socket pins, any damage or contained or bending, replace the system board. 3. Check microprocessor damage, replace microprocessor.
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 (*Updating the firmware*). 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	Microprocessor temperature has reached thermal trip point.	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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0207-0301ffff 806f0207-0302ffff	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 (*Updating the firmware*). 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)
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 CPU LED. See more information about the CPU LED in *Light path diagnostics*. 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0607-0301ffff 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 (see *Installing a microprocessor and heat sink* for information about microprocessor requirements). 2. Update the server firmware to the latest level (see *Updating the firmware*). 3. (Trained technician only) Replace the incompatible microprocessor.
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 One of the CPUs has been disabled.	Info	A processor has been disabled.	No action; information only.
806f0807-2584ffff	The Processor for All CPUs has been disabled.	Info	A processor has been disabled.	No action; information only.
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)

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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 (see *Features and specifications* for more information). 3. Make sure that the heat sink for microprocessor *n*is installed correctly. 4. (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 (see *Features and specifications* for more information). 3. Make sure that the heat sink for microprocessor *n*. 4. (Trained technician only) Replace microprocessor *n*. (*n* = microprocessor number)

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0813-2584ffff	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 (see *Removing a microprocessor and heat sink*). 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.
Memory errors				
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.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f010c-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.
806f010c-2581ffff	Memory uncorrectable error detected for One of the 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f010c-2581ffff	Memory uncorrectable error detected for 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f030c-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. (continued on the next page)
	Memory DIMM *n* Status Scrub failure detected. (*n* = DIMM number)	Error	A memory scrub failure has been detected.	1. (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. 2. (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. 3. (Trained technician only) Replace the system board.

Table 27. IMM2 error messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.				
806f040c-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.	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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f040c-2581ffff	Memory DIMM disabled for 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).
806f050c-2001ffff 806f050c-2002ffff 806f050c-2003ffff 806f050c-2004ffff 806f050c-2005ffff 806f050c-2006ffff 806f050c-2007ffff 806f050c-2008ffff 806f050c-2009ffff 806f050c-200affff 806f050c-200bffff 806f050c-200cffff 806f050c-200dffff 806f050c-200effff 806f050c-200fffff 806f050c-2010ffff 806f050c-2011ffff 806f050c-2012ffff 806f050c-2013ffff 806f050c-2014ffff 806f050c-2015ffff 806f050c-2016ffff 806f050c-2017ffff 806f050c-2018ffff	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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f050c-2581ffff	Memory Logging Limit Reached for One of the 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.
806f050c-2581ffff	Memory Logging Limit Reached for 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f070c-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.	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 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.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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 mirroring 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 mirroring in the Setup utility.
Storage messages				
806f000d-0400ffff 806f000d-0401ffff 806f000d-0402ffff 806f000d-0403ffff 806f000d-0404ffff 806f000d-0405ffff 806f000d-0406ffff 806f000d-0407ffff 806f000d-0408ffff 806f000d-0409ffff 806f000d-040affff 806f000d-040bffff 806f000d-040cffff 806f000d-040dffff 806f000d-040fffff 806f000d-040fffff	Drive *n* has been added. (*n* = Drive number)	Info	A drive has been added.	No action; information only.
816f000d-0400ffff 816f000d-0401ffff 816f000d-0402ffff 816f000d-0403ffff 816f000d-0404ffff 816f000d-0405ffff 816f000d-0406ffff 816f000d-0407ffff 816f000d-0408ffff 816f000d-0409ffff 816f000d-040affff 816f000d-040bffff 816f000d-040cffff 816f000d-040dffff 816f000d-040effff 816f000d-040fffff	The Drive *n* Status has been removed from unit. (*n* = hard disk drive number)	Error	A drive has been removed.	1. Reseat hard disk drive *n*.(*n* = hard disk drive number). Wait 1 minute or more before reinstalling the drive. 2. Replace the hard disk drive. 3. Make sure that the disk firmware and RAID controller firmware is at the latest level. 4. Check the SAS cable.

Table 27. IMM2 error messages (continued)

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

806f010d-0400ffff
806f010d-0401ffff
806f010d-0402ffff
806f010d-0403ffff
806f010d-0404ffff
806f010d-0405ffff
806f010d-0406ffff
806f010d-0407ffff
806f010d-0408ffff
806f010d-0409ffff
806f010d-040affff
806f010d-040bffff
806f010d-040cffff
806f010d-040dffff
806f010d-040effff
806f010d-040fffff
	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 806f020d-0408ffff 806f020d-0409ffff 806f020d-040affff 806f020d-040bffff 806f020d-040cffff 806f020d-040dffff 806f020d-040effff 806f020d-040fffff	The Drive *n* Status has a predictive failure. (*n* = hard disk drive number)	Warning	A predictive failure has been detected for drive *n*. (*n* = hard disk drive number)	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 806f050d-0408ffff 806f050d-0409ffff 806f050d-040affff 806f050d-040bffff 806f050d-040cffff 806f050d-040dffff 806f050d-040effff 806f050d-040fffff	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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f060d-0400ffff 806f060d-0401ffff 806f060d-0402ffff 806f060d-0403ffff 806f060d-0404ffff 806f060d-0405ffff 806f060d-0406ffff 806f060d-0407ffff 806f060d-0408ffff 806f060d-0409ffff 806f060d-040affff 806f060d-040bffff 806f060d-040cffff 806f060d-040dffff 806f060d-040effff 806f060d-040fffff	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 806f070d-0408ffff 806f070d-0409ffff 806f070d-040affff 806f070d-040bffff 806f070d-040cffff 806f070d-040dffff 806f070d-040effff 806f070d-040fffff	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.
8007020d-d001ffff	Sensor HDD configuration has transitioned to critical from a less severe state.		A sensor has changed to critical state from a less severe state.	130W or 135W microprocessors system configuration only.
PCI messages				

Table 27. IMM2 error messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.				
806f0021-3001ffff	PCI fault has been detected for PCI *n*. (*n* = PCI slot number)	Error	A PCI fault has been detected.	1. Check the PCI LED. 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 service 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. 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 service technicians only) Replace the system board.
806f0021-2582ffff	PCI fault has been detected for All PCI Error.	Error	A PCI fault has been detected.	1. Check the PCI LED. 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 service technicians only) Replace the system board.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0023-2101ffff	Watchdog Timer expired for IPMI Watchdog.	Info	A watchdog timer expired has been detected.	No action; information only.
806f0113-0301ffff 806f0113-0302ffff	A bus timeout has occurred on system CPU *n* PECI.	Error	A bus timeout has been detected.	1. Reseat the microprocessor *n*, and then restart the server. 2. Replace microprocessor *n*. (*n* = microprocessor number)
806f0123-2101ffff	Reboot of system initiated by IPMI Watchdog.	Info	A reboot by a watchdog occurred has been detected.	No action; information only.
806f0223-2101ffff	Powering off system initiated by IPMI Watchdog.	Info	A poweroff by watchdog has been detected.	No action; information only.
806f0323-2101ffff	Power cycle of system initiated by IPMI Watchdog.	Info	A power cycle by watchdog has been detected.	No action; information only.
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. 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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. 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. 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.
806f0823-2101ffff	Watchdog Timer interrupt occurred for IPMI Watchdog.	Info	A watchdog timer interrupt has been detected.	No action; information only.
806f0a13-0301ffff 806f0a13-0302ffff	A Fatal Bus Error has occurred on system CPU *n* PECI.	Error	A bus fatal error has been detected.	1. Reseat the microprocessor *n*, and then restart the server. 2. Replace microprocessor *n*. (*n* = microprocessor number)
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 27. IMM2 error messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.				
80010701-1001ffff 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 optional network adapter error LED. 2. Reseat the dual-port network adapter. 3. Update the firmware (UEFI and IMM) and dual-port network adapter driver to the latest level. 4. Replace the dual-port network adapter. 5. (Trained technicians only) Replace the system board.
80070221-d001ffff	Sensor PCIe configuration has transitioned to critical from a less severe state.		A sensor has changed to critical state from a less severe state.	130W or 135W microprocessors system configuration only.
General messages				
80030012-2301ffff	Sensor OS RealTime Mod has deasserted.	Info	Indicate whether the system management firmware is working in the state to support the realtime OS.	No action; information only.

Table 27. IMM2 error messages (continued)

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

8007010f-2582ffff	Sensor I/O Resources has transitioned from normal to non-critical state.	Warning	A sensor has transitioned to non-critical from normal.	To allow more PCIe space, choose one of the following steps:
				• Change MM configuration setting to 1GB.
				  1. In the Setup utility, click **System Settings > Devices and I/O Ports > MM Config Base.**
				  2. Set **MM Config Base** to 1 GB.
				• Enable PCI 64-bit resource.
				  1. In the Setup utility, click **System Settings > Devices and I/O Ports > PCI 64-Bit Resource Allocation.**
				  2. Enable **PCI 64-Bit Resource Allocation.**

80070202-0701ffff	Sensor SysBrd Vol 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.
8007020f-2582ffff	Sensor I/O resources has transitioned to critical from a less severe state.	Error	A sensor has transitioned to critical from less severe.	Complete the following steps for PCI I/O resource error issue resolution: 1. Understand the I/O resource requirements in a basic system. 2. Identify the I/O resource requirements for desired add-in adapters. For examples, PCI-X or PCIe adapters. 3. Disable on-board devices that you can do without and that request I/O. 4. In F1 setup, select the **System Settings ⇒ Device and I/O Ports** menu 5. Remove adapters or disable slots until the I/O resource is less than 64 KB.

Table 27. IMM2 error messages (continued)

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.				
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.	No action; information only.
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 asserted.	Info	Indicate whether the system management firmware is working in the state to support the realtime OS.	No action; information only.
80070219-0701ffff	Sensor SysBrd 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.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f0608-1301xx03	Power supply PS Configuration error with rating mismatch.	Error	A power supply configuration error (rating mismatch) has occurred.	1. Make sure that the power supplies installed are with the same rating or wattage. 2. Reinstall the power supplies with the same rating or wattage.
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 occurrence is caused by the System TPM physical presence jumper (JP20) is set in pins 2 and 3 (ON position). 2. Set the System TPM physical presence jumper (JP20) back to the default position (pins 1 and 2, OFF position).
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.
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.
Firmware and software messages				
806f000f-220103xx	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 Info Center for the appropriate user response.

Table 27. IMM2 error messages (continued)

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

806f000f-220104xx	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 Info Center for the appropriate user response.
806f000f-220107xx	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 Info Center for the appropriate user response.
806f000f-22010axx	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 Info Center for the appropriate user response.
806f000f-22010cxx	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 Info 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.

Table 27. IMM2 error messages (continued)

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

806f000f-22010bxx	The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem. ElementName)	Error	Firmware BIOS (ROM) corruption was detected during POST. (Sensor = ABR Status)	1. Make sure the server meets the minimum configuration to start (see *Power-supply LEDs*).
				 2. Recover the server firmware from the backup page:
				   a. Restart the server.
				   b. At the prompt, press F3 to recover the firmware.
				 3. Update the server firmware to the latest level (see *Updating the firmware*).
				 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 service technician) replace the system board.

806f000f-220101xx	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 (see *Power-supply LEDs*). 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f000f-220102xx	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 (see *Power-supply LEDs*). 2. Update the server firmware on the primary page. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 3. (Trained technician only) Replace the system board.
806f010f-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 (see *Power-supply LEDs*). 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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
806f052b-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 (see *Power-supply LEDs*). 2. Recover the server firmware from the backup page by restarting the server. 3. Update the server firmware to the latest level (see *Updating the 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 components one at a time, restarting the server each time, to see if the problem goes away. 5. If the problem remains, (trained service technician) replace the system board.
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_Certificate Authority. CADistinguished Name; %2 = CIM_PublicKey Certificate.Element Name)	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.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000009-00000000	IP address of network interface modified from %1 to %2 by user %3.(%1 = CIM_IPProtocol Endpoint.IPv4 Address; %2 = CIM_StaticIP AssignmentSetting Data.IPAddress; %3 = user ID)	Info	A user has modified the IP address of the IMM.	No action; information only.
4000000a-00000000	IP subnet mask of network interface modified from %1 to %2 by user %3s.(%1 = CIM_IPProtocol Endpoint.SubnetMask; %2 = CIM_StaticIP Assignment SettingData.Subnet Mask; %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_IPProtocol Endpoint.Gateway IPv4Address; %2 = CIM_StaticIP Assignment SettingData. DefaultGateway Address; %3 = user ID)	Info	A user has modified the default gateway IP address of the IMM.	No action; information only.
4000000c-00000000	OS Watchdog response %1 by %2.(%1 = Enabled or Disabled; %2 = user ID)	Info	A user has enabled or disabled an OS Watchdog.	No action; information only.
4000000d-00000000	DHCP[%1] failure, no IP address assigned.(%1 = IP address, *xxx.xxx.xxx.xxx*)	Info	A DHCP server has failed to assign an IP address to the IMM.	1. Make sure that the network cable is connected. 2. Make sure that there is a DHCP server on the network that can assign an IP address to the IMM.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000017-00000000	ENET[0] IP-Cfg:HstName=%1, IP@%2, NetMsk=%3, GW@=%4.(%1 = CIM_DNSProtocol Endpoint.Hostname; %2 = CIM_StaticIPSetting Data.IPv4Address; %3 = CIM_StaticIPSetting Data.SubnetMask; %4 = CIM_StaticIPSetting Data.DefaultGateway Address)	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.Configuration Name; %2 = user ID)	Info	A user has restored the IMM configuration by importing a configuration file.	No action; information only.
4000001c-00000000	Watchdog %1 Screen Capture Occurred.(%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture was successful.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000022-00000000	SSL data in the IMM configuration data is invalid. Clearing configuration data region and disabling SSL+H25.	Error	There is a problem with the certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated through the **Generate a New Key and Certificate Signing Request** link.	1. Make sure that the certificate that you are importing is correct. 2. Try to import the certificate again.
40000023-00000000	Flash of %1 from %2 succeeded for user %3.(%1 = CIM_Managed Element.Element Name; %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_Managed Element.Element Name; %2 = Web or LegacyCLI; %3 = user ID)	Info	An attempt to update a firmware component from the interface and IP address has failed.	Try to update the firmware again.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
40000025-00000000	The Chassis Event Log (CEL) on system %1 is 75% full.(%1 = CIM_ComputerSystem .ElementName)	Info	The IMM event log is 75% full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
40000026-00000000	The Chassis Event Log (CEL) on system %1 is 100% full.(%1 = CIM_ComputerSystem .ElementName)	Info	The IMM event log is full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
40000027-00000000	%1 Platform Watchdog Timer expired for %2.(%1 = OS Watchdog or Loader Watchdog; %2 = OS Watchdog or Loader Watchdog)	Error	A Platform Watchdog Timer Expired event has occurred.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.
40000028-00000000	IMM Test Alert Generated by %1.(%1 = user ID)	Info	A user has generated a test alert from the IMM.	No action; information only.
40000029-00000000	Security: Userid: '%1' had %2 login failures from an SSH client at IP address %3.(%1 = user ID; %2 = MaximumSuccessive LoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from SSH and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
4000002a-00000000	[arg1] Firmware mismatch internal to system [arg2]. Please attempt to flash the [arg3] firmware.	Error	This message is for the use case where a specific type of firmware mismatch has been detected.	No action; information only.
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.

Table 27. IMM2 error messages (continued)

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

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	DDNS registration and values.	No action; information only.
4000002f-00000000	IPv6 enabled by user [arg1].	Info	IPv6 protocol is enabled by user.	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.2k7
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.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**				
• **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
4000005f-00000000	Server timeouts set by user [arg1]: EnableOSWatchdog =[arg2], OSWatchdogTimout =[arg3], EnableLoader Watchdog=[arg4], LoaderTimeou t=[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]: Authentication Method=[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], PasswordExpiration Period=[arg3], MinimumPassword ReuseCycle=[arg4], MinimumPassword Length=[arg5], MinimumPassword ChangeInterval =[arg6], MaxmumLogin Failures=[arg7], LockoutAfterMax Failures=[arg8], MinimumDifferent Characters=[arg9], DefaultIDExpired =[arg10], ChangePassword FirstAccess=[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.

Table 27. IMM2 error messages (continued)

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

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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.
40000075-00000000	The measured power value exceeded the power cap value.	Info	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.

Table 27. IMM2 error messages (continued)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **If an action step is preceded by "(Trained technician only)," that step must be performed only by a trained technician.**				
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.
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.	No action; information only.
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.

Table 27. IMM2 error messages (continued)

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

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.

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

Diagnostic code	Message	Description	Action
S.51006	[S.51006] A memory mismatch has been detected. Please verify that the memory configuration is valid.	One or More Mismatched DIMMs Detected.	**Note:** Each time you install or remove a DIMM, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.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.

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

Diagnostic code	Message	Description	Action
W.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.

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

Diagnostic code	Message	Description	Action
W.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.

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

Diagnostic code	Message	Description	Action
S.680B8	[S.680B8] Internal QPI Link Failure Detected.	Internal QPI Link Failure Detected.	1. Check the IBM support website for an applicable retain tip or firmware update that applies to this error. 2. Inspect the microprocessor socket for foreign material, if the microprocessor socket contains any foreign material, remove the foreign material. If it is found damaged, (trained technician only) replace the system board.
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.

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

Diagnostic code	Message	Description	Action
W.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.

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

Diagnostic code	Message	Description	Action
W.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.

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

Diagnostic code	Message	Description	Action
W.3808003	[W.3808003] Unable to retrieve the system configuration from the IMM.	Error Retrieving System Configuration from IMM.	1. Run the Setup utility, select **Save Settings**, and restart the server. 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.

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

Diagnostic code	Message	Description	Action
W.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 software, 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/app/upload_hw
* **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
* **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

Creating a personalized support web page

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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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes, and GB stands for 1,000,000,000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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

device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. IBM is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the 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 28. 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 28. 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.	

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

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Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that 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

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:

IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

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Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
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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

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines with Modifications (products greater than 20 A per phase)

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This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

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В жилых помещениях оно может создавать радиопомехи, для
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求採取某些適當的對策。

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