IBM System x3100 M4 Type 2582

Installation and User's Guide

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Note:

Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 101 and the *IBM Safety Information*, and *IBM Environmental Notices and User's Guide* on the IBM *System x Documentation* CD, and the *Warranty Information* document that comes with the server.

Seventh Edition (August 2012)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

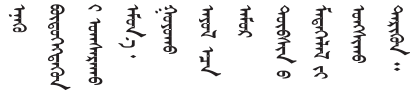
Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.



ཐོན་རྫས་འདི་བདེ་སྒྱོད་མ་བྱས་གོང་། ་སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འདོད་སྐེར་བཞུ་དགོས།

ھەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Important:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* book under statement 1.

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

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

Statement 1:

DANGER

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

To avoid a shock hazard:

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

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

Statement 2:

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

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

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

Statement 3:

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

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

DANGER

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

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

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

Statement 4:

≥ 18 kg (39.7 lb)

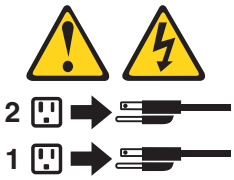
≥ 32 kg (70.5 lb)

≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:

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



Statement 8:

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

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

Statement 11:

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

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

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

Statement 15:

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

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

Statement 26:

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

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

Statement 35:

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

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

United Kingdom - Notice to Customers:

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

Chapter 1. The System x3100 M4 server

This *Installation and User's Guide* contains information and instructions for setting up your IBM System x3100 M4 Type 2582 server, instructions for installing optional devices, and instructions for cabling, and configuring the server. For removing and installing optional devices, diagnostics and troubleshooting information, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD, which comes with the server.

The IBM® System x3100 M4 Type 2582 server is a 4U-high-high, high-performance, self-contained server. It is ideally suited for networking environments that require superior microprocessor performance, improved systems management, and flexible memory and data management.

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 and getting service and assistance, see the *Warranty Information* document that comes with the server.

The server contains IBM Enterprise X-Architecture® technologies, which help increase performance, reliability, and availability. For more information, see “What your server offers” on page 10 and “Reliability, availability, and serviceability” on page 12.

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/.

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, complete the following steps.

Note: Changes are made periodically to the IBM website. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

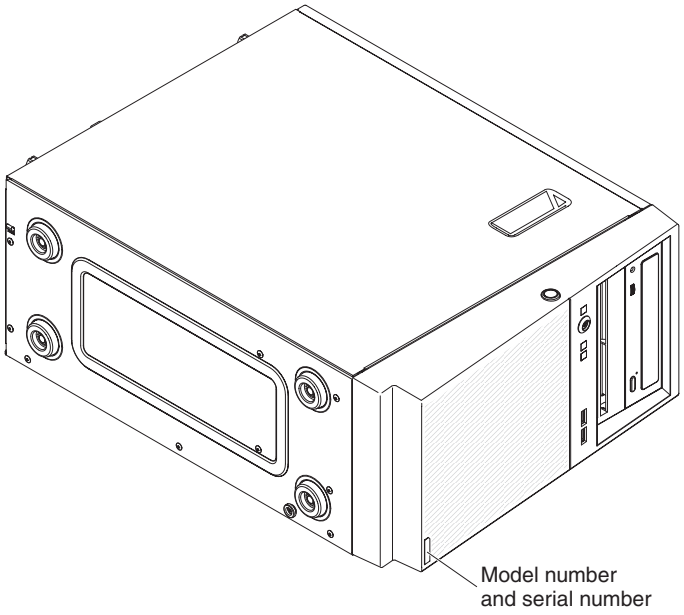
1. Racks are measured in vertical increments of 4.45 cm (1.75 inches) each. Each increment is called a "U." A 1u-high device is 1.75 inches tall.

1. Go to http://www.ibm.com/supportportal/ or http://www.ibm.com/support/fixcentral/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.

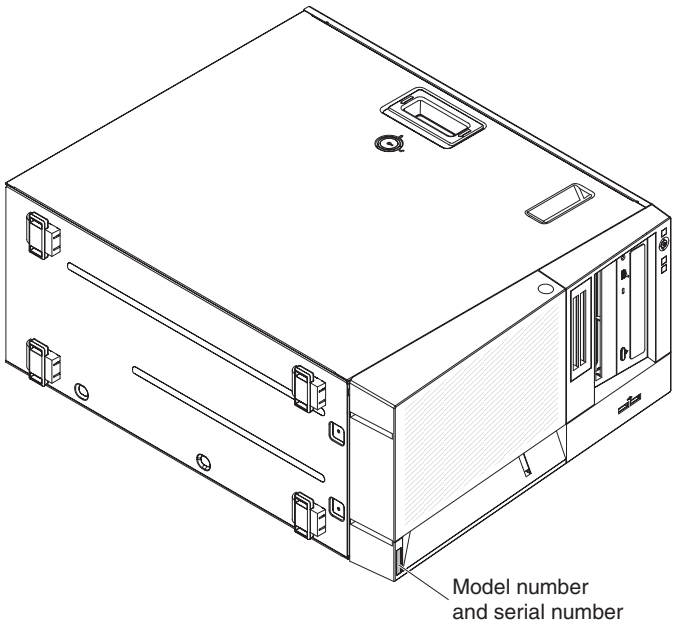
Record information about the server in the following table.

Product name	IBM System x3100 M4 server
Machine type	2582
Model number	_____
Serial number	_____

For the 4U chassis, the model number and serial number are on the lower-right side of the bezel.



For the 5U chassis, the model number and serial number are on the lower-right side of the lower bezel.



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

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/.

Important: The server keys cannot be duplicated by a locksmith. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag that is attached to the keys.

If you plan to install the server in a rack, you must purchase a Tower-to-Rack Kit. For a list of supported optional devices for the server, see http://www-03.ibm.com/servers/eserver/serverproven/compat/us/.

The IBM System x Documentation CD

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

Hardware and software requirements

The IBM *System x 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

Using the Documentation Browser

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 Book** 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 User's Guide* contains general information about the server including how to set up and cabling the server, how to install supported optional devices, and how to configure the server. The following documentation also comes with the server:

- *Environmental Notices and User Guide*

  This document is in PDF on the IBM *System x Documentation* CD. It contains translated environmental notices.
- *IBM License Agreement for Machine Code*

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

- *IBM Warranty Information*

  This printed document contains the warranty terms and a pointer to the IBM Statement of Limited Warranty on the IBM website.
- *Licenses and Attributions Documents*

  This document is in PDF. It provides the open-source notices.
- *Problem Determination and Service Guide*

  This document is in PDF on the IBM *System x Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.
- *Safety Information*

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

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

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

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 updated documentation and technical updates, complete the following steps.

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

1. Go to http://www.ibm.com/supportportal/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **System x3100 M4** and click **Continue**.

Notices and statements in this document

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

Features and specifications

The following information is a summary of the features and specifications for Machine Type 2582. Depending on the server model, some features might not be available, or some specifications might not apply. See the *PDSG* on the *System x Documentation* CD for additional information about the server.

Table 1. Features and specifications for 4U server models with non-hot-swap power supplies. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see Table 2.

Microprocessor: • Supports one Intel quad-core (Xeon E3-1200 series) or dual-core (Pentium G850, or Core i3 series) processor • Multi-chip Package processor architecture • Designed for LGA 1155 socket • Scalable up to four cores • 32 KB instruction L1 cache, 32 KB data L1 cache, 256 KB instruction/data L2 cache, and up to 8 MB L3 cache that is shared among the cores • Support for Intel Extended Memory 64 Technology (EM64T) **Note:** • Use the Setup utility to determine the type and speed of the microprocessor. • For a list of supported microprocessors, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/. **Memory:** • Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved • Minimum: 1 GB • Maximum: 32 GB • Types: PC3-12800 (single-rank or dual-rank), 1066, 1333 and 1600 MHz, ECC, DDR3 unbuffered SDRAM DIMMs only • Sizes: 1GB (single-rank) 2GB (single-rank) 4GB (dual-rank) 8GB (dual-rank)	**Fan:** • One system fan **Power supply**: One fixed 350-watt or 300-watt power supply **Size:** • Height: 360 mm (14.17 in.) • Depth: 480 mm (18.89 in.) • Width: 180 mm (7.08 in.) • Weight: 10 kg (22 lb) to 13 kg (28.66 lb) depending upon configuration	**RAID (depending on model):** • ServeRAID-BR10il v2 SAS/SATA adapter that provides RAID levels 0, 1, and 10. • ServeRAID-C100 (software RAID) that provides RAID levels 0, 1, and 10. **Environment:** • Air temperature: – Server on: 10°C to 35°C (50°F to 95°F) Altitude: 0 to 914.4 m (3000 ft) – Server on: 10°C to 32°C (50°F to 89.6°F) Altitude: 914.4 m (3000 ft) to 2133.6 m (7000 ft) – Server on: 10°C to 28°C (50.0°F to 83°F); altitude: 2133.6 m (7000 ft) to 3050 m (10000 ft) – Server off: 10°C to 43°C (50°F to 109.4°F) – Shipping: -40°C to 60°C (-40°F to 140°F) • Humidity (operating and storage): 8% to 80% • Particulate contamination: **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 103.

Table 1. Features and specifications for 4U server models with non-hot-swap power supplies. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see Table 2. (continued)

Drives (depending on the model): • Hard disk drives: up to four 3.5-inch simple-swap SATA **Note:** 3TB hard disk drives are not supported in OS 4690. • One of the following SATA attached optical drives: – DVD-ROM **Drive bays:** • Two 5.25-inch half-high bays (one optical drive installed). • Four 3.5-inch hard disk drive bays	**Integrated functions:** • integrated management module II (IMM2), which consolidates multiple management functions in a single chip • Intel 82574L Gb Ethernet controller with TCP/IP Offload Engine (TOE) and Wake on LAN support • Integrated SATA controller • Seven Universal Serial Bus (USB) 2.0 ports (two front, four rear of the chassis, and one internal for an optional tape drive) • Six SATA ports (four for simple-swap hard disk drives and two for the DVD drive and the optional tape drive) • One serial port • Two Ethernet port • One VGA port	**Heat output:** Approximate heat output: • Minimum configuration: 119 Btu per hour (35 watts) • Maximum configuration: 1194 Btu per hour (350 watts) **Electrical input:** • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • 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: 0.035 kVA (all models) – Maximum: 0.350 kVA
Expansion slots: • One PCI Express x16 slot • One PCI Express x8 slot • One PCI Express x4 slot • One PCI Express x1 slot	**Acoustical noise emissions:** • Sound power, idling: 4.5 bels • Sound power, operating: 4.8 bels	**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.

Table 2. Features and specifications for the 5U server model with hot-swap power supplies (Model name: 2582-F4x). For 4U server models with non-hot-swap power supplies, please see Table 1.

Microprocessor: • Supports one Intel quad-core (Xeon E3-1200 series) or dual-core (Pentium G850, or Core i3 series) processor • Multi-chip Package processor architecture • Designed for LGA 1155 socket • Scalable up to four cores • 32 KB instruction L1 cache, 32 KB data L1 cache, 256 KB instruction/data L2 cache, and up to 8 MB L3 cache that is shared among the cores • Support for Intel Extended Memory 64 Technology (EM64T) **Note:** • Use the Setup utility to determine the type and speed of the microprocessor. • For a list of supported microprocessors, see http://www.ibm.com/servers/eserver/serverproven/compat/us/. **Memory:** • Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved • Minimum: 1 GB • Maximum: 32 GB • Types: PC3-12800 (single-rank or dual-rank), 1066, 1333 and 1600 MHz, ECC, DDR3 unbuffered SDRAM DIMMs only • Sizes: 1GB (single-rank) 2GB (single-rank) 4GB (dual-rank) 8GB (dual-rank)	**Fan:** • One system fan **Power supply**: One or two redundant 430-watt power supply **Size:** • Height: 438.60 mm (17.27 in.) • Depth: 569.11 mm (22.41 in.) • Width: 217.25 mm (8.56 in.) • Weight: 19.6 kg (43 lb) to 21.4 kg (47 lb) depending upon configuration	**RAID (depending on model):** • ServeRAID-BR10il v2 SAS/SATA adapter that provides RAID levels 0, 1, and 10. **Environment:** • Air temperature: – Server on: 10°C to 35°C (50°F to 95°F) Altitude: 0 to 914.4 m (3000 ft) – Server on: 10°C to 32°C (50°F to 89.6°F) Altitude: 914.4 m (3000 ft) to 2133.6 m (7000 ft) – Server on: 10°C to 28°C (50.0°F to 83°F); altitude: 2133.6 m (7000 ft) to 3050 m (10000 ft) – Server off: 10°C to 43°C (50°F to 109.4°F) – Shipping: -40°C to 60°C (-40°F to 140°F) • Humidity (operating and storage): 8% to 80% • Particulate contamination: **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 103.
Drives (depending on the model): • Hard disk drives: up to eight 2.5-inch hot-swap SATA • One of the following SATA attached optical drives: – DVD-ROM **Drive bays:** • Two 5.25-inch half-high bays (one optical drive installed). • Eight 2.5-inch hard disk drive bays	**Integrated functions:** • Integrated management module II (IMM2), which consolidates multiple management functions in a single chip • Intel 82574L Gb Ethernet controller with TCP/IP Offload Engine (TOE) and Wake on LAN support • Integrated SATA controller • Seven Universal Serial Bus (USB) 2.0 ports (two front, four rear of the chassis, and one internal for an optional tape drive) • Six SATA ports (blue-colored ports for DVD drive or optional tape drive) • One serial port • Two Ethernet port • One VGA port	**Heat output:** Approximate heat output: • Minimum configuration: 341 Btu per hour (100 watts) • Maximum configuration: 1726 Btu per hour (506 watts) **Electrical input:** • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • 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: 0.100 kVA (all models) – Maximum: 0.506 kVA

Table 2. Features and specifications for the 5U server model with hot-swap power supplies (Model name: 2582-F4x). For 4U server models with non-hot-swap power supplies, please see Table 1. (continued)

Expansion slots: • One PCI Express x16 slot • One PCI Express x8 slot • One PCI Express x4 slot • One PCI Express x1 slot	**Acoustical noise emissions:** • Sound power, idling: 5.0 bels • Sound power, operating: 5.3 bels	**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. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance 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 declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

What your server offers

The server uses the following features and technologies:

- **Integrated management module II**

  The integrated management module II (IMM2) is the second generation of the IMM. The IMM2 is the common management controller for IBM System x hardware. The IMM2 consolidates multiple management functions in a single chip on the server system board.

  Some of the features that are unique to the IMM2 are enhanced performance, expanded compatibility with blade servers, 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 II” on page 83.

- **UEFI-compliant server firmware**

  The IBM System x Server Firmware offers several features, including Unified Extensible Firmware Interface (UEFI) version 2.1 compliance, enhanced reliability, availability, and serviceability (RAS) capabilities, and basic input/output system (BIOS) compatibility support. UEFI replaces the legacy BIOS. UEFI defines a standard interface between the operating system, platform firmware and external devices, and offers capabilities that far exceeds that of the legacy BIOS.

  The server design combines the UEFI capabilities and features with legacy BIOS compatibility. The server is 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).

- **Dynamic System Analysis (DSA)**

  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
  - Kernel modules
  - Light path diagnostics statusetwork interfaces and settings
  - Performance data and details about processes that are running
  - RAID and controller configuration
  - integrated management module II (IMM2) status and configuration
  - System configuration
  - Vital product data and firmware information

  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 II (IMM2) event log (as the ASM event log), and the operating-system event logs. You can send the DSA log as a file to a support representative or view the information as a text file or HTML file. For more information, see the *Problem Determination and Service Guide*.

- **High-performance graphics controller**

  The server comes with an onboard high-performance graphics controller that supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- **IBM Systems Director CD**

  IBM Systems Director is a workgroup-hardware-management tool that you can use to centrally manage System x and xSeries servers. For more information, see the IBM Systems Director documentation on the *IBM Systems Director* CD and “IBM Systems Director” on page 13.

- **IBM Enterprise X-Architecture technology**

  IBM X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, see http://www.ibm.com/servers/eserver/xseries/xarchitecture/enterprise/index.html.

- **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 88.

- **Integrated network support**

  The server comes with an integrated dual-port Intel 82574L Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. For more information, see “Configuring the Gigabit Ethernet controller” on page 90.

- **PCI adapter capabilities**

  The server has two PCI interface slots on the riser card (one supports low-profile cards, and one supports full-height, three-quarter length cards). Both slots can support PCI Express or PCI-X adapters. See “Installing a ServeRAID adapter” on page 55 for detailed information.

- **Large system-memory capacity**

  The server supports up to 32 GB of system memory when unbuffered DIMMs are installed. The memory controller supports error correcting code (ECC) and non-error correcting code for up to 4 industry-standard PC3-10600R-999 (single-rank or dual-rank), 1066 and 1333 MHz, DDR3 (third-generation double-data-rate) unbuffered synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Redundant connection**

  The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **ServeRAID support**

  The ServeRAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. The LSI Configuration Utility program provides RAID levels 0, 1, and 10. The optional ServerRAID-BR10il adapter provides RAID levels 0 and 1. See “Installing a ServeRAID adapter” on page 55 and “Using LSI Configuration Utility program” on page 92 for more information about the adapters that are supported and creating RAID arrays.

- **Dual-core or quad-core processing**

  The server supports one Intel Xeon dual-core or quad-core microprocessor.

- **Systems-management capabilities**

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

- **TCP/IP offload engine (TOE) support**

  The Ethernet controller in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessor and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE. The Windows operating system requires that the Windows Scalable Network Pack (SNP) be installed for TOE support.

  Note: As of the date of this document, the Linux operating system does not support TOE.

Reliability, availability, and serviceability

Three important server 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 repair problems.

The server might have the following RAS features (the features vary depending on your model):

- 1-year parts and 1-year labor limited warranty
- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic BIOS recovery to a backup image
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the UEFI setting
- Availability of microcode level
- Boot-block recovery
- Built-in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration
- Built-in monitoring for fan, power, temperature, and voltage
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week[2]
- Diagnostic support of ServeRAID adapters
- Error codes and messages
- Error correcting code (ECC) double-data-rate 3 (DDR3) synchronous dynamic random-access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures
- Simple-swap Serial ATA (SATA) hard disk drives

2. Service availability will vary by country. Response time varies; may exclude holidays.

- Integrated Ethernet controller
- Intelligent Platform Management Interface (IPMI)
- Key-lock support for physical security
- Memory change messages posted to the error log
- integrated management module II (IMM2)
- Power management
- Power-on self-test (POST)
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities (requires an optional Ethernet adapter) with failover support
- ROM-based diagnostic programs
- Simple-swap Serial Advanced Technology Attachment (SATA) hard disk drives
- Standby voltage for system-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostic LEDs on the system board
- System-error logging (POST and IMM2)
- Upgradeable integrated management module II (IMM2) firmware
- Upgradeable microcode for POST, server firmware, and read-only memory (ROM) resident code, locally or over a LAN
- Vital product data (VPD); includes serial-number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance
- 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 following common tasks are included:

- 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 IBM Systems Director Information Center at http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html and the Systems Management web page at http://www.ibm.com/systems/management/, which presents an overview of IBM Systems Management and IBM Systems Director.

The Update*Xpress* System Packs

The Update*Xpress* System Packs provide and effective and simple way to update device drivers, server firmware, and firmware of supported options contained within the server, for System x and IBM BladeCenter® servers. Each Update*Xpress* System Pack contains all the online driver and firmware updates for a specific machine type and operating system combination. The Update*Xpress* System Packs are released quarterly. Use the Update*Xpress* System Pack Installer to install the current Update*Xpress* System Pack for your server. You can download the installer and the latest Update*Xpress* System Pack for your server from the web at no additional cost. To download the installer or the latest Update*Xpress* System Pack, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=SERV-XPRESS&brandind=5000008 or 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/supportportal/ or http://www.ibm.com/support/fixcentral/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Under **Related downloads**, click **UpdateXpress**.

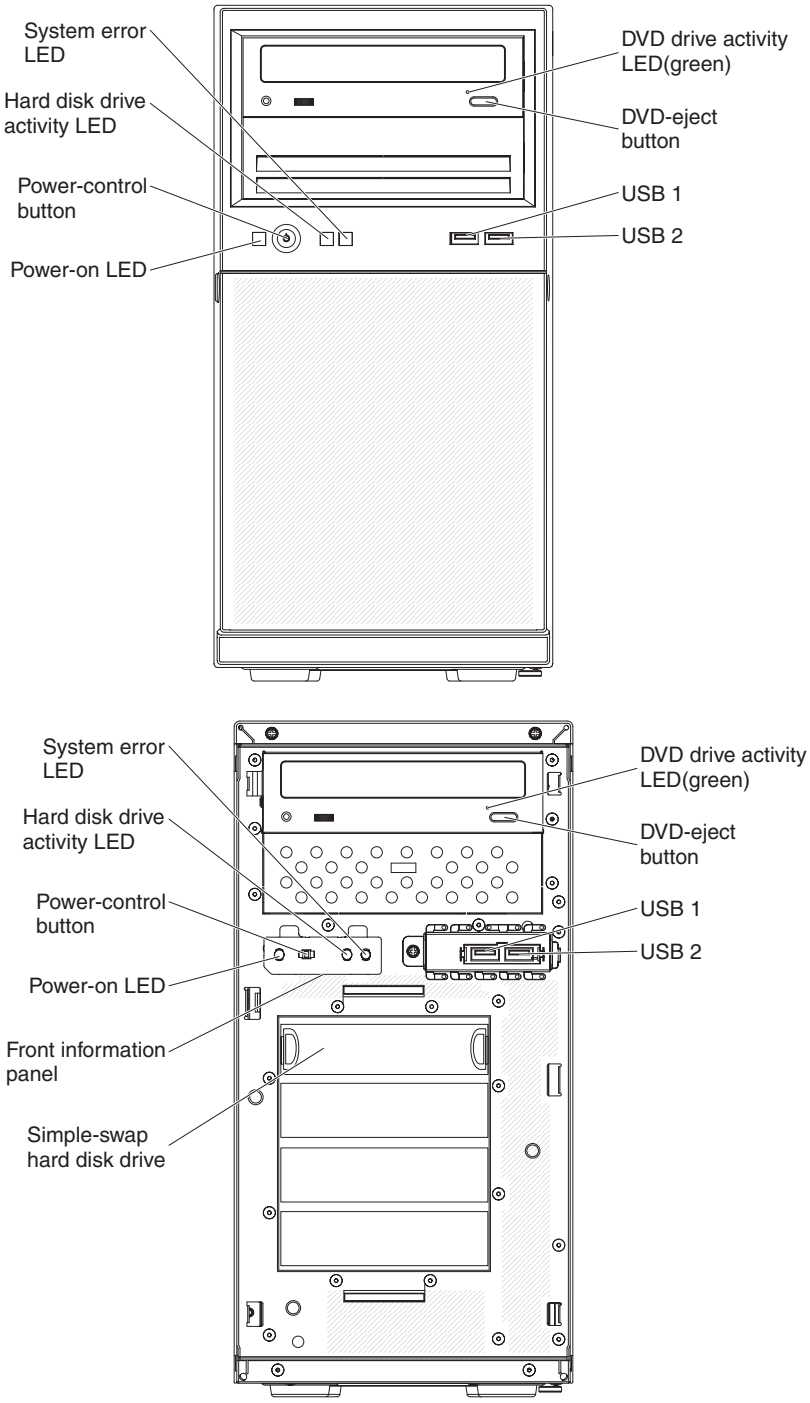
Server controls, LEDs, and power

This section describes the controls, light-emitting diodes (LEDs), and connectors on the front and rear of the server, and how to turn the server on and off. For the location of the LEDs on the system board, see “System-board LEDs” on page 26.

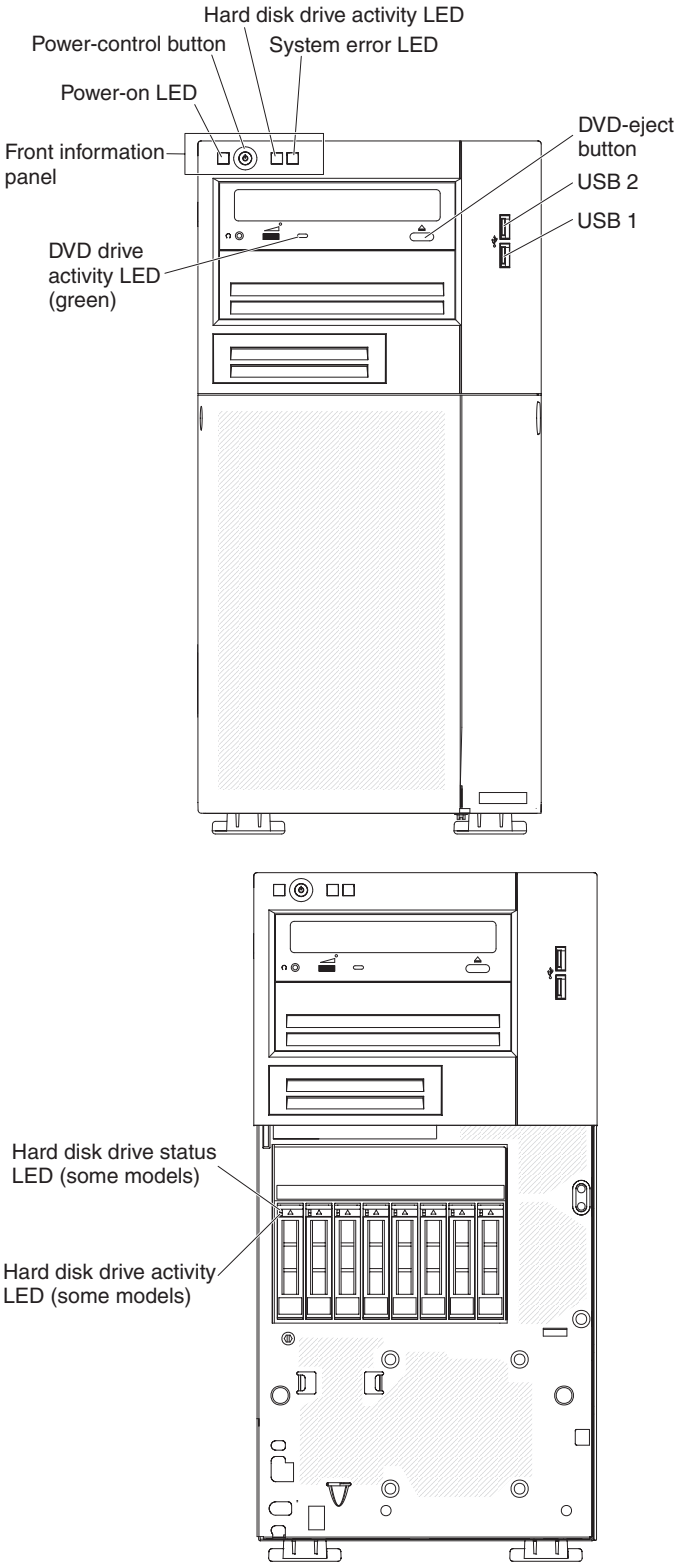
Note: The illustrations in this document might differ slightly from your model.

Front view

The following illustration shows the controls and LEDs on the front of 4U server models with non-hot-swap power supplies.



The following illustration shows the controls and LEDs on the front of the 5U server model with hot-swap power supplies (Model name: 2582-F4x).



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

Flashing rapidly (4 times per second): The server is partially on, but not ready to be fully turned on. The power-control button is disabled. This will last approximately 1 to 3 minutes.

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

Lit: The server is turned on.

Hard disk drive activity LED

When this LED is flashing rapidly, it indicates that a hard disk drive is in use.

System-error LED

When this yellow LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. Detailed troubleshooting information is in the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

USB connectors

Connect USB devices to these connectors.

DVD-eject button

Press this button to release a CD or DVD from the DVD drive.

DVD drive activity LED

When this LED is lit, it indicates that the DVD drive is in use.

Hot-swap hard disk drive activity LED (some models)

On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the drive is in use.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 7 on 3.5-inch hard disk drive models.

Hot-swap hard disk drive status LED (some models)

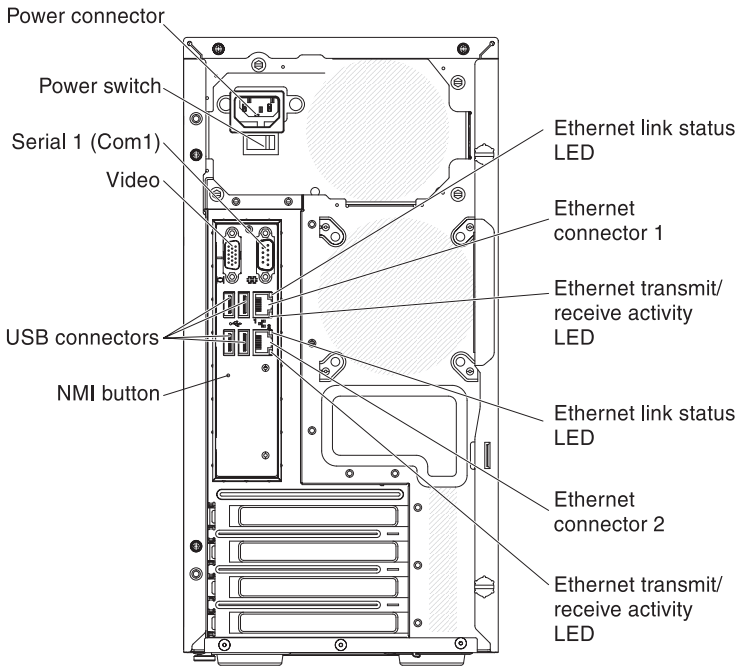
On some server models, each hot-swap hard disk drive has an yellow status LED. If this yellow status LED for a drive is lit, it indicates that the associated hard disk drive has failed.

If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.

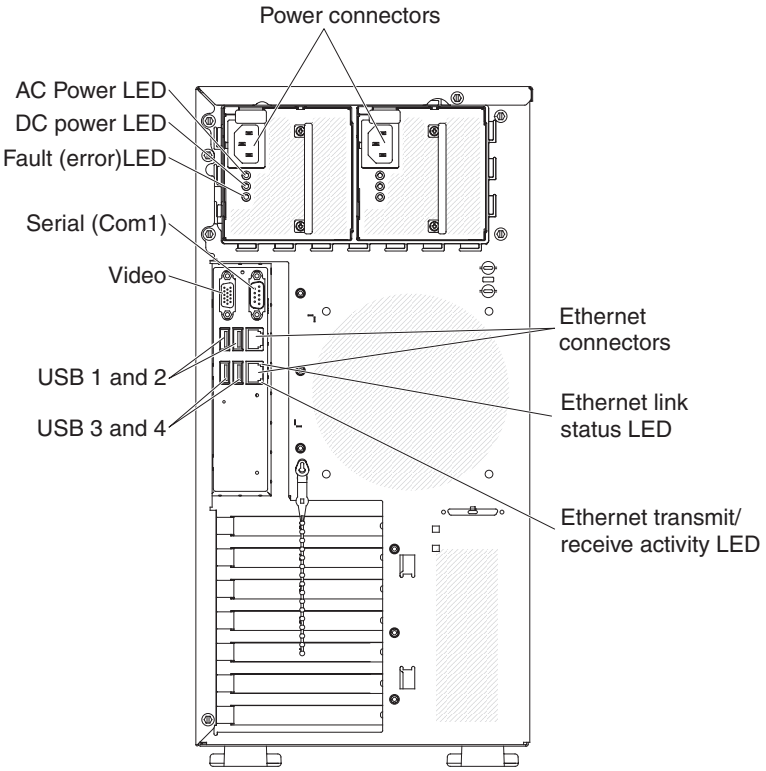
When the drive is removed, this LED also is visible on the SAS/SATA backplane, below the hot-swap hard disk drive activity LED.

Rear view

The following illustration shows the controls and LEDs on the rear of 4U server models with non-hot-swap power supplies.



The following illustration shows the controls and LEDs on the rear of the 5U server model with hot-swap power supplies (Model name: 2582-F4x).



Power connector

Connect the power cord to this connector.

AC power LED

This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit.

DC power LED

This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit.

Fault-error LED

When this yellow LED is lit, it indicates that the power supply has failed.

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).

Video connector

Connect a monitor to this connector.

Note: When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.

USB connectors

Connect USB devices to these connectors.

NMI button

Press this button to force a nonmaskable interrupt to the microprocessor. It allows you to blue screen the server and take a memory dump (use this button only when directed by the IBM service support). You might have to use a pen or the end of a straightened paper clip to press the button.

Ethernet connector

Use either of these connectors to connect the server to a network. When you use the Ethernet 0 connector, the network can be shared with the IMM2 through a single network cable.

Ethernet transmit/receive activity LED

This LED is on the Ethernet connector. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED

This LED is on the Ethernet connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

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 is shut down; however, the server can respond to requests to IMM2, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active after the power-on LED flashes slowly.

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.

Note: 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 peripheral component interconnect (PCI) devices.

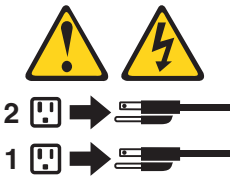
Turning off the server

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

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

Statement 5:

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



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

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned 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 the Wake on LAN feature.
- 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 chapter 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 firmware and device drivers, and completing the installation, IBM Business Partners must also complete the steps in “Instructions for IBM Business Partners.”

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 IMM2 firmware and any other firmware that is stored on the system boards. For information about where firmware is stored in the server, see Chapter 6, “Configuration information and instructions,” in the Problem Determination and Service Guide. For a list of supported optional devices for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
2. 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 the *Problem Determination and Service Guide* for information about how to run diagnostics.
3. Follow the installation procedures in this chapter and use the correct tools. Incorrectly installed devices can cause system failures because of damaged pins in sockets or connectors, loose cabling, or loose components.
4. 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 http://www.ibm.com/support/entry/portal/docdisplay?brand=50000020&lndocid=MIGR-5082923. 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

Instructions for IBM Business Partners

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

1. Before you configure a server for a customer, complete the Solution Assurance checklist at http://w3.ibm.com/support/assure/assur30i.nsf/webindex/sa294/.
2. 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 tests. For information about using DSA, see the *Problem Determination and Service Guide*.
3. Shut down and restart the server multiple times to ensure that the server is correctly configured and functions correctly with the newly installed devices.
4. Save the DSA log as a file and send it to IBM.

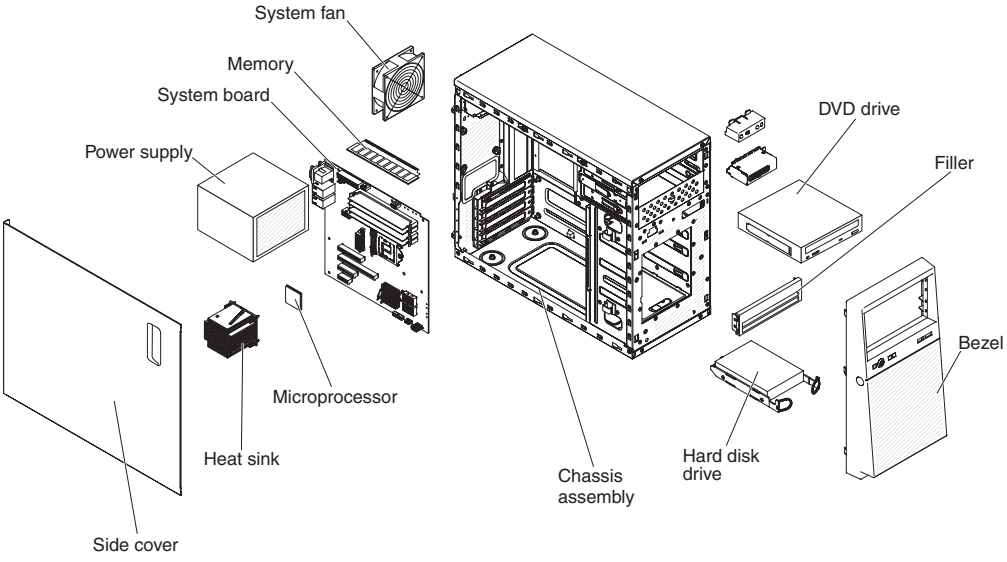
5. To ship the server, repackage it in the original undamaged packing material and observe IBM procedures for shipping.

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

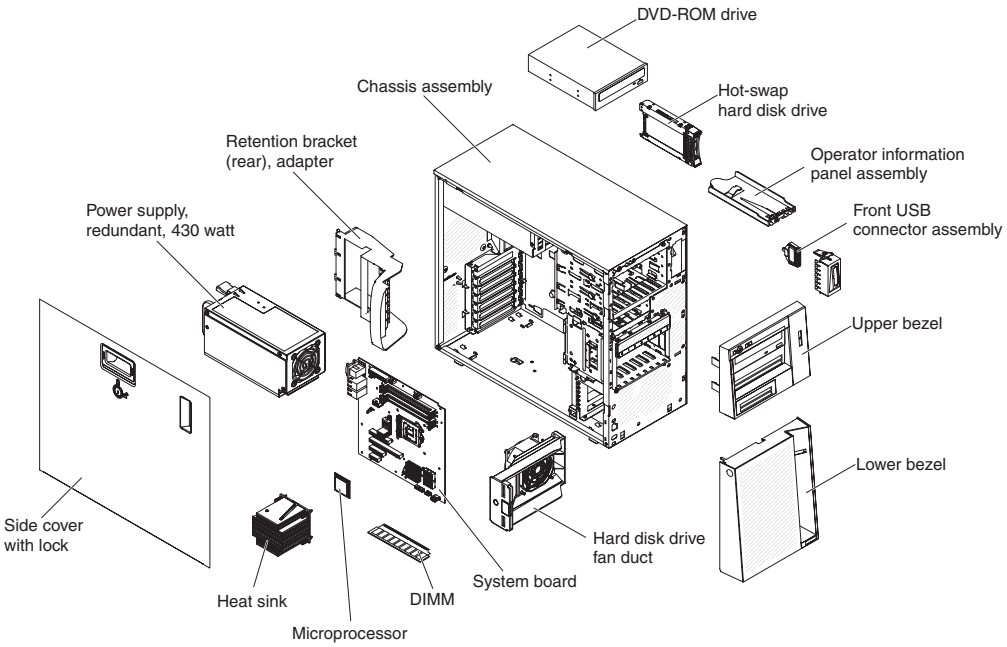
Server components

The following illustration shows the major components in 4U server models with non-hot-swap power supplies (depending on the server model). The illustrations in this document might differ slightly from your hardware. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next paragraph.

See the *PDSG* on the *System x Documentation* CD for additional information about the server.



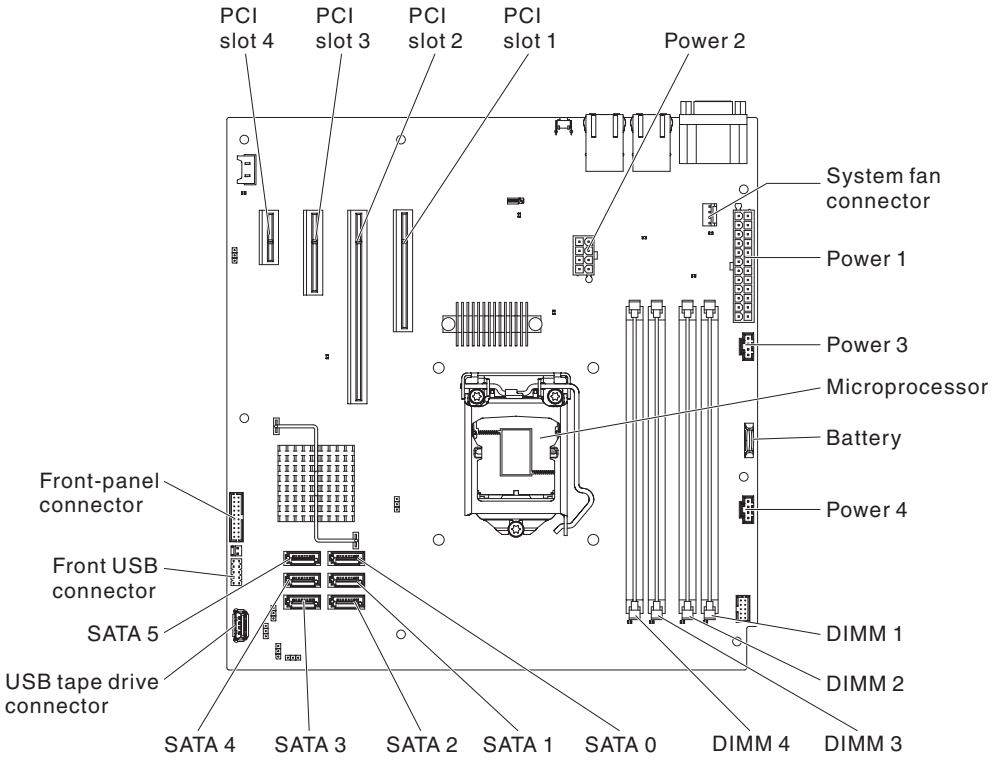
The following illustration shows the major components in the 5U server model with hot-swap power supplies (Model name: 2582-F4x). The illustrations in this document might differ slightly from your hardware. For 4U server models with non-hot-swap power supplies, please see the above paragraph.



System-board internal connectors

The following illustration shows the internal connectors on the system board.

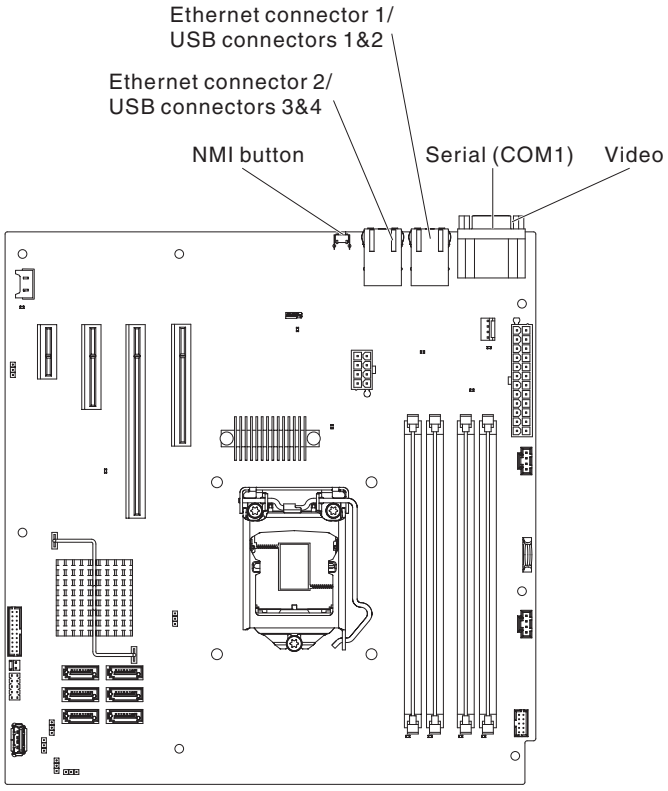
Note: The connectors on the system board illustrations might vary slightly from your system board, depending on your server model.



System-board external connectors

The following illustration shows the external connectors on the system board.

Note: The connectors on the system board illustrations might vary slightly from your system board, depending on your server model.



System-board switches and jumpers

The following illustration shows the jumpers on the system board.

Note: The connectors on the system board illustrations might vary slightly from your system board, depending on your server model.

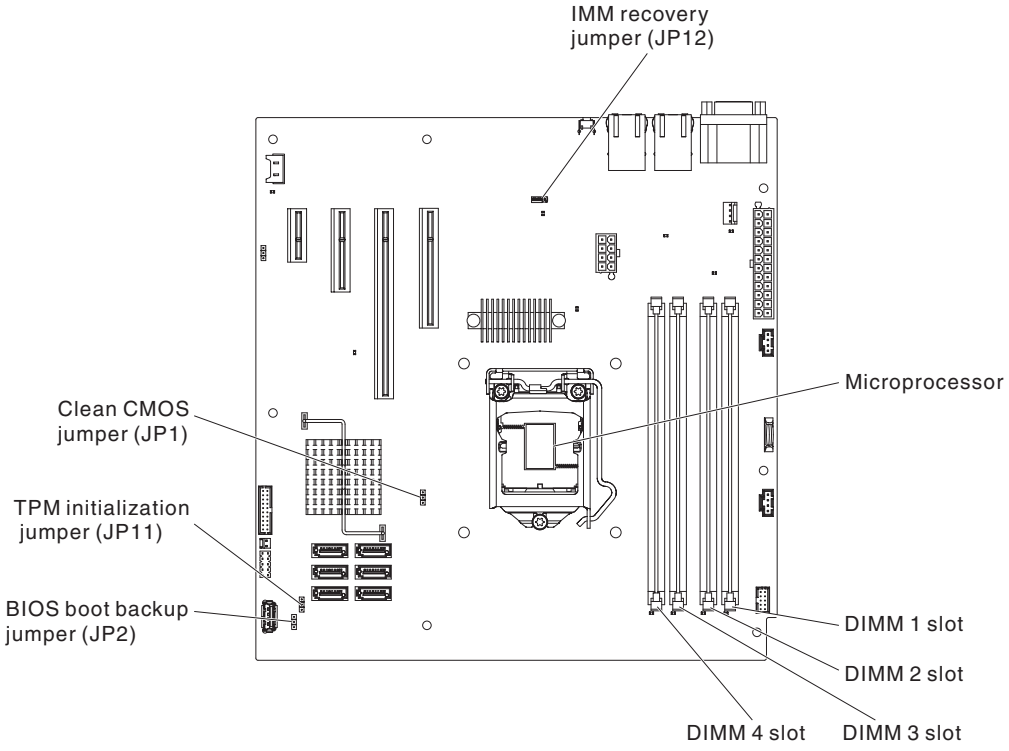


Table 3. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper	• Pins 1 and 2: Keep CMOS data (default). • Pins 2 and 3: Clear CMOS data.
JP2	BIOS boot backup (boot block jumper)	• Pins 1 and 2: Boot from primary BIOS page (default). • Pins 2 and 3: Boot from backup BIOS page.
JP10	TPM physical presence jumper	• Pins 1 and 2: Normal (default). • Pins 2 and 3: Pull down TPM.
JP11	TPM initialization jumper	• Pins 1 and 2: Normal (default). • Pins 2 and 3: Initiate TPM.
JP12	IMM recovery jumper	• Pins 1 and 2: Loads the secondary (backup) IMM firmware ROM page. • Pins 2 and 3: Normal (default) Loads the primary IMM firmware ROM page.

Table 3. System board jumpers (continued)

Jumper number	Jumper name	Jumper setting
JP22	Low security_N jumper	• Pins 1 and 2: Normal (default). • Pins 2 and 3: Activate low security.

Notes:

1. If no jumper is present, the server responds as if the pins are set to 1 and 2.
2. Changing the position of the boot block jumper 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.
3. If a message is shown indicating that your Trusted Platform Module's (TPM) physical presence is asserted, it is an indication that the system is vulnerable to potential security risks. This occurs when the jumper setting of JP11 is at Pins 2 and 3. Switching the jumper setting to Pins 1 and 2 of JP11 will deassert the Trusted Platform Module's (TPM) physical presence.

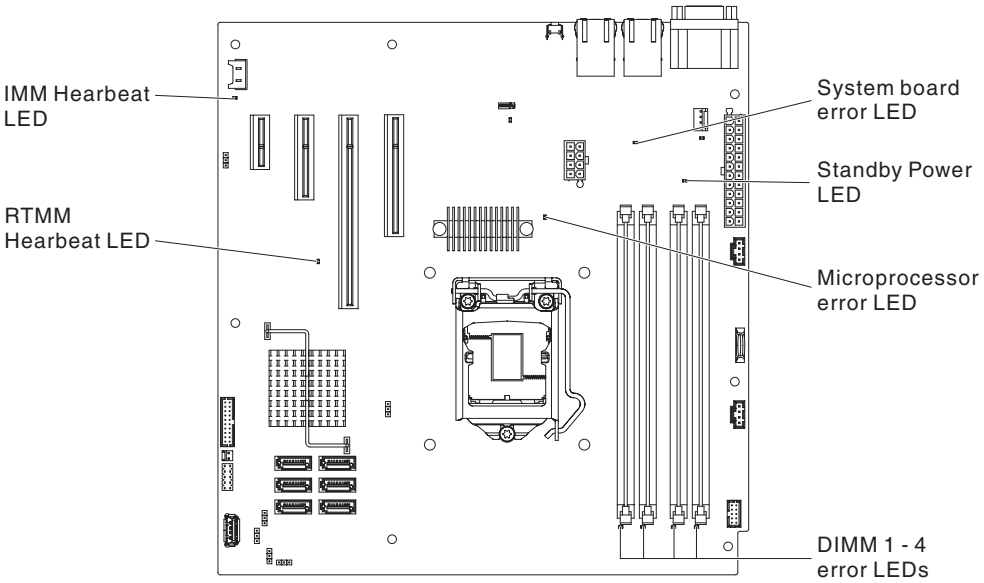
Important:

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 vii, “Installation guidelines” on page 27, “Handling static-sensitive devices” on page 28, and “Turning off the server” on page 20.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the LEDs on the system board.

Note: The connectors on the system board illustrations might vary slightly from your system board, depending on your server model.



Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page vii, the guidelines in "Working inside the server with the power on" on page 28, and "Handling static-sensitive devices" on page 28. This information will help you work safely..
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps:
  1. Go to http://www.ibm.com/supportportal/ or http://www.ibm.com/support/fixcentral/.
  2. Under **Product support**, click **System x**.
  3. Under **Popular links**, click **Software and device drivers**.
  4. Click **System x3100 M4** to display the matrix of downloadable files for the server.
- 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. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.

  Note: When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.
- 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.
- 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.
- When you have to access the inside of the server, you might find it easier to lay the server on its side.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported options for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- 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 turning 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.

Working inside the server with the power on

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

Follow these guidelines when you work inside a server that is turned on.

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

Handling static-sensitive devices

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

To reduce the possibility of 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.

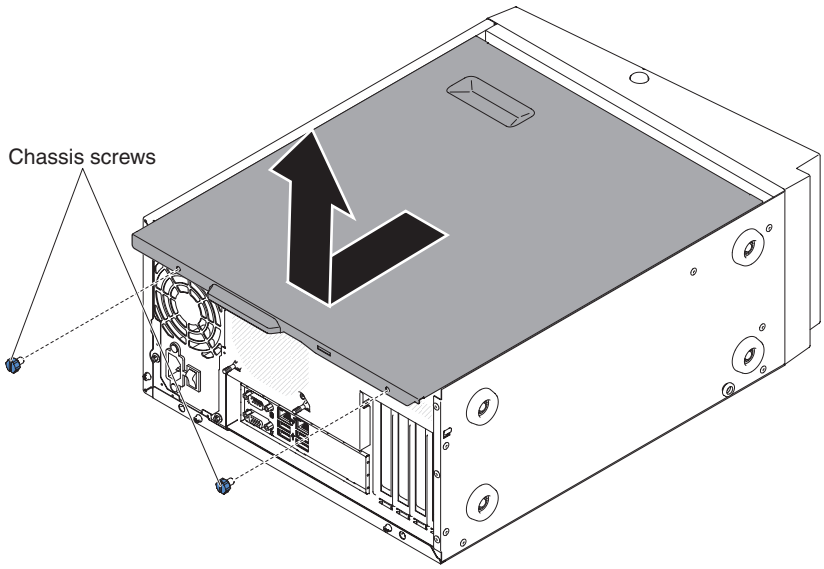
Removing the side cover

Attention: Operating the server for more than 30 minutes with the side cover removed might damage server components. For proper cooling and airflow, replace the side cover before you turn on the server.

For 4U server models with non-hot-swap power supplies, complete the following steps to remove the side cover. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

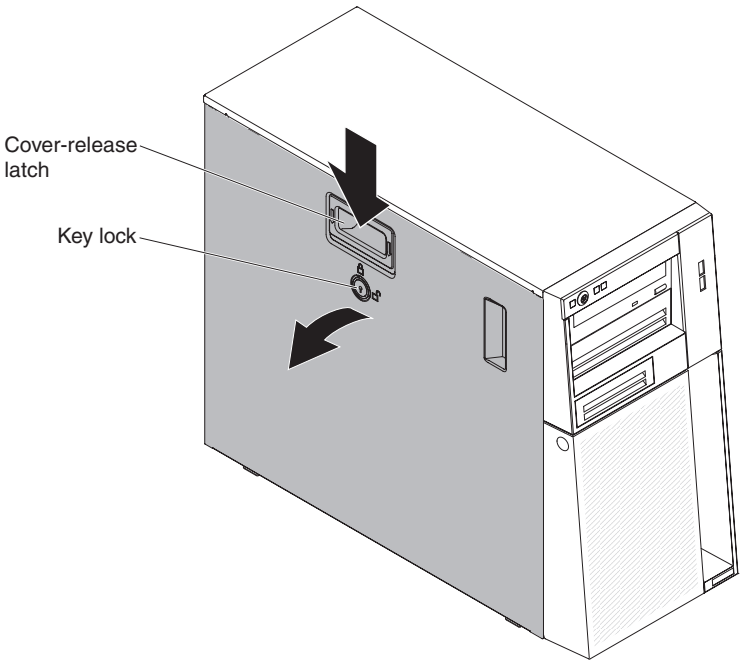
   Attention: Do not allow the server to fall over.
4. Unscrew the two chassis screws on the rear side of the server.
5. Pull the rear side cover handle and push the front side cover handle at the same time.



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

For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps to remove the side cover. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover; then, press the cover-release latch down (as shown in the illustration) to remove the cover.



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

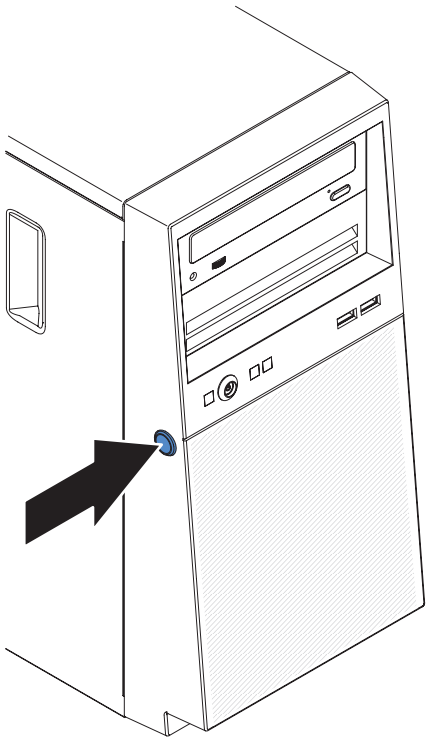
Removing the bezel

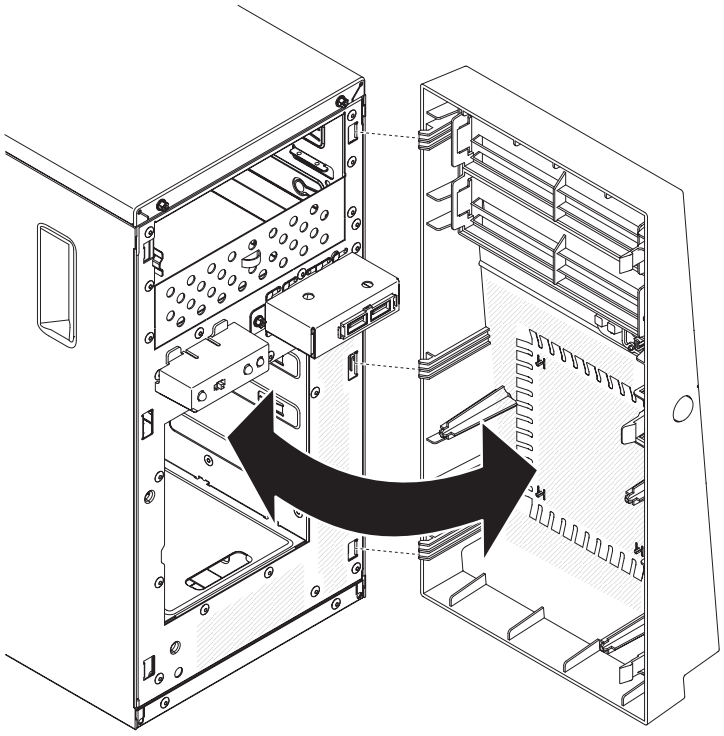
This procedure applies only to 4U server models that have non-hot-swap power supplies.

When you work with some devices, such as the drives in bays 3 through 6, you must first remove the bezel to access the devices.

To remove the bezel, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Open the bezel by pressing the button on the left edge of the bezel, and rotate the left side of the bezel away from the server.





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

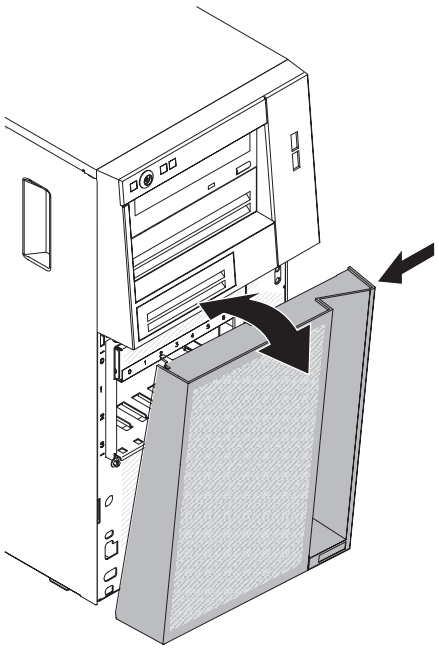
Removing the lower bezel

This procedure applies only to the 5U server model with hot-swap power supplies (Model name: 2582-F4x).

To access the hard disk drives on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), you must first remove the lower bezel.

To remove the lower bezel on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. If you are replacing a non-hot-swap component, turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Press the blue-colored release button on the right side of the lower bezel and rotate the lower bezel downward to disengage from the chassis.



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

Removing the upper bezel

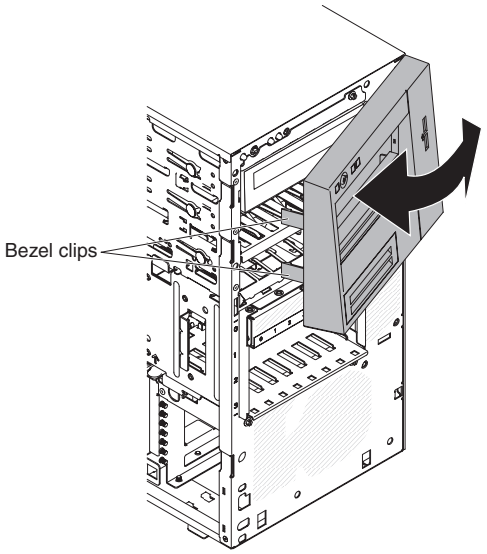
This procedure applies only to the 5U server model with hot-swap power supplies (Model name: 2582-F4x).

To access the DVD drive or tape drive on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), you must first remove the upper bezel to access the devices.

To remove the upper bezel on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. If you are replacing a non-hot-swap component, turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 30).
4. Remove the lower bezel (see “Removing the lower bezel” on page 32).

5. Carefully pull the two bezel clips on the left side of the upper bezel; then, rotate the upper bezel to the right side of the server to disengage the two right-side tabs from the chassis.



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

Removing the microprocessor and heat sink

To remove the microprocessor and heat sink on 4U server models with non-hot-swap power supplies, complete the following steps. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

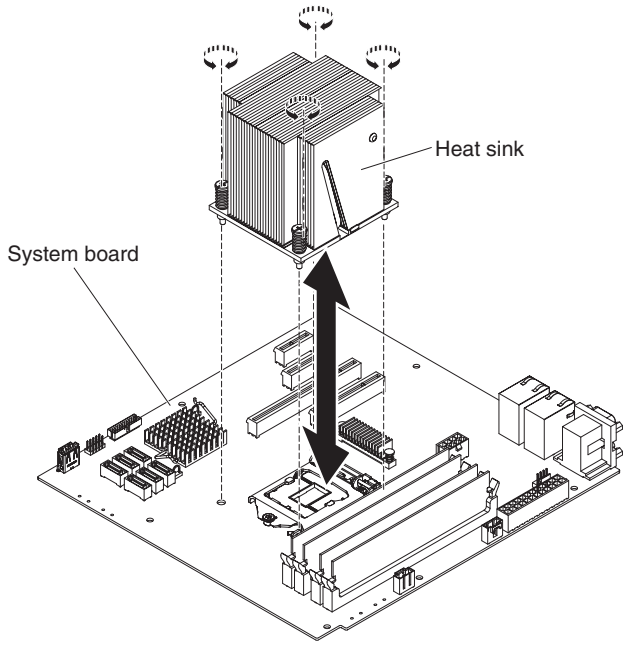
1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
4. Remove the side cover (see “Removing the side cover” on page 30).
5. Remove the air duct.
6. Remove the heat sink from the microprocessor:

   Attention: The heat sink may become very hot during normal operation. Allow time for the heat sink to cool down before you touch it.

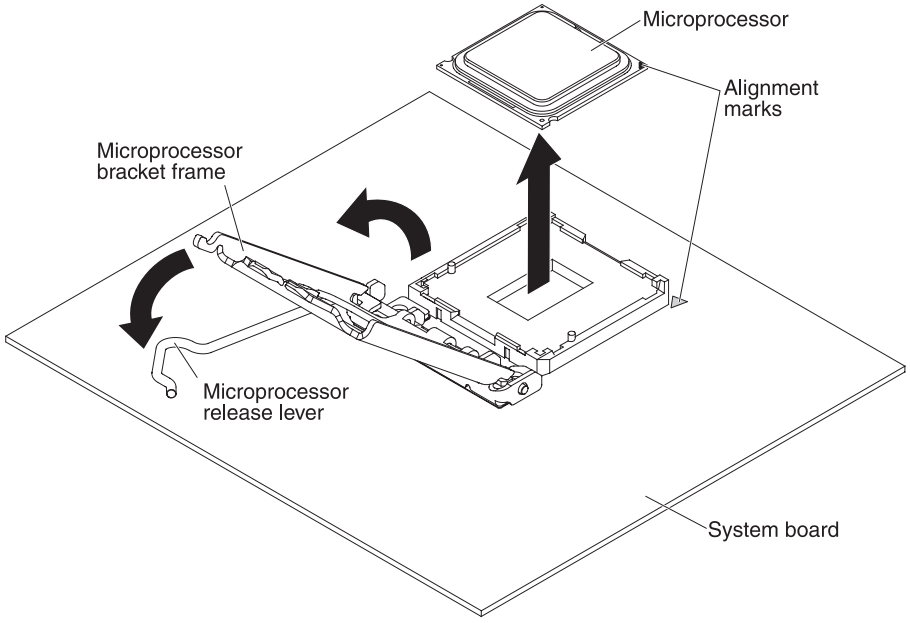
   a. Loosen the screws and alternate among the screws until they break the seal with the microprocessor.
   b. Press firmly on the captive screws and loosen them with a screwdriver.
   c. Use your fingers to gently pull the heat sink from the microprocessor.

      Important: Be careful when you handle the microprocessor and heat sink. If the microprocessor and heat sink will be reused, do not contaminate the thermal material between them.



Attention: The microprocessor retention latch is spring-loaded when the microprocessor is in place. Releasing the latch too quickly or allowing it to spring upward can damage the microprocessor and surrounding components.

7. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and slowly releasing it to the open (up) position.



8. Open the microprocessor bracket frame by lifting up the tab on the top edge.
9. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.
10. If you are instructed to return the microprocessor and heat sink, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

To remove the microprocessor and heat sink on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

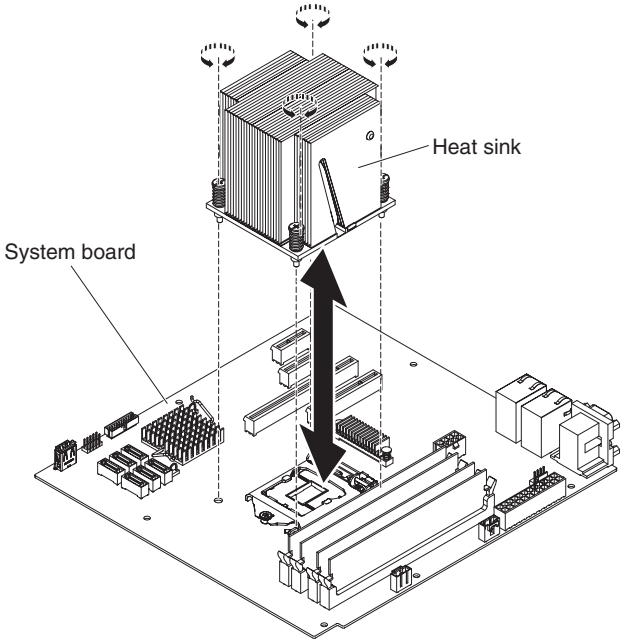
1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 30).
4. Carefully turn the server on its side so that it is lying flat, with the system board facing up.

   Attention: Do not allow the server to fall over.
5. Rotate the rear adapter-retention bracket to the open (unlocked) position.
6. Remove the heat sink from the microprocessor:

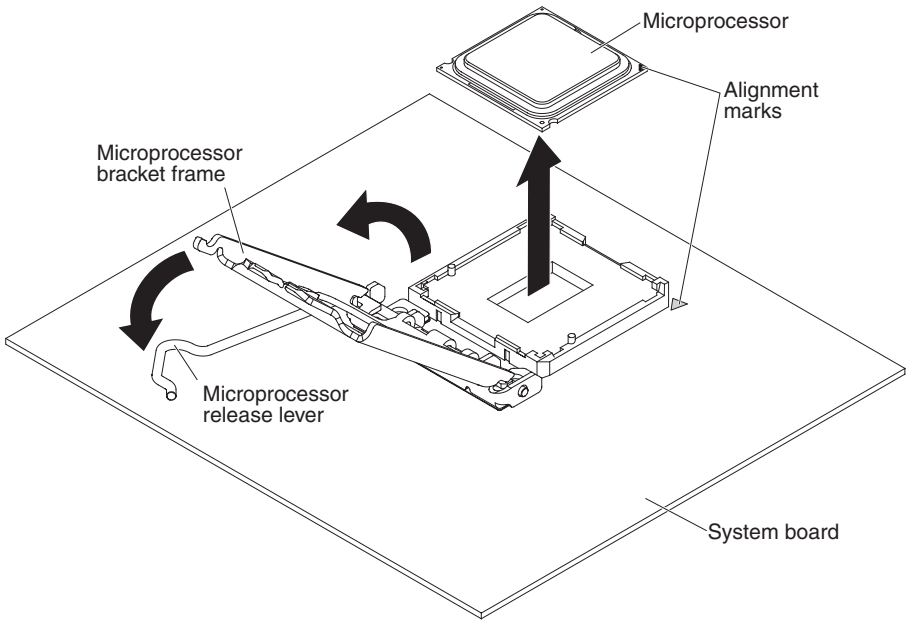
   Attention: The heat sink may become very hot during normal operation. Allow time for the heat sink to cool down before you touch it.

   a. Loosen the screws and alternate among the screws until they break the seal with the microprocessor.
   b. Press firmly on the captive screws and loosen them with a screwdriver.
   c. Use your fingers to gently pull the heat sink from the microprocessor.

      Important: Be careful when you handle the microprocessor and heat sink. If the microprocessor and heat sink will be reused, do not contaminate the thermal material between them.



   Attention: The microprocessor retention latch is spring-loaded when the microprocessor is in place. Releasing the latch too quickly or allowing it to spring upward can damage the microprocessor and surrounding components.
7. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and slowly releasing it to the open (up) position.



8. Open the microprocessor bracket frame by lifting up the tab on the top edge.
9. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.
10. If you are instructed to return the microprocessor and heat sink, 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 dual inline memory modules (DIMMs) that the server supports and other information that you must consider when you install DIMMs (see “System-board internal connectors” on page 23 for the location of the DIMM connectors):

- The server supports only industry-standard double-data-rate 3 (DDR3), 1066, 1333 or 1600 MHz, PC3-12800 (single-rank, dual-rank, or quad-rank), 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 maximum amount of memory that the server supports is dependent on the type of memory that you install in the server.
- 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 “Using the Setup utility” on page 78.
- The maximum operating speed of the server is determined by the slowest DIMM in the server.
- If you install a pair of DIMMs in DIMM connectors 1 and 3, the size and speed of the DIMMs that you install in DIMM connectors 1 and 3 must match each other. However, they do not have to be the same size and speed as the DIMMs that are installed in DIMM connectors 2 and 4.
- You can use compatible DIMMs from various manufacturers in the same pair.

- 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 specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

  *ggg e*Rx*ff*-PC3-*wwwwwm-aa-bb-cc*

  where:

  ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

  e is the number of ranks

  1 = single-rank

  2 = dual-rank

  4 = quad-rank

  ff is the device organization (bit width)

  4 = x4 organization (4 DQ lines per SDRAM)

  8 = x8 organization

  16 = x16 organization

  wwwww is the DIMM bandwidth, in MBps

  8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

  10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

  12800 = 12.8 GBps (PC3-1600 SDRAMs, 8-byte primary data bus)

  m is the DIMM type

  E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

  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 PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).

The following sections provide additional information specific to unbuffered and registered DIMMs that you must consider.

Unbuffered DIMMs (UDIMMs)

The following notes provide information that you must consider when you install UDIMMs:

- The memory channels run at the lowest common frequency of the DIMMs installed.
- The UDIMM options that are available for the server are 1 GB, 2 GB, 4 GB, and 8 GB (when available) DIMMs.
- The server supports up to two single-rank or dual-rank UDIMMs per channel.
- The following table lists the supported UDIMM population.

Table 4. Supported UDIMM population per channel

DIMM connectors per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
2	1	Unbuffered DDR3 ECC	1066, 1333, 1600	Single-rank, dual-rank
2	2	Unbuffered DDR3 ECC	1066, 1333, 1600	Single-rank, dual-rank

- The following table lists the maximum DIMM population using ranked UDIMMs.

Table 5. Maximum memory population using ranked UDIMMs (depending on your model)

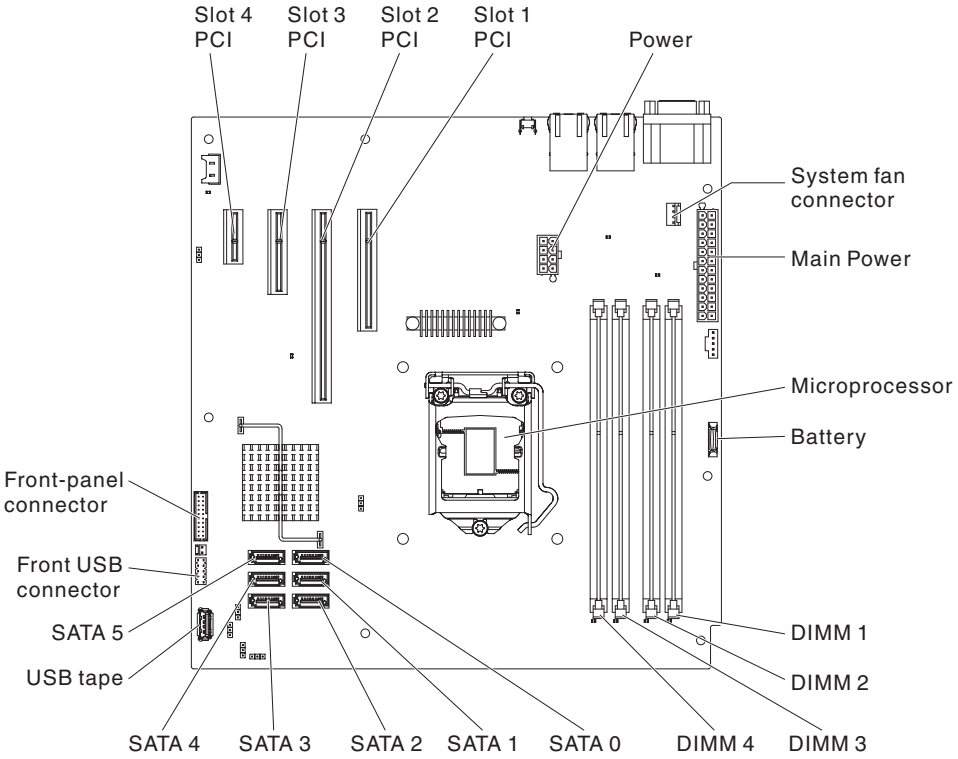
Number of UDIMMs	DIMM type	Size	Total memory
4	Single-rank UDIMMs	1 GB	4 GB
4	Dual-rank UDIMMs	2 GB	8 GB
4	Dual-rank UDIMMs	4 GB	16 GB
4	Dual-rank UDIMMs	8 GB (when available)	32 GB

- The following table shows the UDIMM memory population rule to optimize the system performance.

Table 6. UDIMM population rule

DIMM connector 1	DIMM connector 2	DIMM connector 3	DIMM connector 4
Populated	Empty	Empty	Empty
Populated	Empty	Populated	Empty
Populated	Populated	Populated	Populated

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



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.

To install a DIMM on 4U server models with non-hot-swap power supplies, complete the following steps. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and all peripheral devices; then, disconnect the power cords and all external cables.
3. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

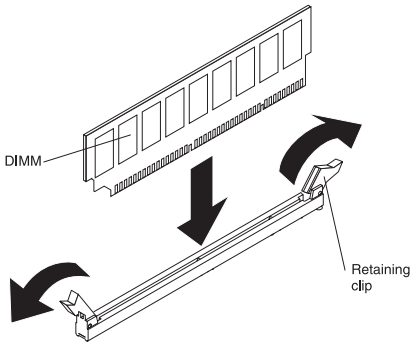
   Attention: Do not allow the server to fall over.
4. Remove the side cover (see “Removing the side cover” on page 30).
5. Remove the air duct.
6. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.

Table 7. DIMM installation sequence

Number of DIMMs	Installation sequence (connectors)
First pair of DIMMs	1, 3
Second pair of DIMMs	2, 4

7. Open the retaining clip on each end of the DIMM connector.

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



8. 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.
9. Turn the DIMM so that the DIMM keys align correctly with the connector.
10. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.
11. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

    Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.
12. Install the air duct.
13. Install the side cover (see “Installing the side cover” on page 71).
14. Stand the server back up in its vertical position.
15. Install the bezel (see “Installing the bezel” on page 68).

    Note: Remove the filler blocking the installed drive if any.
16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

To install a DIMM on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 30).
4. Carefully turn the server on its side so that it is lying flat, with the system board facing up.

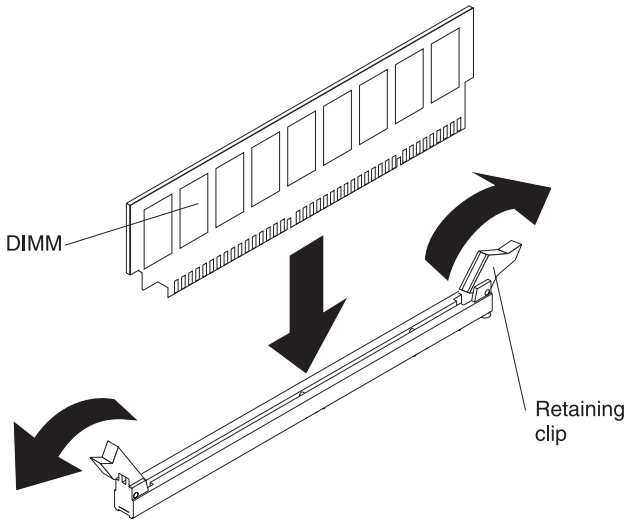
   Attention: Do not allow the server to fall over.
5. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.

Table 8. DIMM installation sequence

Number of DIMMs	Installation sequence (connectors)
First pair of DIMMs	1, 3
Second pair of DIMMs	2, 4

6. Open the retaining clips and, if necessary, remove any existing DIMM.

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

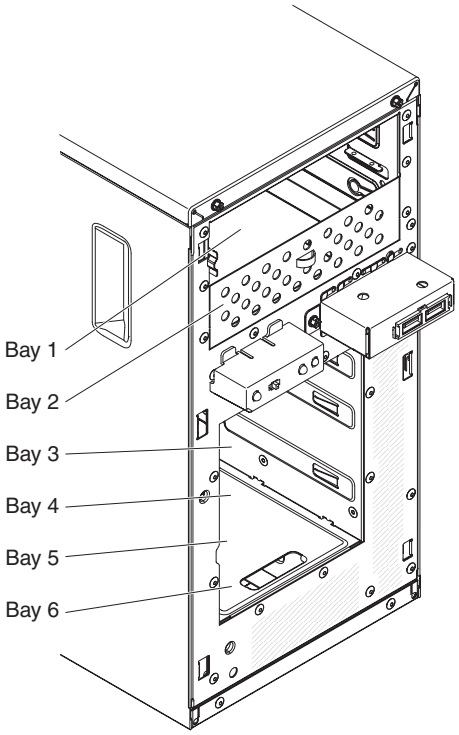


7. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
8. Turn the DIMM so that the DIMM keys align correctly with the connector.
9. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. 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. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.
10. Stand the server back up in its vertical position.
11. Install and lock the side cover (see “Installing the side cover” on page 71).
12. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

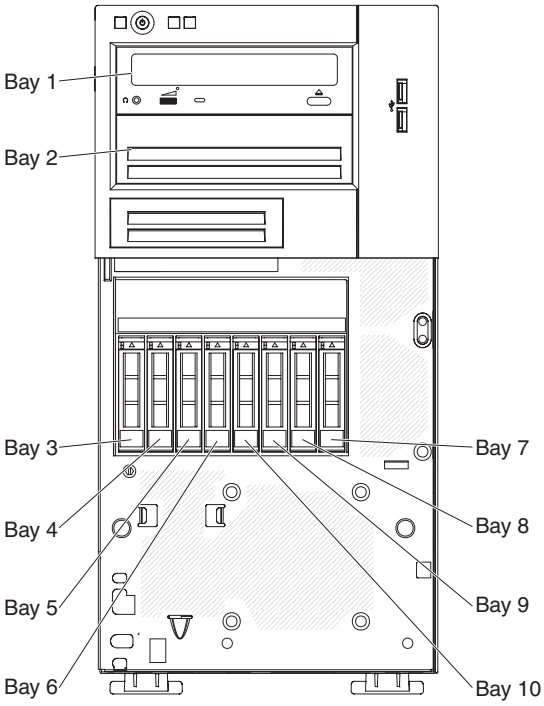
Installing drives

Depending on the server model, a DVD-ROM or multiburner drive might be installed in the server. For 4U server models with non-hot-swap power supplies, the server supports up to four 3.5-inch simple-swap SATA hard disk drives (depending on the model). For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), the server supports up to eight hot-swap SATA hard disk drives.

The following figure shows the locations of the drive bays in 4U server models with non-hot-swap power supplies.



The following figure shows the locations of the drive bays in the 5U server model with hot-swap power supplies (Model name: 2582-F4x).



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

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.

- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SATA device, be sure to set the SATA ID for that device.
- Optional internal or external USB diskette drives, tape drives, DVD-ROM, and multiburner drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- 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/servers/eserver/serverproven/compat/us/.

Installing a DVD drive

To install a DVD drive, complete the following steps:

If you are replacing a removed drive with a new drive, make sure that:

- You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
- You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers in the drive.
- You have removed the blue optical drive retainer clip from the side of the old drive and have them available for installation on the new drive.

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

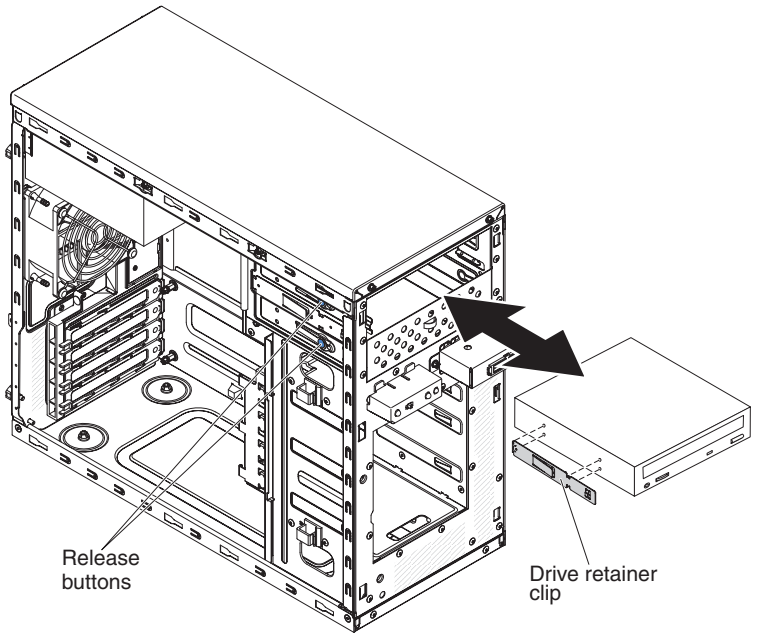
Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

To install a DVD drive on 4U server models with non-hot-swap power supplies, complete the following steps. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

   Note: You might find it easier to install the new drive from the front and then attach the cables.
3. Turn off the server and all peripheral devices; then, disconnect the power cords and all external cables.
4. Remove the bezel (see “Removing the bezel” on page 31).
5. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
6. Remove the side cover (see “Removing the side cover” on page 30).
7. Touch the static-protective package that contains the new DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package and place it on a static-protective surface.
8. Stand the server back up in its vertical position.
9. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



10. Push the drive into the bay.
11. Carefully turn the server on its side so that it is lying flat.

    Attention: Do not allow the server to fall over.
12. Connect the power (power connector P9) and signal cables to the drive.

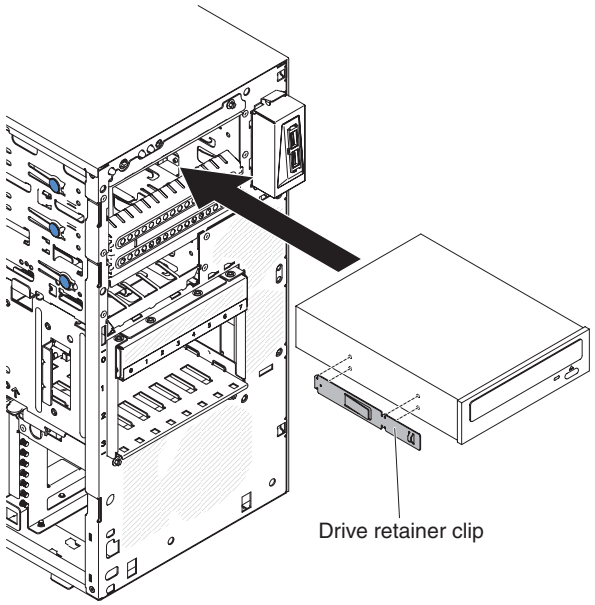
    Note: Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
13. If you have another drive to install or remove, do so now.
14. Install the side cover (see “Installing the side cover” on page 71).
15. Stand the server back up in its vertical position.
16. Install the bezel (see “Installing the bezel” on page 68).

    Note: Remove the filler blocking the installed drive if any.
17. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

To install a DVD drive on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

1. Touch the static-protective package that contains the new DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package and place it on a static-protective surface.
2. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

   Note: You might find it easier to install the new drive from the front and then attach the cables.
3. Attach the drive retainer clip that you removed from the previous drive to the side of the new drive.
4. Push the drive into the bay.



5. Connect the power and signal cables to the drive.

   Note: Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
6. Install the upper bezel (see “Installing the upper bezel” on page 70).
7. Install the lower bezel (see “Installing the lower bezel” on page 69).
8. Install and lock the side cover (see “Installing the side cover” on page 71).
9. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing a tape drive

If you are replacing a removed drive with a new drive, make sure that:

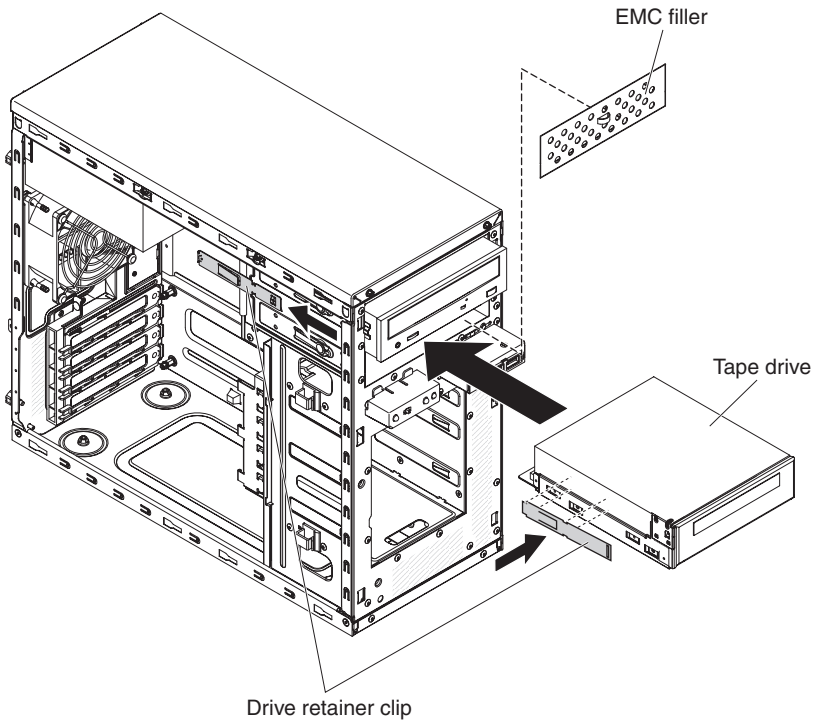
- You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
- You check the instructions that come with the new drive to determine whether you must set any switches or jumpers on the drive.
- You have removed the drive retainer clip on the side of the old drive and have it available for installation on the new drive.

To install a tape drive on 4U server models with non-hot-swap power supplies, complete the following steps. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

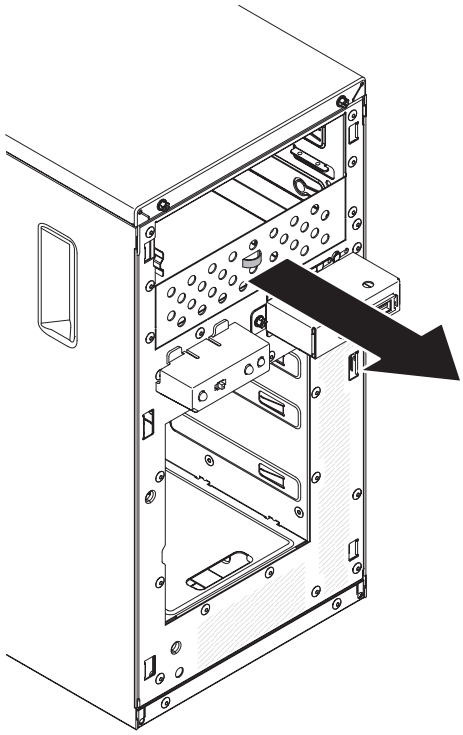
1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the bezel (see “Removing the bezel” on page 31).
4. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
5. Remove the side cover (see “Removing the side cover” on page 30).

6. Remove the air duct.
7. 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.
8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
9. Stand the server back up in its vertical position.
10. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



11. Remove the EMC filler.



Note: Be careful of any sharp edges.

12. Push the drive into the bay.

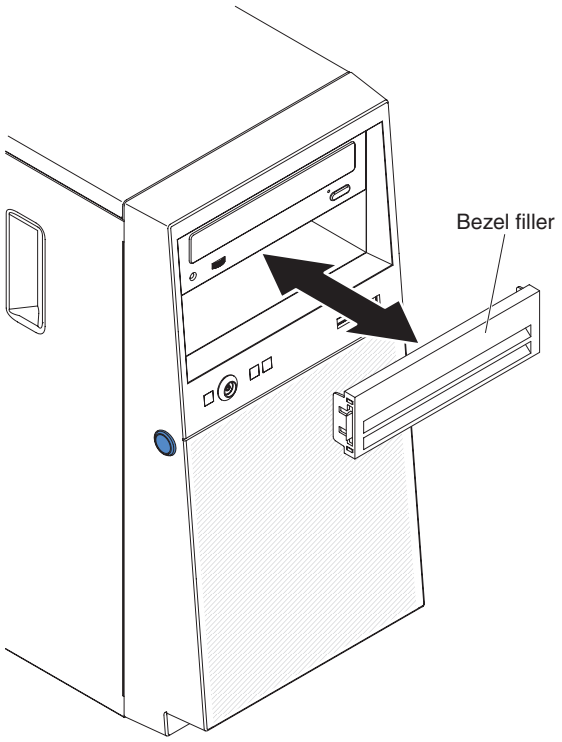
    Note: A tape drive can only be installed in bay 1 or bay 2

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

    Attention: Do not allow the server to fall over.

14. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable connector on the system board.
15. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
16. If you have another drive to install or remove, do so now.
17. Install the air duct.
18. Install the side cover (see “Installing the side cover” on page 71).
19. Stand the server back up in its vertical position.
20. Install the bezel (see “Installing the bezel” on page 68).

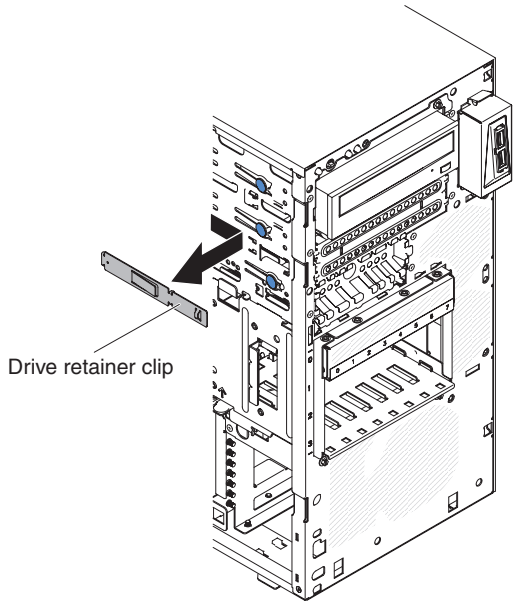
    Note: Remove the bezel filler blocking the installed drive if any.



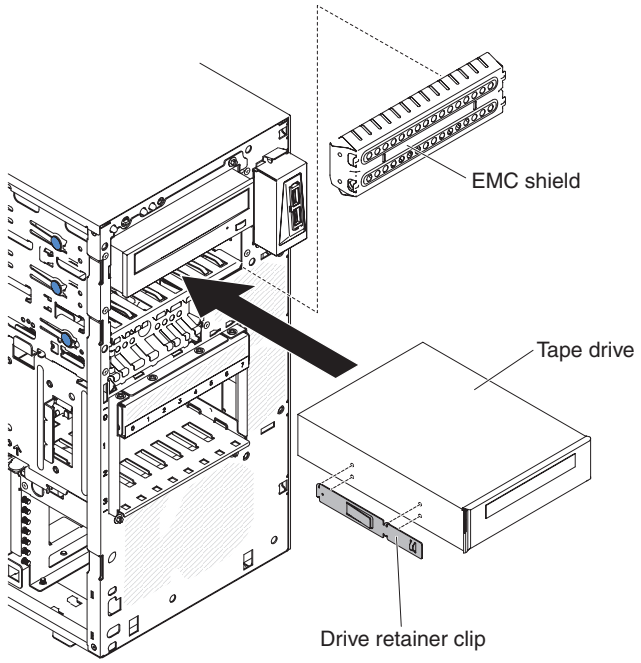
21. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

To install a tape drive on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 30).
4. Remove the lower bezel (see “Removing the lower bezel” on page 32).
5. Remove the upper bezel (see “Removing the upper bezel” on page 33).
6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
8. Slide the drive retainer clip to the front to remove it from the drive cage of bay 2; then, snap the drive retainer clip into the screw holes on the side of the drive.



9. Remove the EMC filler.
10. Push the drive into the bay.



11. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable connector on the system board.
12. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
13. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.
14. Install the upper bezel (see “Installing the upper bezel” on page 70).
15. Install the lower bezel (see “Installing the lower bezel” on page 69).
16. Install and lock the side cover (see “Installing the side cover” on page 71).

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

Installing a simple-swap hard disk drive

This procedure applies only to 4U server models that have non-hot-swap power supplies.

For 4U server models with non-hot-swap power supplies, the server supports up to four 3.5-inch simple-swap SATA hard disk drives, which are accessible from the front of the server. You must disconnect all power from the server before you remove or install simple-swap drives. Before you install a simple-swap SATA hard disk drive, read the following information:

- Install the drives starting from the top bay to the bottom bay (bay 3, 4, 5, and then 6). The following tables list the IDs of the hard disk drives:

Table 9. IDs of simple-swap drives

Drive bay	ID
3	0
4	1
5	2
6	3

- The simple-swap SATA hard disk drives connect to the SATA 0 through SATA 3 connectors on the system board as follows:
  - System board end cable connector 0 connects to the SATA 0 connector on the system board.
  - System board end cable connector 1 connects to the SATA 1 connector on the system board.
  - System board end cable connector 2 connects to the SATA 2 connector on the system board.
  - System board end cable connector 3 connects to the SATA 3 connector on the system board.
-
  - Hard disk drive 0 connects to the SATA 0 connector on the system board.
  - Hard disk drive 1 connects to the SATA ***2*** connector on the system board.
  - Hard disk drive 2 connects to the SATA ***1*** connector on the system board.
  - Hard disk drive 3 connects to the SATA 3 connector on the system board.

Note: Under RAID mode:

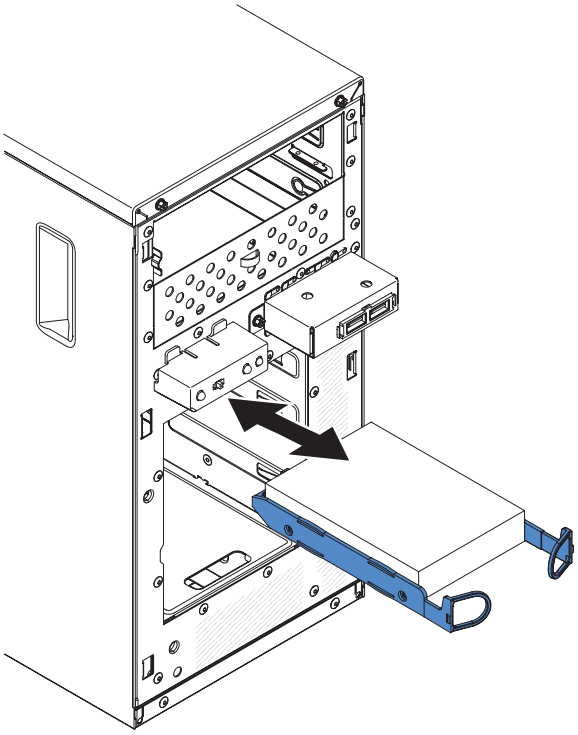
1. In uEFI setup menu:
   - Drive 0 indicates hard disk drive 0.
   - Drive 1 indicates hard disk drive ***2***.
   - Drive 2 indicates hard disk drive ***1***.
   - Drive 3 indicates hard disk drive 3.
2. In MegaRAID Storage Manager utility:
   - Slot 0 indicates hard disk drive 0.
   - Slot 1 indicates hard disk drive ***2***.
   - Slot 2 indicates hard disk drive ***1***.
   - Slot 3 indicates hard disk drive 3.

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before you remove or install a simple-swap hard disk drive.

Note: If you installed a ServeRAID adapter in the server, connect the other end of the SATA signal cable to the connector on the ServeRAID adapter.

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

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Remove the bezel (see “Removing the bezel” on page 31).
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. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
6. Pull the round blue loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it stops, and release the loops.



Note: Do not release the loops on the drive assembly until it is completely seated.

7. If you have another drive to install or remove, do so now.
8. Install the bezel (see “Installing the bezel” on page 68).
9. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Note: 3TB hard disk drives are not supported in OS 4690.

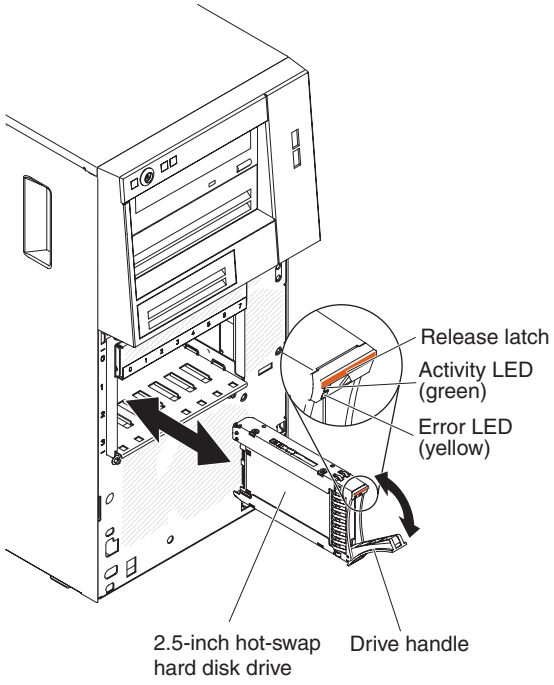
Installing a hot-swap hard disk drive

This procedure applies only to the 5U server model with hot-swap power supplies (Model name: 2582-F4x).

Before you install a hot-swap hard disk drive, read the following information:

- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; the two types cannot be combined.
- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without at least one hard disk drive installed in the drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.

To install a hot-swap hard disk drive on the 5U server model that have hot-swap power supplies (Model name: 2582-F4x), complete the following steps.



1. 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.
2. Make sure that the drive tray handle is in the open position.
3. Align the drive assembly with the guide rails in the bay; then, carefully slide the drive assembly into the drive bay until the drive stops.
4. Rotate the drive tray handle to the closed position.
5. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server for the drive to be recognized.) If the yellow hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, this indicates that the drive is being accessed.

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

6. Install the lower bezel (see “Installing the lower bezel” on page 69).
7. Install and lock the side cover (see “Installing the side cover” on page 71).

Power and signal cables for internal drives of 4U server models

The server uses cables to connect SATA attached, simple-swap SATA devices to the power supply and to the system board. (See “System-board internal connectors” on page 23 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, make sure that one of the signal cable drive connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board or a compatible adapter or controller that you have installed.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the ends of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or SATA power cable with SATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect SATA attached, SATA and SAS to the system board. Two or three types of signal cables come with the server:
  - **SATA attached (for optical drives):** The flat SATA-attached signal cable has two connectors. One of these connectors is attached to the optical drive, and one is attached to one of the connectors on the system board.
  - **Simple-swap SATA:** Simple-swap SATA models come with four SATA cables that are already connected to the system board and the backplate at the rear of the simple-swap drive cage.

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

For a list of supported optional devices for the server, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

Installing a ServeRAID adapter

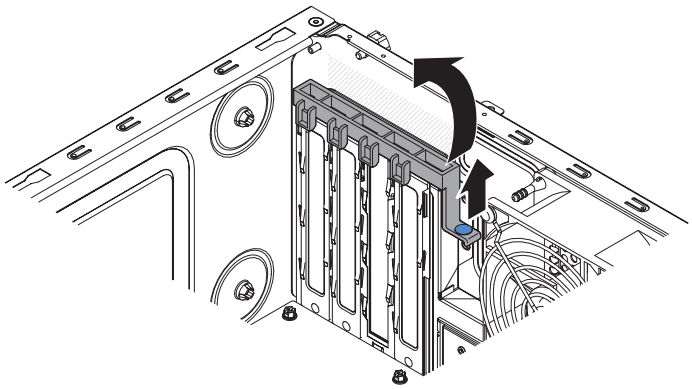
For information about the types of adapters that the server supports and other information that you might consider when you install an adapter, see the *Installation and User’s Guide*. (For the locations of the expansion slots and connectors, see “System-board internal connectors” on page 23).

Note: If you are installing Intel Ethernet Quad Port Server Adapter I340-T4 (part number 49Y4240), you can only install the adaptor in slot 1, slot 2, or slot 3.

To install a replacement ServeRAID adapter on 4U server models with non-hot-swap power supplies, complete the following steps. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route cables before you install the adapter.
3. Follow the instructions that come with the adapter to set jumpers or switches, if any.
4. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
5. Turn off the server and all peripheral devices; then, disconnect the power cords and all external cables.
6. Carefully turn the server on its side so that it is lying flat, with the cover facing up.

   Attention: Do not allow the server to fall over.
7. Remove the side cover (see “Removing the side cover” on page 30).
8. Remove the air duct.
9. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
10. Follow the instructions that come with the adapter to set jumpers or switches, if any.
11. Lift the end of the rear adapter retention bracket till the tab disengages the hole on the chassis.

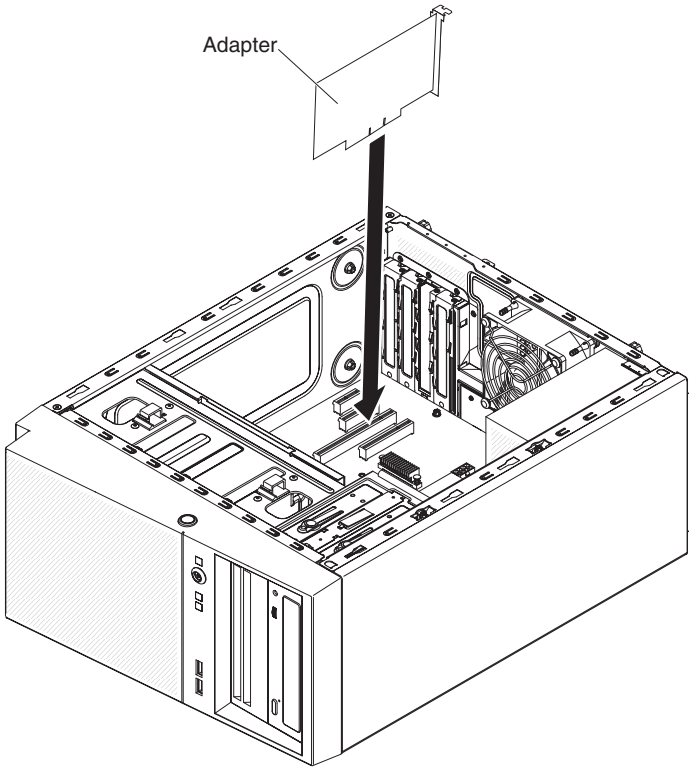


12. Rotate the rear adapter retention bracket upward to remove it from the chassis.
13. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

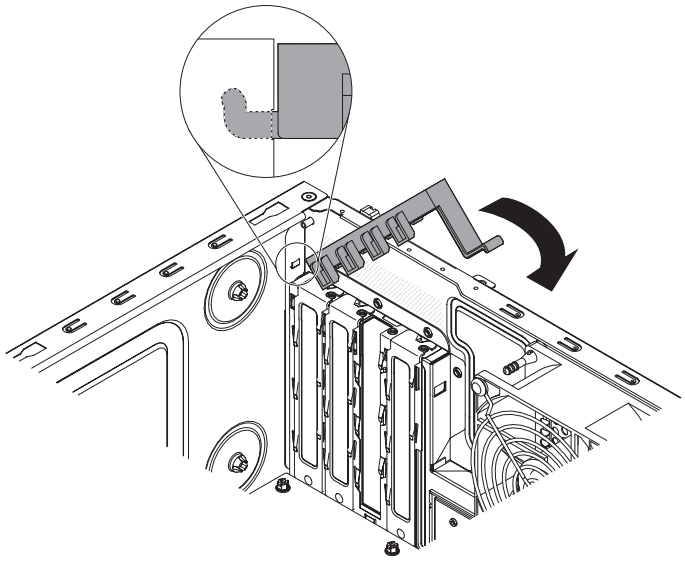
    Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.

14. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
15. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot.

    Attention: Make sure that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.



16. Position the rear adapter retention bracket so that the hole in one of the hinge points is aligned with the hinge pin on the chassis; then, place the hinge pin through the hole on the chassis.



17. Rotate the rear adapter retention bracket into place so that the hole in the opposite hinge point snaps into place over the hinge pin on the chassis.
18. Connect any required cables to the adapter. Route the cables so that they do not block the flow of air from the system fan.
19. Install the air duct.
20. Install the side cover (see “Installing the side cover” on page 71).
21. Stand the server back up in its vertical position.
22. Install the bezel (see “Installing the bezel” on page 68).
23. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

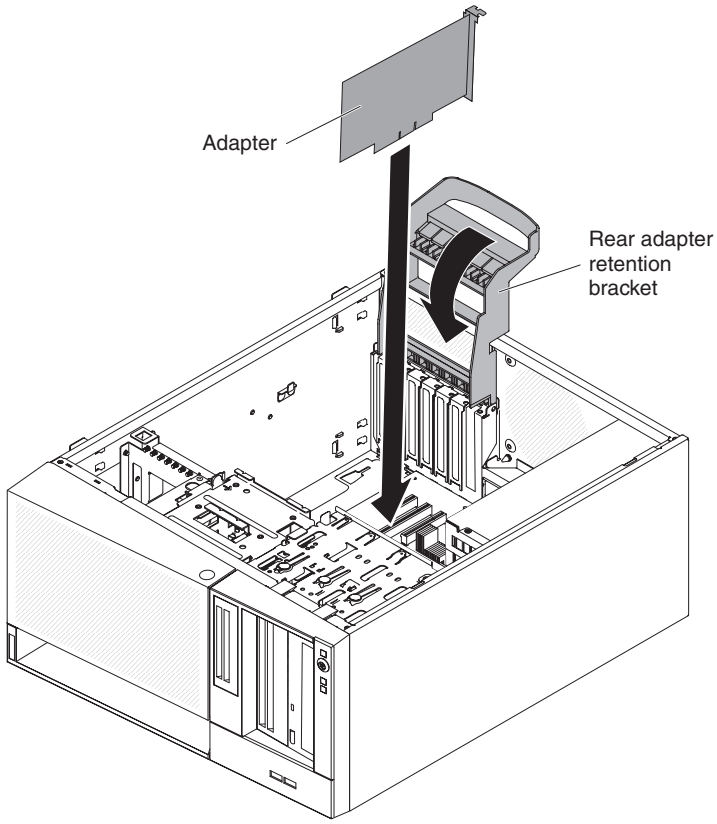
Note: To support Windows 2011 SBS on Brocade adapters need to use at least 3.0.0.0 driver package or later version.

To install a replacement ServeRAID adapter on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route cables before you install the adapter.
3. Follow the instructions that come with the adapter to set jumpers or switches, if any.
4. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
5. Turn off the server and all peripheral devices; then, disconnect the power cords and all external cables.
6. Unlock and remove the side cover (see “Removing the side cover” on page 30).

7. Carefully turn the server on its side so that it is lying flat, with the system board facing up.

   Attention: Do not allow the server to fall over.
8. Rotate the rear adapter-retention bracket to the open (unlocked) position.
9. Carefully grasp the adapter by the top edge or upper corner, and move the adapter directly from the static-protective package to the expansion slot. Align the adapter with the expansion slot guides; then, press the adapter firmly into the expansion slot.
10. Connect the required cables to the adapter. Route cables so that they do not block the air flow from the fan.
11. Rotate the rear adapter-retention bracket to the closed (locked) position.



12. Install and lock the side cover (see “Installing the side cover” on page 71).
13. Stand the server back up in its vertical position.
14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing a microprocessor and heat sink

To install the microprocessor and heat sink on 4U server models with non-hot-swap power supplies, complete the following steps. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

1. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
2. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.

3. Rotate the release lever on the microprocessor socket to the fully open position.

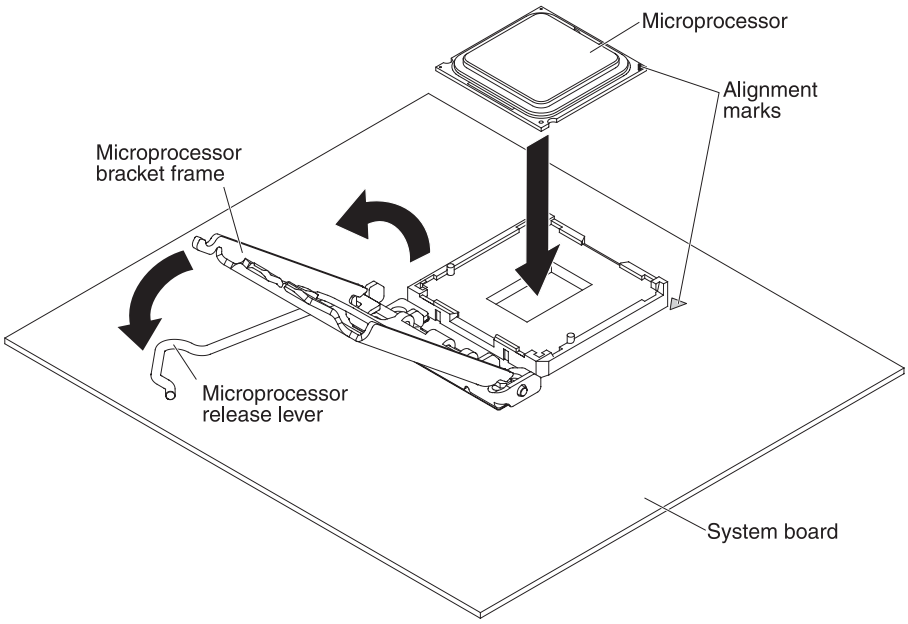
   Attention: Make sure that the release lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

4. Carefully grasp the microprocessor and place the microprocessor into the microprocessor socket.

   Note: To maintain correct orientation between the microprocessor and the microprocessor socket during installation, observe the following information:

   - The microprocessor has two notches that are keyed to two tabs on the sides of the socket.
   - A triangle-shaped indicator on one corner of the microprocessor points to a 45-degree angle on the system board.
   - Do not use excessive force when you press the microprocessor into the socket.

5. Close the microprocessor bracket frame; then, close the microprocessor retention latch and lock it securely in place.



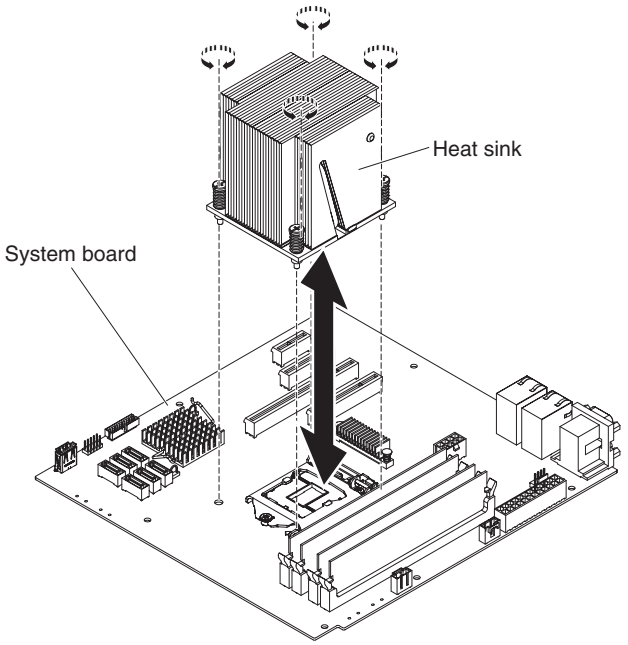
6. Install the heat sink:

   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, contact your service technician.

   a. Align the screw holes on the heat sink with the holes on the system board.
   b. Tighten the screws with a screwdriver, alternating among the screws until they are tight. If possible, each screw should be rotated two full rotations at a time. Repeat until the screws are tight. Do not overtighten the screws by using excessive force.

      Important: 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,

contact your service technician.



7. Reconnect any cables that you disconnected during the removal of the old microprocessor.
8. Secure the SATA signal cables with the retention-clips.
9. Install the air duct.
10. Install the side cover (see “Installing the side cover” on page 71).
11. Stand the server back up in its vertical position.
12. Install the bezel (see “Installing the bezel” on page 68).
13. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

To install the microprocessor and heat sink on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

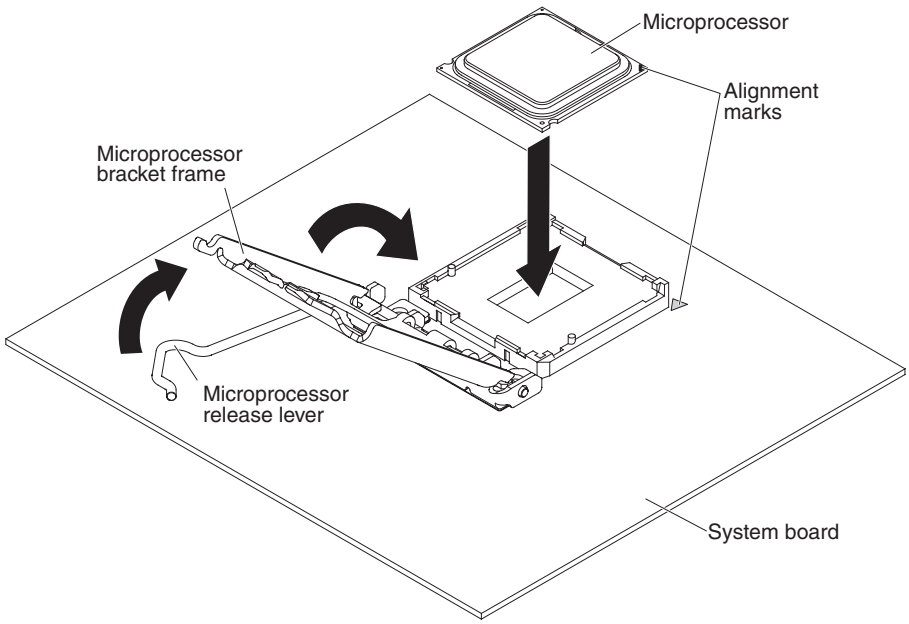
1. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
2. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.
3. Rotate the release lever on the microprocessor socket to the fully open position.

   Attention: Make sure that the release lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.
4. Carefully grasp the microprocessor and place the microprocessor into the microprocessor socket.

   Note: To maintain correct orientation between the microprocessor and the microprocessor socket during installation, observe the following information:

- The microprocessor has two notches that are keyed to two tabs on the sides of the socket.
- A triangle-shaped indicator on one corner of the microprocessor points to a 45-degree angle on the system board.
- Do not use excessive force when you press the microprocessor into the socket.

5. Close the microprocessor bracket frame; then, close the microprocessor retention latch and lock it securely in place.

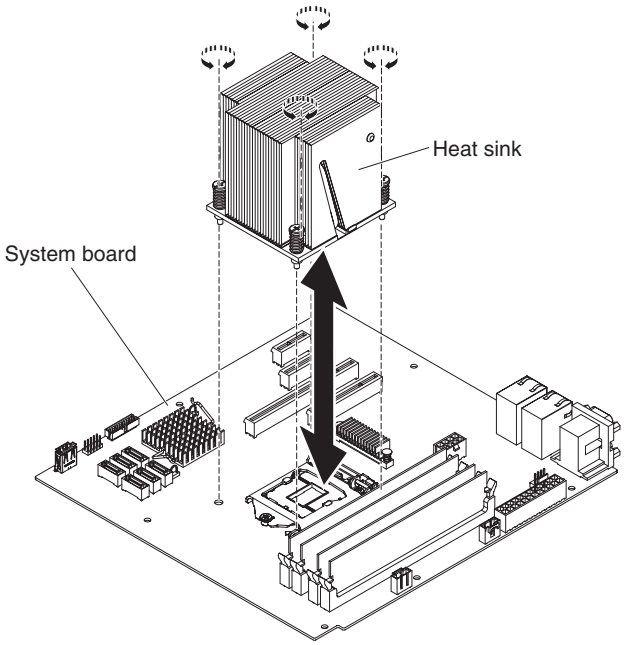


6. Install the heat sink:

   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, contact your service technician.

   a. Align the screw holes on the heat sink with the holes on the system board.
   b. Tighten the screws with a screwdriver, alternating among the screws until they are tight. If possible, each screw should be rotated two full rotations at a time. Repeat until the screws are tight. Do not overtighten the screws by using excessive force.

      Important: 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, contact your service technician.



7. Reconnect any cables that you disconnected during the removal of the old microprocessor.
8. Rotate the rear adapter-retention bracket to the closed (locked) position.
9. Stand the server back up in its vertical position.
10. Install and lock the side cover (see “Installing the side cover” on page 71).
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Thermal grease

The thermal grease must be replaced whenever the heat sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

When you are installing the heat sink on the same microprocessor that is was removed from, make sure that:

- 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.

Note:

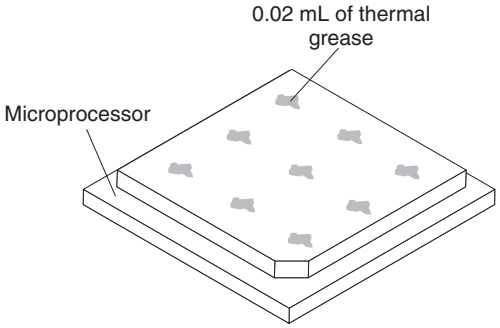
- Read the safety information that begins on page vii and “Installation guidelines” on page 27.
- Read “Handling static-sensitive devices” on page 28.

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

1. Place the heat sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

Note: Make sure that all of the thermal grease is removed.

4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge of the microprocessor, this is to ensure uniform distribution of the grease.

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

6. Install the heat sink onto the microprocessor as described in “Installing a microprocessor and heat sink” on page 59.

Installing the non-hot-swap power supply

This procedure applies only to 4U server models that have non-hot-swap power supplies.

Statement 8:

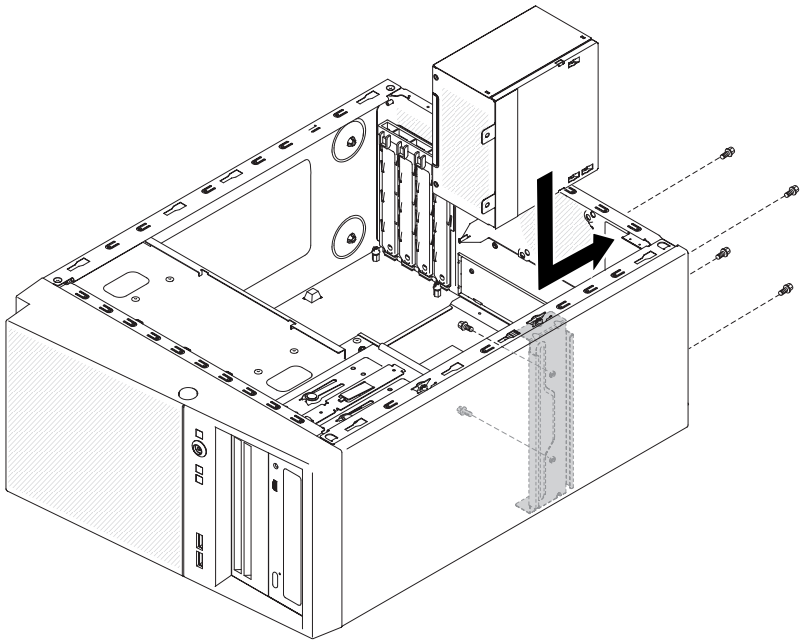
CAUTION:
Never Remove the server top cover on a power supply or any part that has the following label attached.

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.

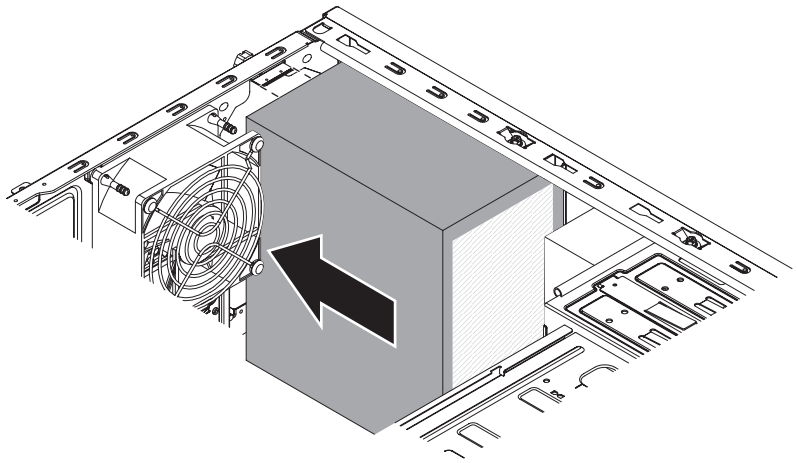
To install a non-hot-swap power supply on 4U server models with non-hot-swap power supplies, complete the following steps:

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

1. Remove the air duct.
2. Remove the heat sink (see “Installing a microprocessor and heat sink” on page 59).
3. Position the power supply in the chassis so that the screw holes in the power supply are aligned with the corresponding holes in the rear of the chassis.



Note: Make sure the top and the bottom of the power supply align with the upper and lower tabs on the opening.



4. Install the screws that secure the power supply to the chassis.
5. Install the air duct.
6. Install the side cover (see “Installing the side cover” on page 71).
7. Stand the server back up in its vertical position.
8. Install the bezel (see “Installing the bezel” on page 68).
9. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing the hot-swap power supply

This procedure applies only to the 5U server model with hot-swap power supplies (Model name: 2582-F4x).

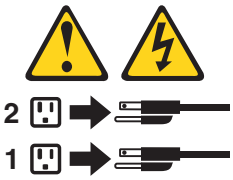
The following items describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- To confirm that the server supports the power supply that you are installing, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
- The server comes standard with one 430-watt hot-swap power supply. The input voltage is 110 V ac or 220 V ac auto-sensing.
- 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.
- The server can run fully configured with one power supply. For redundancy support, you must install the second hot-swap power supply.

Note: You cannot mix high-efficiency and non-high-efficiency power supplies in the server.

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:

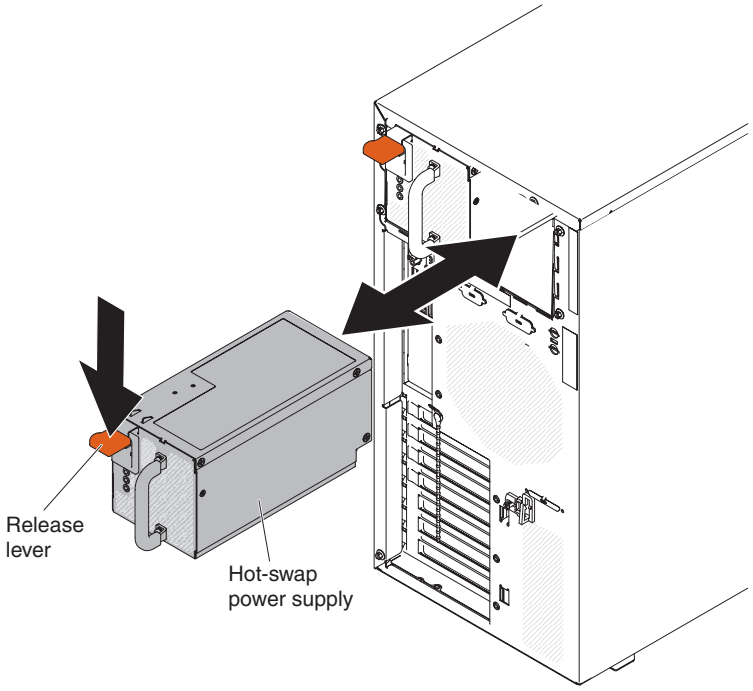
CAUTION:
Never Remove the server top cover on a power supply or any part that has the following label attached.

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.

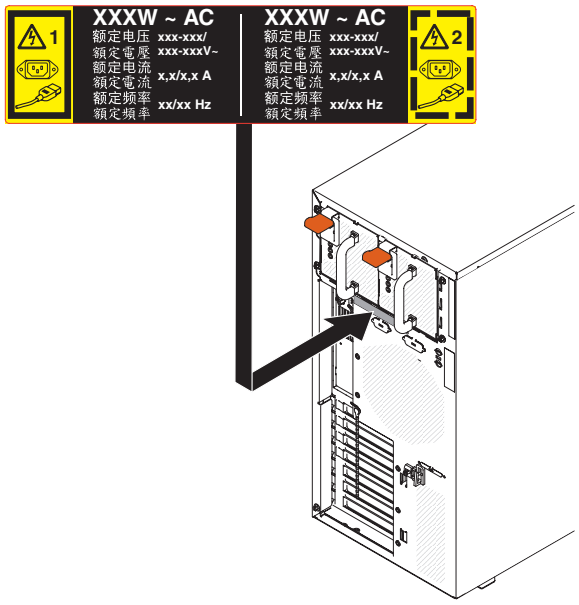
Attention: During normal operation, each power-supply bay must contain either a power supply or power-supply filler for proper cooling.

To install a hot-swap power supply on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps.

1. Place the power supply into the bay guides.
2. Using the handle, push the power supply toward the front of the chassis until it locks into place.



3. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.
4. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.
5. If you are adding a power supply to the server, attach the redundant power information label that comes with this option on the server top cover near the power supplies.



Completing the installation

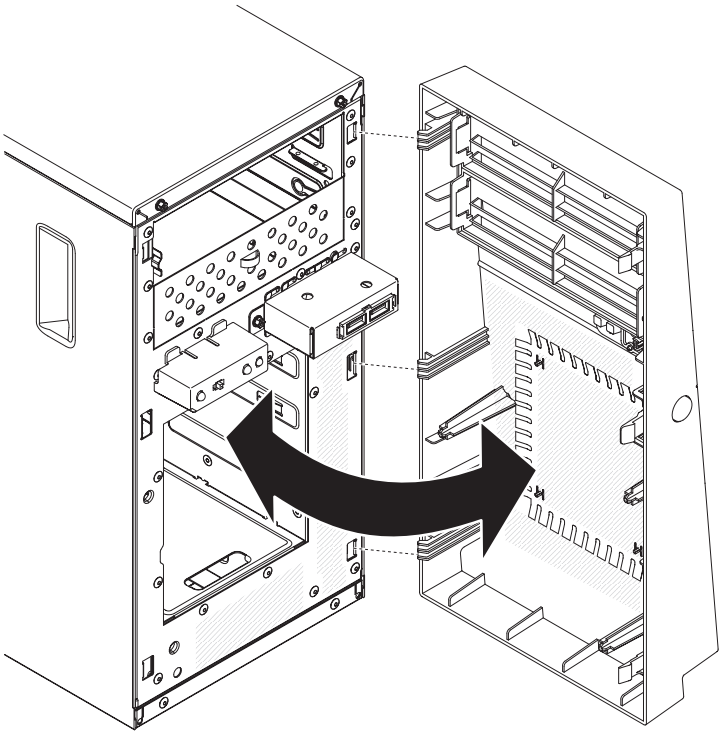
To complete the installation, you must reinstall the two-piece bezel, reinstall the side cover, connect all the cables and, for some devices, run the Setup utility. Follow the instructions in this section.

Installing the bezel

This procedure applies only to 4U server models that have non-hot-swap power supplies.

To install the bezel on 4U server models with non-hot-swap power supplies, complete the following steps.

1. Insert the three tabs on the bezel into the corresponding holes in the front of the server.
2. Rotate the bezel to the server until it locks securely into place.



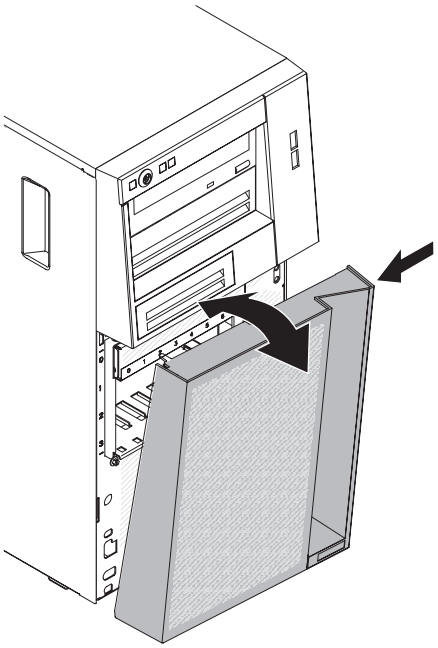
3. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing the lower bezel

This procedure applies only to the 5U server model with hot-swap power supplies (Model name: 2582-F4x).

To install the lower bezel on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps.

1. Insert the two bottom tabs on the lower bezel into the corresponding holes in the front of the chassis.



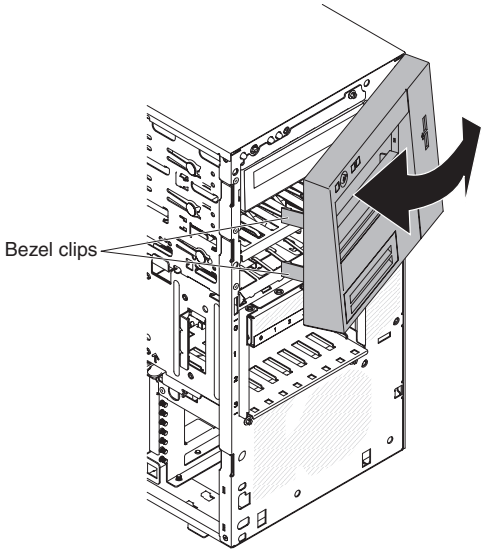
2. Rotate the top of the lower bezel up to the chassis; then, press the blue-colored release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.
3. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing the upper bezel

This procedure applies only to the 5U server model with hot-swap power supplies (Model name: 2582-F4x).

To install the upper bezel on the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps.

1. Insert the two tabs on the right-side of the upper bezel into the corresponding holes on the right side of the chassis.



2. Rotate the upper bezel to the left side of the chassis until the bezel clips are aligned with the corresponding indentations on the left side of the chassis and snap them into place.
3. Install the lower bezel (see “Installing the lower bezel” on page 69).
4. Install and lock the side cover (see “Installing the side cover”).
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

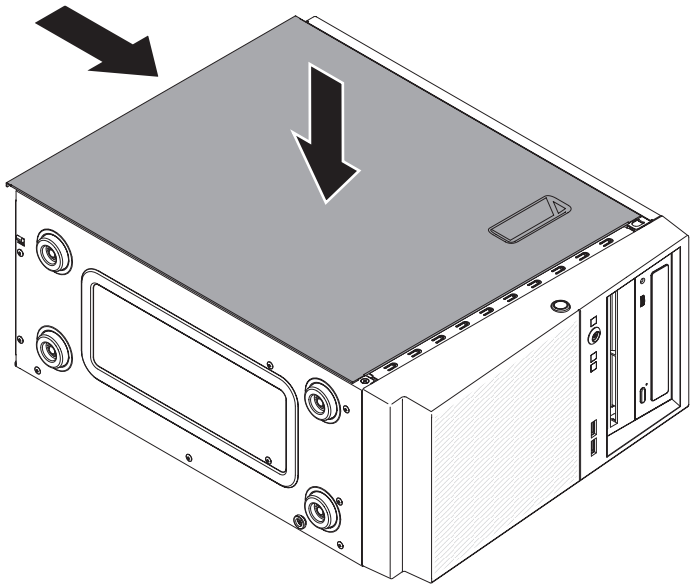
Installing the side cover

Attention: For proper cooling and airflow, replace the side cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the side cover removed might damage server components.

For 4U server models with non-hot-swap power supplies, complete the following steps in order to remove the side cover. For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), please see the next sub-section.

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

   Attention: Do not allow the server to fall over.
3. Press on the side cover and push from the rear side of the side cover until it locks securely into place.

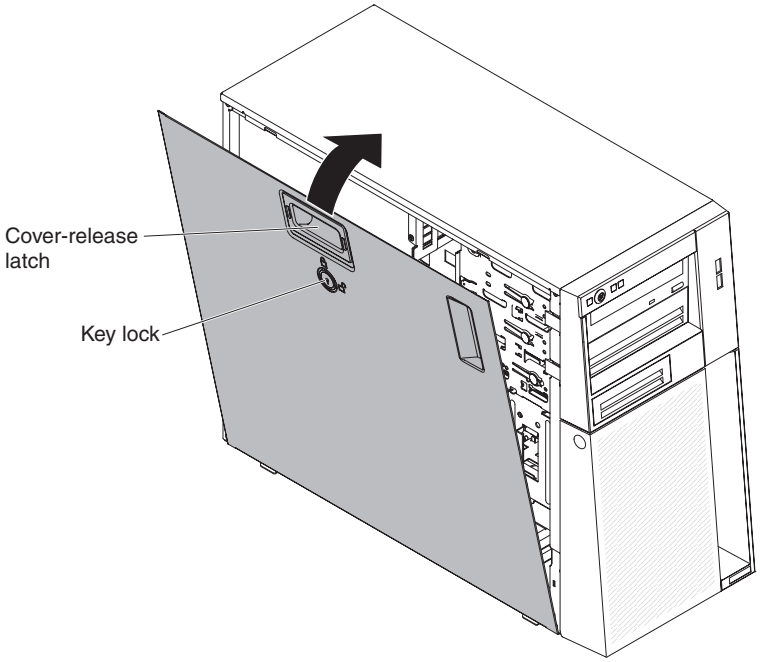


4. Secure the side cover in place with the two chassis screws on the rear of the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

For the 5U server model with hot-swap power supplies (Model name: 2582-F4x), complete the following steps in order to remove the side cover. For 4U server models with non-hot-swap power supplies, please see the above sub-section.

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: The cover lock must be in the unlocked (opened) position before you install the side cover.
2. If you removed the upper and lower bezels, reinstall them before you replace the side cover (see “Installing the upper bezel” on page 70 and “Installing the lower bezel” on page 69).
3. Position the lip at the bottom edge of the side cover on the ledge at the bottom of the chassis; then, rotate the cover up to the chassis. Press down on the cover release latch and push the cover into the chassis until it latches securely into place.



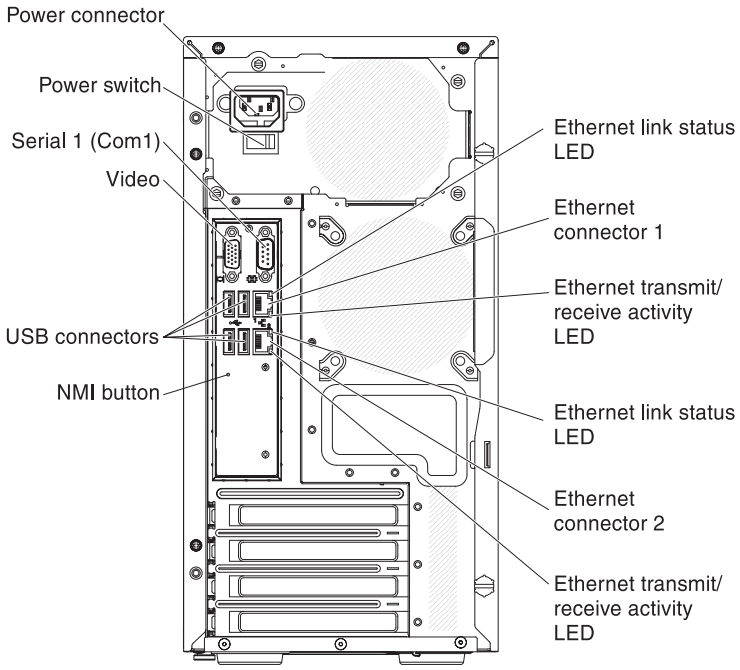
4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Connecting the cables

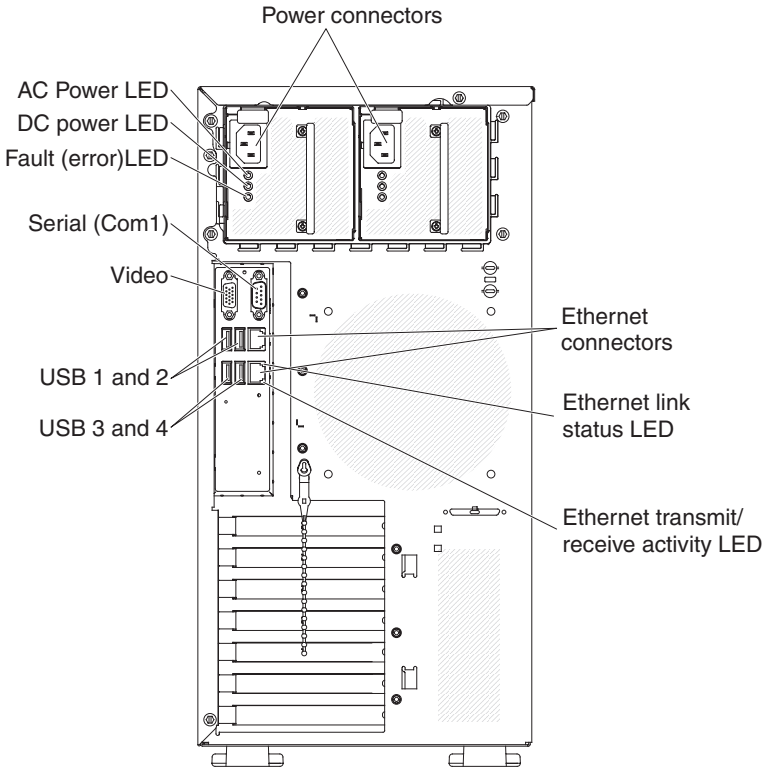
Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the rear of server models with non-hot-swap power supplies (4U chassis).



The following illustration shows the input/output (I/O) connectors on the rear of the 5U server model with hot-swap power supplies (Model name: 2582-F4x).



Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external 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. For additional information, see “Using the Setup utility” on page 78.

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

If the server has a ServeRAID adapter and you have installed or removed a hard disk drive, see the ServeRAID documentation for information about reconfiguring the disk arrays.

Connecting external devices

If you install a supported optional adapter, you can attach external devices to the server.

To attach an external device, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 27.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the device to prepare it for installation and to connect it to the server.

Note: If you are attaching an external device, see the documentation that comes with the device for information about cabling.

Installing the server in a rack

To convert the server from a tower model to a rack model, you must use a Tower-to-Rack Kit. You can then install the server in a rack cabinet. To order a Tower-to-Rack Kit for the server, contact your IBM marketing representative or authorized reseller.

Notes:

1. It is not necessary to remove the following items from the tower when installing the system in a rack cabinet.
   - Front bezel
   - DVD-ROM drive
   - Tape drive
   - Front USB connector assembly
   - Operator information panel assembly
2. After installing the system in a rack cabinet, the distance between the EIA bracket and lower bezel will be roughly 67 mm. In light of this distance, please make sure your rack cabinet door can fully close before you begin to install the system in the rack cabinet.

Chapter 3. Configuring the server

The following configuration programs and utilities come with the server:

- **Setup utility**

  The UEFI (formerly BIOS) Setup Utility program is part of the basic input/output system firmware. Use it to change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see “Using the Setup utility” on page 78.

- **Boot Manager program**

  The Boot Manager program is part of the server firmware. Use it to override the startup sequence that is set in the Setup utility and temporarily assign a device to be first in the startup sequence. For more information about using this program, see “Using the Boot Manager program” on page 82.

  Note: OPROM configuration utility is only available for emulex 10G card.

- **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 88.

- **Integrated management module II**

  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 system. For information about using the IMM2, see “Using the integrated management module II” on page 83.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 90.

- **LSI Configuration Utility program**

  Use the LSI Configuration Utility program to configure the integrated SAS/SATA controller with RAID capabilities and the devices that are attached to it. For information about using this program, see “Using LSI Configuration Utility program” on page 92

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

Table 10. 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-BR10il v2 adapter installed	LSI Utility (Setup utility, press Ctrl+C), ServerGuide	MegaRAID Storage Manager (for monitoring storage only)

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

  Use this program as an alternative to the Setup utility for modifying UEFI settings and IMM2 settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the server to access the Setup utility. For more information about using this program, see “IBM Advanced Settings Utility program” on page 95.

Using the Setup utility

Use the setup utility program to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Resolve configuration conflicts

Starting the Setup utility

To start the Setup utility, complete the following steps:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active after the power-on LED flashes slowly.
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

The following choices are on the Setup utility main menu. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information. This choice is on the full Setup utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessor, 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 II 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.

  – **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. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

– **Power**

  Select this choice to view or change power capping to control consumption, processors, and performance states.

– **Legacy Support**

  Select this choice to view or set legacy support.

  - **Force Legacy Video on Boot**

    Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

  - **Rehook INT 19h**

    Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

  - **Legacy Thunk Support**

    Select this choice to enable or disable UEFI to interact with PCI mass storage devices that are non-UEFI compliant.

– **Integrated management module II**

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

  - **POST Watchdog Timer**

    Select this choice to view or enable the POST watchdog timer.

  - **POST Watchdog Timer Value**

    Select this choice to view or set the POST loader watchdog timer value.

  - **Reboot System on NMI**

    Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Enable** is the default.

  - **Commands on USB Interface Preference**

    Select this choice to enable or disable the Ethernet over USB interface on IMM2.

  - **Network Configuration**

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

  - **Reset IMM2 to Defaults**

    Select this choice to view or reset IMM2 to the default settings.

  - **Reset IMM2**

    Select this choice to reset IMM2.

– **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.

– **Network**

Select this choice to view or configure the network device options, such as iSCSI, PXE, and network devices.

- **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 boot to devices, including the startup sequence. The server starts from the first boot record that it finds.

  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

  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.

  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.

  Note: OPROM configuration utility is only available for emulex 10G card.

- **System Event Logs**

  Select this choice to enter the System Event Manager, where you can view the POST event log and system-event log.

  The POST event log contains the three 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 integrated management module that is embedded in the integrated management module II.

  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 event log.

  – **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 or clear passwords. See “Passwords” on page 81 for more information.

  This choice is on the full and limited Setup utility menu.

  – **Power-on Password**

    Select this choice to set a power-on password. See “Power-on password” on page 81 for more information.

  – **Administrator Password**

Select this choice to set an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If an administrator password is set, the full Setup utility menu is available only if you type the administrator password at the password prompt. For more information, see “Administrator password” on page 82.

- **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 must type the power-on 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, the system startup will not be completed until you type the power-on password. You can use any combination of between six and 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 and then reinstall it. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for instructions for removing the battery.
- Change the position of the clear CMOS jumper on the system board to bypass the power-on password check. See “Administrator password” for additional information.

  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 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 power-on password override jumper 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 between six and 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 program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup utility.

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

1. Turn off the server.
2. Restart the server.
3. When the prompt `<F12> Select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up Arrow and Down Arrow keys to select an item from the **Boot Selection Menu** and press **Enter**.

Note: OPROM configuration utility is only available for emulex 10G card.

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 JP2 jumper in the backup position (pins 2 and 3).

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 JP2 jumper back to the primary position (pins 1 and 2).

Using the integrated management module II

The Integrated Management Module II (IMM2) is the second generation of the functions that were formerly provided by the Integrated Management Module (IMM). It combines service processor functions and the video controller in a single chip.

The IMM2 supports the following basic systems-management features:

- Environmental monitor with fan speed control for temperature, voltages, fan failure, and power supply failure. •
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM2 lights the associated system error LED and the failing DIMM error LED.
- System event-log (SEL).
- ROM-based IMM2 firmware flash updates.
- Auto Boot Failure Recovery (ABR).
- Nonmaskable interrupt (NMI) detection and reporting.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating system watchdog timer times-out. The IMM2 allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the system board for an operating-system memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CNFG) LED support.
- Serial over LAN (SOL).
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset).
- Alerts (IPMI style PET traps).

Using IPMItool

IPMItool provides various tools that you can use to manage and configure an IPMI system. You can use IPMItool in-band to manage and configure the IMM2. For more information about IPMItool, or to download IPMItool, go to http://sourceforge.net/

Managing tools and utilities with IMM2 and IBM System x Server Firmware

This section describes the tools and utilities that are supported by IMM2 and IBM System x Server Firmware. The IBM tools that you use to manage the IMM2 in-band do not require you to install device drivers. However, if you choose to use certain tools such as IPMItool in-band, you must install the OpenIPMI drivers.

Updates and downloads for IBM systems-management tools and utilities are available on the IBM website. To check for updates to tools and utilities, complete the following steps.

Note: Changes are made periodically to the IBM website. Procedures for locating firmware and documentation might vary slightly from what is described in this document. See http://www-947.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=TOOL-CENTER.

Using IBM Advanced Settings Utility (ASU)

IBM Advanced Settings Utility (ASU) version 3.0.0 or later is required to manage IMM2. ASU is a tool that you can use to modify firmware settings from the command-line interface on multiple operating-system platforms. It also enables you to issue selected IMM2 setup commands. You can use ASU in-band to manage and configure the IMM2.

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

Using IBM Flash utilities and update utilities

A flash utility enables you to update hardware and server firmware and eliminates the need to manually install new firmware or firmware updates from a physical diskette or other medium. To find a flash utility, complete the following steps:

1. Go to http://www.ibm.com/supportportal/.
2. Under Product support, click System x.
3. Type flash utility in the search field and click Search.
4. Click the link to the applicable flash utility.

A flash utility enables you to update hardware and server firmware and eliminates the need to manually install new firmware or firmware updates from a physical diskette or other medium. To find a flash utility, complete the following steps:

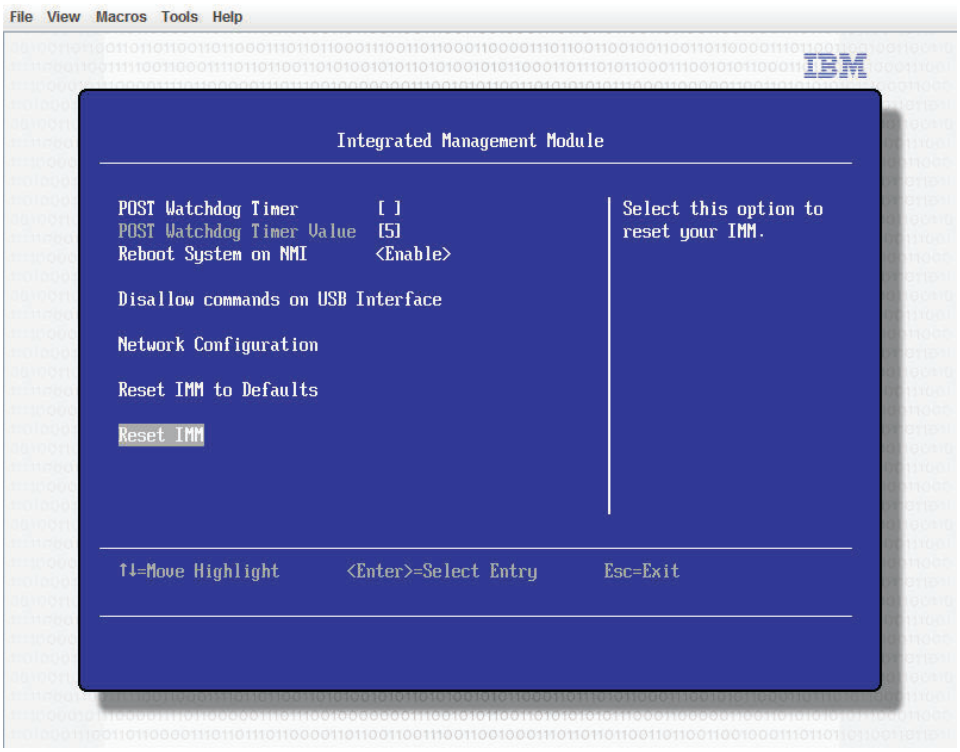
1. Go to http://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-XPRESS.
2. Download IMM, uEFI, pDSA code from http://www.ibm.com/support/fixcentral/.
3. Follow IMM, uEFI, pDSA readme file for firmware update

Resetting the IMM2 with the Setup utility

To reset the IMM2 through the Setup utility, complete the following steps:

1. Turn on the server.

   Note: Approximately 60 seconds after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `F1 Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. 3. From the Setup utility main menu, select **System Settings**.
4. On the next screen, select **Integrated Management Module**.
5. Select **Reset IMM**.



Note: After you reset the IMM2, this confirmation message is displayed immediately:

```
IMM2 reset command has been sent successfully!! Press ENTER to continue.
```

The IMM2 reset process is not yet complete. You must wait approximately 3 minutes for the IMM2 to reset before the IMM2 is functional again. If you attempt to access sever firmware information while the server is resetting, `Unknown` is displayed in the fields, and the description is `Error retrieving information from IMM2`.

LAN over USB

A LAN over USB interface enables in-band communications to the IMM2; the IMM2 hardware on the system board presents an internal Ethernet NIC from the IMM2 to the operating system.

Typically, the IMM2 IP address for the LAN over USB interface is set to a static address of 169.254.95.118 with a subnet mask of 255.255.0.0. In the event of an IP address collision on the network, the IMM2 might obtain a different IP address in the 169.254.xxx.xxx range.

Because the IMM2 might obtain a random IP address for the LAN over USB interface, the ASU and firmware flash utilities, DSA, and the IBM Systems Director Agent use the Service Location Protocol (SLP) to discover the IMM2 IP address. These tools perform an SLP multicast discovery on the LAN over USB interface. When they receive a response from the IMM2, they obtain the attributes that contain the IP address that the IMM2 is using for the LAN over USB interface.

Potential conflicts with the LAN over USB interface

In some situations, the IMM2 LAN over USB interface can conflict with certain network configurations, applications, or both. For example, Open MPI attempts to use all of the available network interfaces on a server. Open MPI detects the IMM2 LAN over USB interface and attempts to use it to communicate with other systems in a clustered environment. The LAN over USB interface is an internal interface, so this interface does not work for external communications with other systems in the cluster.

Resolving conflicts with the IMM2 LAN over USB interface

There are several actions that resolve LAN over USB conflicts with network configurations and applications:

- For conflicts with Open MPI, configure the application so that it does not attempt to use the interface.
- Take the interface down (run ifdown under Linux).
- Remove the device driver (run rmmod under Linux).

Configuring the LAN over USB interface manually

For the IMM2 to use the LAN over USB interface, you might have to complete other configuration tasks if the automatic setup fails or if you prefer to set up the LAN over USB manually. The firmware update package or Advanced Settings Utility attempts to perform the setup automatically. For more information about LAN over USB configuration on different operating systems, see the IBM white paper Transitioning to UEFI and IMM on the IBM website.

Installing device drivers

For the IMM2 to use the LAN over USB interface, you might have to install operating-system drivers. If the automatic setup fails or if you prefer to set up the LAN over USB manually, use one of the following procedures. For more information about LAN over USB configuration on different operating systems, see the IBM white paper Transitioning to UEFI and IMM on the IBM website.

Installing the Windows IPMI device driver

The Microsoft IPMI device driver is not installed by default on Microsoft Windows Server 2003 R2 operating systems. To install the Microsoft IPMI device driver, complete the following steps:

1. From the Windows desktop, click**Start → Control Panel → Add or Remove Programs**.
2. Click **Add/Remove Windows Components**.
3. From the component list, select **Management and Monitoring Tools**, and then click **Details**.
4. Select **Hardware Management**.
5. Click **Next**. The installation wizard opens and guides you through the installation.

Note: The Windows installation CD might be required.

Installing the LAN over USB Windows device driver

When you install Windows, an unknown RNDIS device is shown in the Device Manager. You must install a Windows INF file that identifies this device and is required by Windows operating system to detect and use the LAN over USB functionality. The signed version of the INF is included in all of the Windows

versions of the IMM2, UEFI, and DSA update packages. The file needs to be installed only once. To install the Windows INF file, complete the following steps:

1. Obtain the IMM2 update package.
2. Extract the ibm_rndis_server_os.inf and device.cat files from the firmware update package and copy them to the \WINDOWS\inf subdirectory.
3. **For Windows 2003**: Install the ibm_rndis_server_os.inf file by right-clicking on the file and selecting **Install**. This generates a PNF file of the same name in \WINDOWS\inf. **For Windows 2008**: Go to **Computer Management**, then **Device Manager** and locate the RNDIS Device. Select **Properties → Driver → Reinstall driver**. Point the server to the \Windows\inf directory, where it can locate the ibm_rndis_server_os.inf file and install the device.
4. Go to **Computer Management**, then **Device Manager**, right-click **Network adapters**, and select **Scan for hardware changes**. A message confirms that the Ethernet device is found and installed. The New Hardware Wizard starts automatically.
5. When you are prompted Can Windows connect to Windows Update to search for software?, click **No, not this time**. Click **Next** to continue.
6. When you are prompted What do you want the wizard to do?, click **Install from a list or specific location (Advanced)**. Click **Next** to continue.
7. When you are prompted Please choose your search and installation options, click **Don't search. I will choose the driver to install**. Click **Next** to continue.
8. When you are prompted Select a hardware type, and then click Next, click **Network adapters**. Click **Next** to continue.
9. When you are prompted Completing the Found New Hardware Wizard, click **Finish**.

   Note: A new local area connection is displayed and might state This connection has limited or no connectivity. Ignore this message.
10. Go back to the Device Manager. Verify that **IBM USB Remote NDIS Network Device** appears under **Network Adapters**.
11. Open a command prompt, type ipconfig, and press Enter. The local area connection for the IBM USB RNDIS is displayed with an IP address in the range of 169.254.xxx.xxx with a subnet mask set to 255.255.0.0.

Installing the LAN over USB Linux device driver

Current versions of Linux, such as RHEL 5 Update 6 and SLES 10 Service Pack 4, support the LAN over USB interface by default. This interface is detected and displayed during the installation of these operating systems. When you configure the device, use a static IP address of 169.254.95.130 with a subnet mask of 255.255.0.0.

Note: Older Linux distributions might not detect the LAN over USB interface and might require manual configuration. For information about configuring LAN over USB on specific Linux distributions, see the IBM white paper *Transitioning to UEFI and IMM* on the IBM website.

The IMM2 LAN over USB interface requires that the usbnet and cdc_ether device drivers be loaded. If the device drivers have not been installed, use the modprobe command to install them. When these device drivers are installed, the IMM2 USB network interface is shown as a network device in the operating system. To discover the name that the operating system has assigned to the IMM2 USB network interface, type:

dmesg | grep -i cdc ether

Use the ifconfig command to configure the interface to have an IP address in the range 169.254.xxx.xxx. For example:

ifconfig IMM2_device_name 169.254.1.102 netmask 255.255.0.0

This interface is configured to have an IP address in the 169.254.xxx.xxx range each time that the operating system is started.

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 hardware options that are installed and uses that information during setup to configure the hardware. Use this CD during the initial installation of the server to simplify the operating-system installations by providing updated device drivers and, in some cases, installing them automatically. To download the CD, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-GUIDE and click **IBM Service and Support Site**.

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

To start the *ServerGuide Setup and Installation* CD, complete the following steps:

1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide Problems" in the *Problem Determination and Service Guide* on the *System x Documentation* CD.
2. Follow the instructions on the screen to:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips for your operating system and adapter.
   e. Start the operating-system installation. You will need your operating-system CD.

The ServerGuide program has the following features:

- An easy-to-use interface
- Diskette-free setup, and configuration programs that are based on detected hardware
- ServeRAID Manager program, which configures your ServeRAID adapter
- Device drivers that are provided for your server model and detected hardware
- Operating-system partition size and file-system type that are selectable during setup

ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your operating-system CD to install the operating system.

The ServerGuide program performs the following tasks:

- Sets system date and time
- Detects the RAID adapter or controller and runs the SAS/SATA RAID configuration program
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- 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

Important: Before you install a legacy operating system (such as VMware) on a server with an LSI SAS controller, you must first complete the following steps:

1. Update the device driver for the LSI SAS controller to the latest level.
2. In the Setup utility, set **Legacy Only** as the first option in the boot sequence in the **Boot Manager** menu.
3. Using the LSI Configuration Utility program, select a boot drive.

For detailed information and instructions, go to https://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5083225.

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up your server model. On a server with a ServeRAID adapter or SAS/SATA controller with RAID capabilities, you can run the SAS/SATA RAID configuration program to create logical drives.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

Typical operating-system installation

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive 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

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM website.

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

1. Go to http://www.ibm.com/supportportal/.
2. Under **Product support**, click **System x**.
3. From the menu on the left side of the page, click **System x support search**.
4. From the **Task** menu, select **Install**.
5. From the **Product family** menu, select **System x3100 M4**.
6. From the **Operating system** menu, select your operating system, and then click **Search** to display the available installation documents.

Enabling the Intel Gigabit Ethernet Utility program

The Intel Gigabit Ethernet Utility program is part of the server firmware. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence. Enable and disable the Intel Gigabit Ethernet Utility program from the Setup utility.

Configuring the Gigabit Ethernet controller

The Ethernet controllers are integrated on the system board. They provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server supports 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 operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller.
To find updated information about configuring the controllers:

1. Go to http://www.ibm.com/supportportal/.
2. Under **Product support**, click **System x**.
3. From the **Product family** menu, select **System x3100 M4**, and click **Continue**.
4. Under **Popular links**, click **Downloads**.
5. Under **Downloads and fixes**, click **View System x3100 M4 downloads**.
6. Under menu, click **Network**.

Enabling and configuring Serial over LAN (SOL)

Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the BIOS settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

To enable and configure the server for SOL, you must update and configure the UEFI code; update and configure the integrated management module II (IMM2) firmware; update and configure the Ethernet controller firmware; and enable the operating system for an SOL connection.

UEFI update and configuration

To update and configure the UEFI code to enable SOL, complete the following steps:

1. Update the UEFI code:
   a. Download the latest version of the UEFI code from http://www.ibm.com/supportportal/.
   b. Update the UEFI code, following the instructions that come with the update file that you downloaded.
2. Update the IMM2 firmware:
   a. Download the latest version of the IMM2 firmware from http://www.ibm.com/supportportal/ or http://www.ibm.com/support/fixcentral/.
   b. Update the IMM2 firmware, following the instructions that come with the update file that you downloaded.
3. Configure the UEFI settings:
   a. When you are prompted to start the Configuration/Setup Utility program, restart the server and press F1.
   b. Select **System Settings** → **Devices and I/O Ports**.
   c. Select **Console Redirection Settings**; then, make sure that the values are set as follows:
      - **COM Port 1**: Enable
      - **COM Port 2**: Enable
      - **Remote Console**: Disable
      - **Serial Port Sharing**: Disable
      - **Serial Port Access Mode**: Disable
      - **Legacy Option ROM Display**: COM Port 1
      - **Baud Rate**: 115200
      - **Data Bits**: 8
      - **Parity**: Select any of the following three options:
        – None
        – Odd
        – Even
      - **Stop Bits**: 1

        Attention: In Linux operating system, if the number "2" is selected for the Stop Bits setting, the Parity setting must be set to "None".
      - **Thermal Emulation**: ANSI
      - **Active After Boot**: Enable
      - **Flow Control**: Hardware

d. Press Esc twice to exit the **Devices and I/O Ports** section of the Configuration/Setup Utility program.
e. Select **Save Settings**; then, press Enter.
f. Press Enter to confirm.
g. Select **Exit Setup**; then, press Enter.
h. Make sure that Yes, exit the Setup Utility is selected; then, press Enter.

Using LSI Configuration Utility program

Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use this program as described in this document.

- Use the LSI Configuration Utility program to perform the following tasks:
  - Perform a low-level format on a hard disk drive
  - Create an array of hard disk drives with or without a hot-spare drive
  - Set protocol parameters on hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 0, RAID 1, and RAID 5 for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change settings for attached devices.

In addition, you can download an LSI command-line configuration program from http://www.ibm.com/supportportal/.

When you are using the LSI Configuration Utility program to configure and manage arrays, consider the following information:

- The integrated SAS/SATA controller with RAID capabilities supports the following features:
  - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

    Use this option to create an integrated array of two disks plus up to two optional hot spares. All data on the primary disk can be migrated.
  - Integrated Striping (IS) (also known as RAID 0)

    Use this option to create an integrated striping array of two to eight disks. All data on the array disks will be deleted.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- If you use an integrated SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing settings for attached devices.

Starting the LSI Configuration Utility program

To start the LSI Configuration Utility program, complete the following steps:

1. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active after the power-on LED flashes slowly.

2. When the prompt <F1 Setup> is displayed, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **System Settings → Adapters and UEFI drivers**.
4. Select **Please refresh this page on the first visit** and press Enter.
5. Select **LSI** *controller_driver_name Driver* and press Enter, where *controller_driver_name* is the name of the SAS/SATA controller driver. For the SAS/SATA controller driver name, see the documentation that comes with your controller.
6. To perform storage-management tasks, follow the procedures in the documentation that comes with the SAS/SATA controller.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Formatting a hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

Note: Before you format a hard disk, make sure that the disk is not part of a mirrored pair.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format and press Enter.
2. Select **SAS Topology** and press Enter.
3. Select **Direct Attach Devices** and press Enter.
4. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key. Press Alt+D.
5. To start the low-level formatting operation, select **Format** and press Enter.

Creating a RAID array of hard disk drives

To create a RAID array of hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drives that you want to mirror.
2. Select **RAID Properties**.
3. Select the type of array that you want to create.
4. Use the arrow keys to highlight the first drive in the pair; then, press the Minus (-) or Plus (+) key to change the mirror value to **Primary**.
5. Continue to select the next drive using the Minus (-) or Plus (+) key until you have selected all the drives for your array.
6. Press C to create the disk array.
7. Select **Apply changes and exit menu** to create the array.

Creating a software RAID array of hard disk drives

To create a software RAID array of hard disk drives, complete the following steps:

1. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active after the power-on LED flashes slowly.

2. When the prompt <F1 Setup> is displayed, press F1. If you have set an administrator password, you are prompted to type the password.
3. Under **System Settings**, select **Devices and I/O Ports**.
4. Confirm to configure SATA as **RAID**.
5. Save the setting and **reboot the system**.
6. Press F1 to boot the uEFI setup menu.
7. Under **System Settings**, select **Storage**.
8. Under **Configuration Options**, select **LSI MegaRAID Controller Configuration Utility → Virtual Drive Management → Create Configuration**.
9. Select the type of array that you want to create.
10. Select **Select Drives** and use space key to select all the drives for your array.
11. Select **Apply Change** to create the array.
12. When the prompt Success is displayed, select **OK** to continue.
13. After the system auto skip to the next screen, select **Save Configuration** .
14. When the prompt create RAID will cause data lost on the physical HDD is displayed, use space key to select **Confirm**.
15. Select **Yes** to continue.
16. Select **OK** to continue.
17. To initialize virtual disk, select **LSI MegaRAID Controller Configuration Utility → Virtual Drive Management → Select Virtual Drive Operation**.
18. Select **Start Operation** .
19. Select **Yes** to confirm.
20. When the prompt Success is displayed, select **OK**.

Notes:

1. Software RAID is not supported in Redhat 6.1 UEFI mode.
2. You can create software RAID with Linux OS RAID. LSI software RAID is turned off in Linux OS by default.
3. Legacy OS installation is not supported when BBS boot is enabled on ServeRAID M5014.
4. Brocade adapters are supported in Windows 2011 SBS with 3.0.0.0 driver package or later version installed.

Disable a software RAID array of hard disk drives

To disable a software RAID array of hard disk drives, complete the following steps:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active after the power-on LED flashes slowly.
2. When the prompt <F1 Setup> is displayed, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **Devices and I/O Ports → Adapters and UEFI drivers**.
4. Save the setting and reboot the system.
5. Press F1 to boot the uEFI setup menu.
6. Select **Devices and I/O Ports → Configure SATA as**.

7. Select **IDE** or **AHCI**.
8. Save the setting and **reboot the system**.

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.

For more information and to download the ASU program, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=TOOL-ASU.

Updating IBM Systems Director

If you plan to use IBM Systems Director to manage the server, you must check for the latest applicable IBM Systems Director updates and interim fixes.

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

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

1. Check for the latest version of IBM Systems Director:
   a. Go to http://www.ibm.com/systems/software/director/downloads/index.html.
   b. If a newer version of IBM Systems Director than what comes with the server is shown in the drop-down list, follow the instructions on the web page to download the latest version.
2. Install the IBM Systems Director program.

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

1. Make sure that you have run the Discovery and Inventory collection tasks.
2. On the Welcome page of the IBM Systems Director web interface, click **View updates**.
3. Click **Check for updates**. The available updates are displayed in a table.
4. Select the updates that you want to install, and click **Install** to start the installation wizard.

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

1. Make sure that you have run the Discovery and Inventory collection tasks.
2. On a system that is connected to the Internet, go to http://www.ibm.com/eserver/support/fixes/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.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your IBM product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that

contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. The address for IBM System x® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/systems/intellistation/.

How to send Dynamic System Analysis data to IBM

Use the IBM Enhanced Customer Data Repository to send diagnostic data to IBM. Before you send diagnostic data to IBM, read the terms of use at http://www.ibm.com/de/support/ecurep/terms.html.

You can use any of the following methods to send diagnostic data to IBM:

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

Creating a personalized support web page

At http://www.ibm.com/support/mynotifications/, you can create a personalized support web page by identifying IBM products that are of interest to you. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/supline/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

Appendix B. Notices

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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.

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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 server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the server, IBM may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 11. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days

[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

Information Development
IBM Corporation
205/A015
3039 E. Cornwallis Road
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195

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In the request, be sure to include the publication part number and title.

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Telecommunication regulatory statement

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, nor is it intended to be used in a public services network.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

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Dieses Produkt entspricht dem “Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)”. Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

VCCI Class A statement

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This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

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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.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

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此为 A 级产品。在生活环境中，
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在这种情况下，可能需要用户对其
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Taiwan Class A compliance statement

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居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

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