



@server

xSeries 225

Type 8647

Option Installation Guide



IBM xSeries 225
Type 8647



Option Installation Guide

Note:

Before using this information and the product it supports, read the general information in “Notices” on page 49.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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 pečítajte 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.

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:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

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:

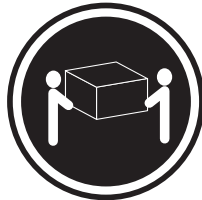
- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation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

Statement 4



≥18 kg (39.7 lb)



≥32 kg (70.5 lb)



≥55 kg (121.2 lb)

CAUTION:

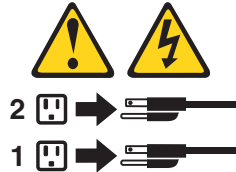
Use safe practices when lifting.

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 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 the branch circuit protection requirements. Refer to the information that is provided with your IBM 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 23



CAUTION:
Do not place any object weighing more than 50 kg (110 lb) on top of rack-mounted devices.



>50 kg (110 lb)

Declaración 23



PRECAUCIÓN:

No coloque ningún objeto que pese más de 50 kg (110 libras) encima de los dispositivos montados en bastidor.



>50 kg (110 libras)

Hinweis 23



ACHTUNG:

Keine Gegenstände, die mehr als 50 kg wiegen, auf Rack-Einheiten ablegen.



>50 kg

Notice n° 23



ATTENTION:

Ne posez pas d'objet dont le poids dépasse 50 kg sur les unités montées en armoire.



>50 kg

Varningsmeddelande 23



WARNING:

Placera inte något föremål som väger mer än 50 kg ovanpå rackmonterade enheter.



>50 kg

Merknad 23



ADVARSEL:

Ikke sett gjenstander som veier mer enn 50 kg oppå enheter som er montert i et kabinett.



>50 kg

Avviso 23



ATTENZIONE:

Non poggiare oggetti che pesano più di 50 kg sulla parte superiore delle unità montate in rack.



>50 kg

Turvaohje 23



Varoitus:

Telineeseen asennettujen laitteiden päälle ei saa asettaa yli 50 kilon painoista esinettä.



>50 kg

Voorschrift 23



WAARSCHUWING:

Plaats geen objecten die meer dan 50 kg wegen op apparaten die in het rek zijn gemonteerd.



>50 kg

Forskrift 23



Pas på!:

Anbring ikke genstande, der vejer mere end 50 kg, oven på enheder, der er monteret i rack.



>50 kg

Instrução 23



CUIDADO:

Não coloque nenhum objeto com peso superior a 50 kg (110 lbs.) sobre dispositivos montados em rack.



>50 kg (110 lbs)

عبارة ٢٣



تنبيه :

لا تضع أي عنصر يزن أكثر من ٥٠ كيلوجرام (١١٠ رطل) أعلى سطح الأجهزة.



أكبر من ٥٠ كيلوجرام (١١٠ رطل)

• Izjava br. 23



OPREZ:

Ne postavljajte predmete teže od 50 kg (110 funti) na ormar u koji su ugrađeni uređaji.



> 50 kg (110 lbs)

Δήλωση 23



ΠΡΟΣΟΧΗ:

Μην τοποθετείτε οποιοδήποτε αντικείμενο με βάρος μεγαλύτερο από 50 kg επάνω σε συσκευές που έχουν προσαρμοσθεί σε ικρίωμα (rack).



> 50 kg

הודעה 23



זהירות:

אל תניחו שום חפץ שמשקלו יותר מ-50 ק"ג על גבי התקנים המורכבים על חסדי מרשימים.



50 ק"ג

- 23. ismertető



FIGYELEM:

Keretszerelésű eszközök tetejére ne helyezzen olyan tárgyat, melynek súlya több, mint 50 kg (110 lbs.).



> 50 kg (110 lbs)

・記述 23

注意

ラック・モデルのサーバーの上に 50 Kg 以上の物を置かないでください。



> 50 Kg

경고문 23



주의:

서랍형 모델의 장치 상단에 50 kg(110 lbs.)이 넘는 물체를 올려 놓지 마십시오.



> 50 kg (110 lbs)

Instrukcja 23



ZAGROŻENIE:

Nie należy umieszczać przedmiotów cięższych niż 50 kg (110 funtów.)



> 50 kg (110 funtów)

· Положение 23



ОСТОРОЖНО:

Не ставьте предметы весом более 50 кг на верхнюю крышку устройств, смонтированных на выдвижных полках.



> 50 кг

声明 23



警告:

机柜安装的设备上面不能放置重于 50kg (110 磅) 的物品。



> 50 kg (110 磅)

· Príkaz 23



VÝSTRAHA:

Neumiestňujte žiadny predmet vážiaci viac ako 50 kg (110 lbs.) na vrch zariadenia montovaného do stojana.



> 50 kg (110 lbs)

· Navedba 23



SVARILO:

Ne postavljajte nobenega predmeta, ki je težji od 50 kg, na vrh naprav, montiranih v stojala.



> 50 kg (110 lbs)

聲明 23



注意：

請勿將任何重量超過 50 公斤 (110 磅) 的物品置於已安裝機架的裝置上方。



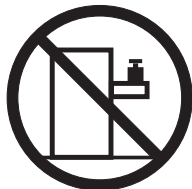
> 50 公斤 (110 磅)

Instrukce 23



POZOR:

Neumíst'ujte nic s hmotností vyšší než 50 kg navrch zařízení namontovaných do stojanu.



>50 kg (110 lbs)

▪ Инструкција 23



ПРЕДУПРЕДУВАЊЕ:

Не поставувајте предмети потешки од 50 кг. (110 lbs.) над уредите кои се монтирани во ормари.



>50 kg (110 lbs)

Instrução 23



CUIDADO:

Não coloque nenhum objeto com peso superior a 50 kg (110 lbs.) sobre dispositivos montados em rack.



>50 kg (110 lbs)

Chapter 1. Introduction

This *Option Installation Guide* contains instructions for installing, removing, and connecting optional devices that your server supports.

The latest version of this publication is available from the IBM® Web site. Go to <http://www.ibm.com/> and click **Support & downloads**. In the **Technical support** keyword search field, type 8647 and click **Go**. A list of publications for your server is displayed.

Related publications

In addition to this *Option Installation Guide*, the following documentation comes with your server:

- *User's Guide*

This publication is in Portable Document Format (PDF) on the IBM *xSeries™ Documentation* CD. It contains general information about your server.

- *Installation Guide*

This printed publication contains instructions for setting up your server and basic instructions for installing some options.

- *Safety Information*

This publication is in PDF on the IBM *xSeries 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* book.

- *Hardware Maintenance Manual and Troubleshooting Guide*

This publication is in PDF on the IBM *xSeries Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

Depending on your server model, additional publications might be included on the IBM *xSeries Documentation* CD.

Notices and statements used in this book

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

The following notices and statements are used in the documentation:

- **Notes:** 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 could 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.

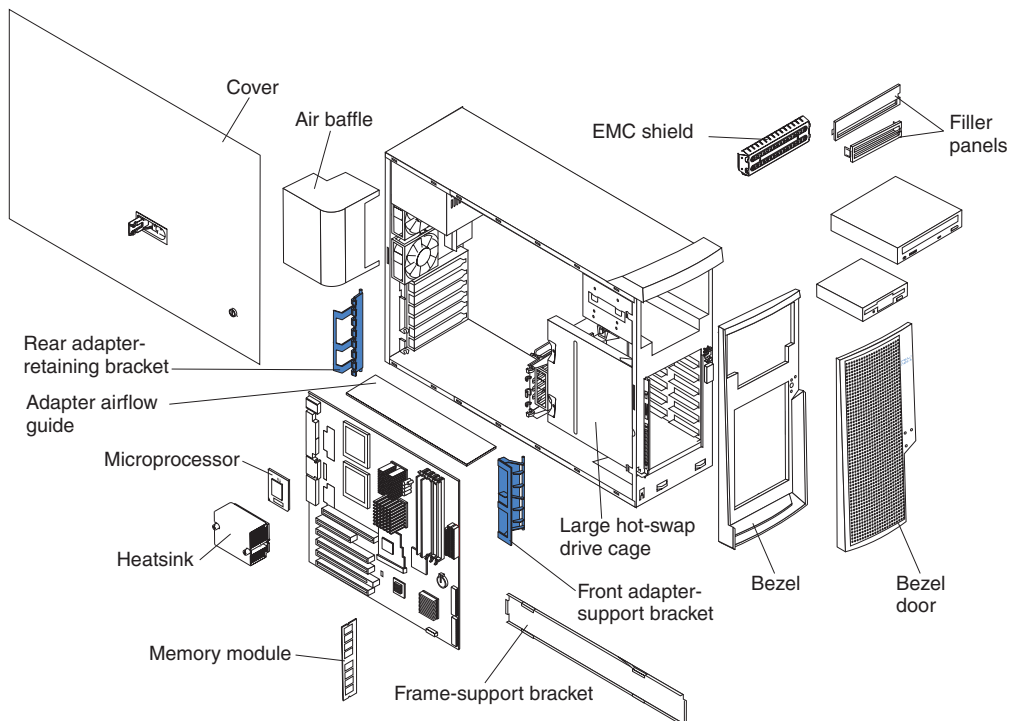
Major components of the xSeries 225 Type 8647 server

The orange color on components and labels in your server identifies hot-swap or hot-plug components. You can install or remove these components while the server is running, provided that the server is configured to support hot-swap and hot-plug features. For complete details about installing or removing a hot-swap or hot-plug component, see the information in Chapter 2, “Installing options” on page 7.

The blue color on components and labels indicates touch points where a component can be gripped, a latch moved, and so on.

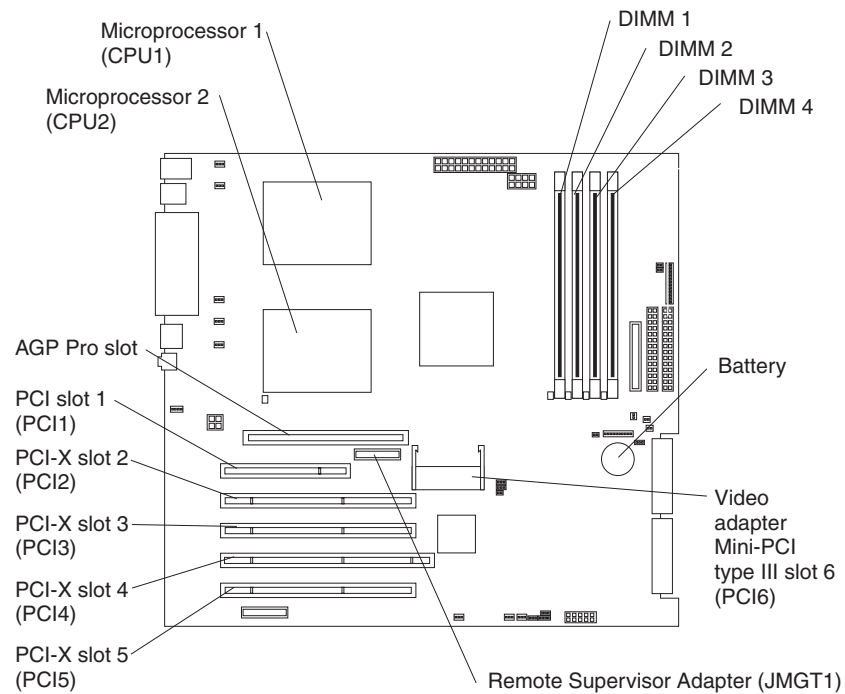
The following illustration shows the major components in the server.

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



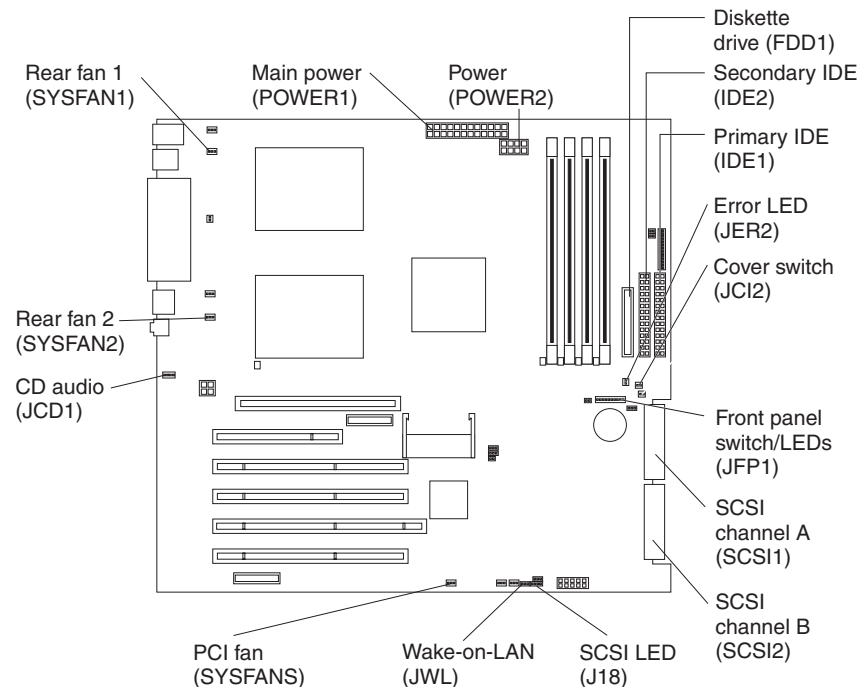
System-board option connectors

The following illustration shows the system-board connectors for user-installable options.



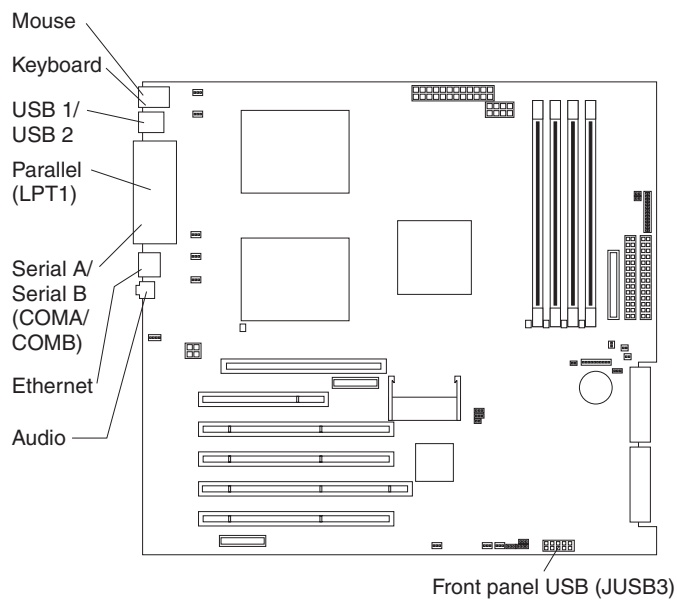
System-board internal connectors

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



System-board external connectors

The following illustration shows the external input/output port connectors on the system board.



System-board error LEDs

The following illustration shows the LEDs on the system board. You might need to refer to this illustration when solving problems with the server.

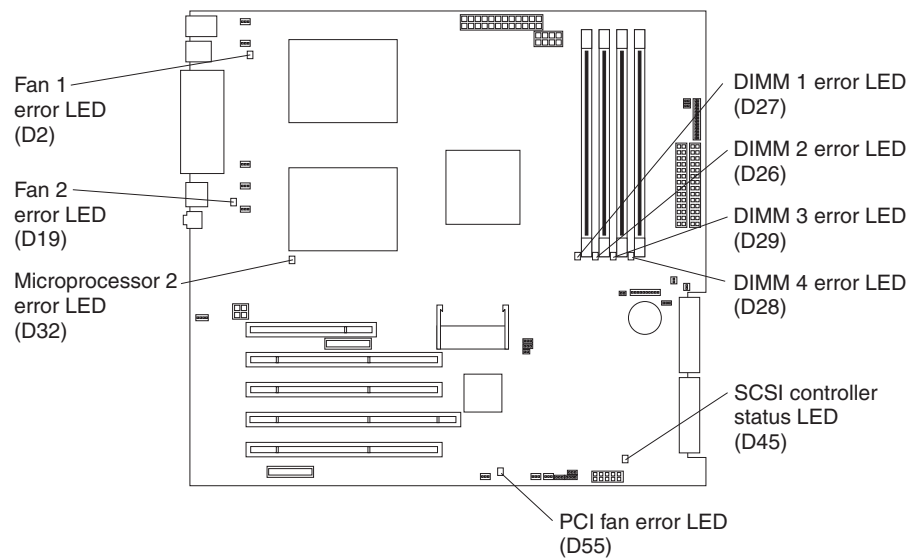


Table 1. Error LEDs

Error LED	Without optional Remote Supervisor Adapter	With optional Remote Supervisor Adapter
DIMM error (D26, D27, D28, D29)	Memory problem (also turns on system error LED on the front bezel)	Memory problem (also turns on system error LED on the front bezel)

Table 1. Error LEDs (continued)

Error LED	Without optional Remote Supervisor Adapter	With optional Remote Supervisor Adapter
Microprocessor 2 error (D32)	Microprocessor 2 problem (also turns on system error LED on the front bezel)	Microprocessor 2 problem (also turns on system error LED on the front bezel)
Fan error (D2, D19, D55)	No function	Fan failure
Hard disk error (LEDs on hot-swap hard disk drives)	Hot-swap hard disk drive failure	Hot-swap hard disk drive failure

Chapter 2. Installing options

This chapter provides detailed instructions for adding hardware options to your server. Some option-removal instructions are provided in case you need to remove one option to install another.

Installation guidelines

Before you begin installing options in your server, read the following information:

- Review the safety information beginning on page v and the guidelines in “Handling static-sensitive devices” on page 8. These guidelines will help you work safely with your server and options.
- When you need to access the inside of the server to install options, you might find it easier to lay the server on its side. If your server has stabilizing feet that rotate, before laying the server on its side, rotate the stabilizing feet a quarter turn inward toward the server, so that they do not break. Before returning the server to an upright position, rotate the stabilizing feet a quarter turn outward from the server. See “Moving the stabilizing feet” on page 10 for more information.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and other devices that you will connect to the server.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, or hot-plug Universal Serial Bus (USB) devices.
- The blue color on components and labels identifies touch points, where you can grip a component, move a latch, and so on.
- For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

System reliability considerations

To help ensure proper system cooling and system reliability, make sure that:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 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 (over 30 minutes) with the server cover removed might damage server components.

When installing the server in a rack, make sure that space is available around the server to enable the server cooling system to work properly. See the documentation that comes with the rack for additional information.

- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You replace a hot-swap drive within 2 minutes of its removal.

- You do not remove the air baffle when the server is operational. Operating the server without the air baffle might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices, including your server. 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.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part 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 your server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

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 is shut down; however, the server can respond to remote requests to turn on the server. The power-on LED flashes to indicate that the server is connected to an ac power source but is not turned on (standby mode).

Turning on the server

Notes:

1. Turn on all external devices, such as the monitor, before turning on the server.
2. The power-on LED on the front of the server is lit when the server is on and while it is powering-up.
3. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your server.

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button. The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.

- If the server is connected to an ASM interconnect network that contains at least one server with an optional Remote Supervisor Adapter installed, the server can be turned on from the Remote Supervisor Adapter user interface.
- If an optional Remote Supervisor Adapter is installed in the server, the server can be turned on from the Remote Supervisor Adapter user interface.
- When you plug in your server for the first time, the Wake on LAN[®] feature can turn on the server. If your server was previously turned on, it must be properly turned off for the Wake on LAN feature to 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 PCI options.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to remote requests to turn on the server. 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.



Note: After turning off the server, wait at least 5 seconds before you press the power-control button to turn on the server again.

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

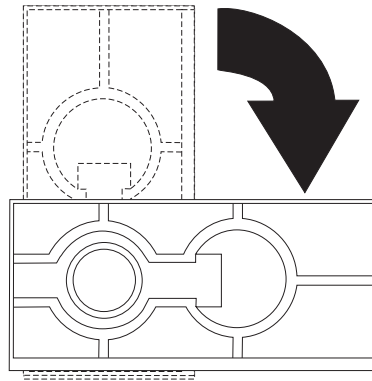
- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn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

- If the server is connected to an ASM interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the server can be turned off from the Remote Supervisor Adapter user interface.
- If an optional Remote Supervisor Adapter is installed in the server, the server can be turned off from the Remote Supervisor Adapter user interface.
- The server can turn itself off as an automatic response to a critical system failure.

Moving the stabilizing feet

On some server models, the four feet on the bottom of the server rotate 90 degrees to provide additional stability.

When installing options in the server, you might find it easier to lay the server on its side. If you do so, rotate the feet inward toward the server, so that they do not break.

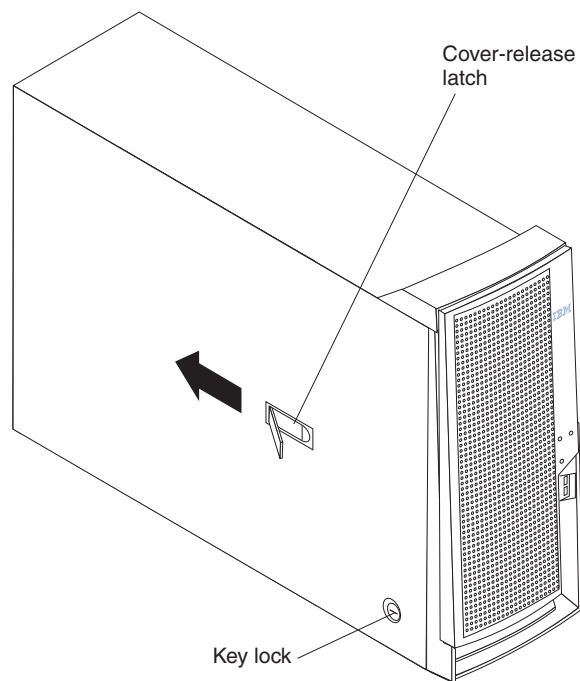


Removing the side cover

To remove the side cover, you might find it easier to lay the server on its side. If you do, and your server has stabilizing feet that rotate, move the stabilizing feet so that they do not break (see “Moving the stabilizing feet” on page 10).

Complete the following steps to remove the side cover of the server:

1. Review the safety information beginning on page v and “Installation guidelines” on page 7.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then disconnect all external cables.
4. Unlock the side cover; then, pull the cover-release latch away from the server, and push the cover toward the rear of the server. Lift the side cover off the server and set it aside.



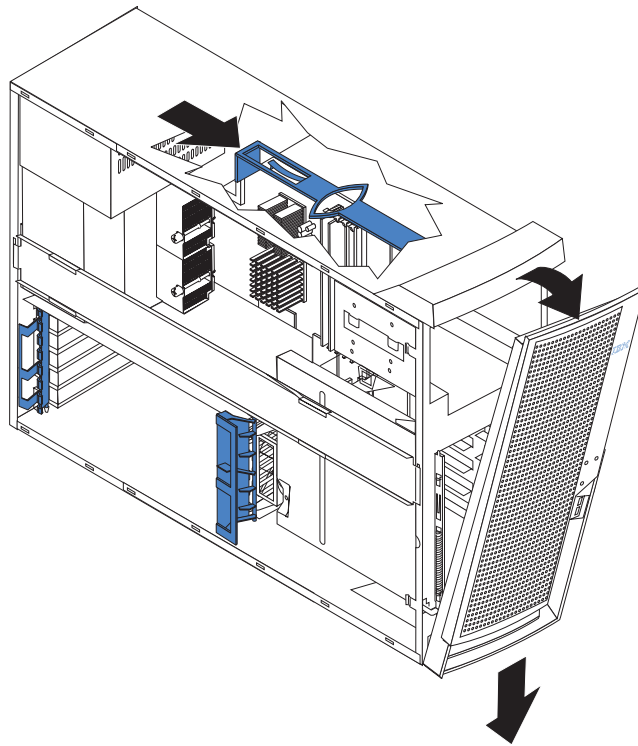
Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server with the cover removed might damage server components.

Removing the bezel

When working with some devices, such as additional optical drives, you must first remove the bezel to access the device.

Complete the following steps to remove the bezel:

1. Remove the side cover (“Removing the side cover” on page 11).
2. For hot-swap hard disk drive models:
 - a. Open the server door.
 - b. Rotate the hot-swap lock bar forward and remove it from the bezel (see the illustration on page 21). If the hot-swap lock bar will not rotate, press the top of the hot-swap lock bar to release the lock mechanism.
3. Locate the bezel-release lever; then, press the bezel-release lever toward the front of the server.
4. Pull the top of the bezel away from the chassis; then, push the bezel down to disengage the bottom tabs.
5. Remove the bezel from the server and store the bezel in a safe place.



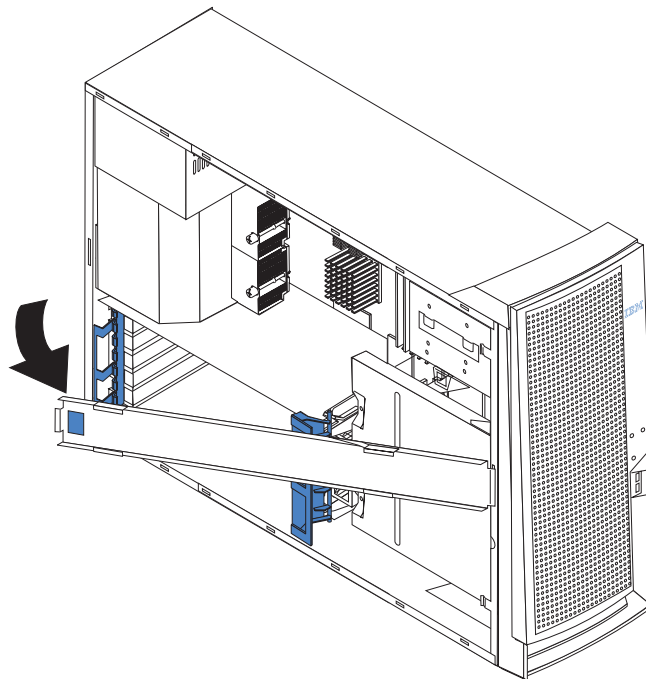
For instructions for replacing the bezel, see “Replacing the bezel” on page 39.

Removing and installing the support bracket

When working with some devices, such as hard disk drives, adapters, and memory modules, you must first remove the support bracket to access the device.

Complete the following steps to remove the support bracket:

1. Review the safety information beginning on page v and “Installation guidelines” on page 7.
2. Remove the side cover (“Removing the side cover” on page 11).
3. Pull out on the rear end of the support bracket approximately 150 mm (6 in.).
4. Disengage the front end of the support bracket from the server and set the bracket aside.



To reinstall the support bracket, reverse the previous steps.

Working with adapters

Your server comes with adapter connectors or *slots*. The standard video adapter is installed in mini-PCI slot 6 (PCI6). You can install up to five additional optional adapters in PCI slot 1 (PCI1) and PCI-X slots 2 through 5 (PCI2 through PCI5).

See “System-board option connectors” on page 3 for the locations of expansion slots on the system board.

Adapter considerations

Before you install an adapter, review the following information:

- Read the documentation that comes with your operating system.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.

- Installation of an AGP video adapter in the AGP slot is not supported.
- You can install only a 32-bit adapter in the 32-bit PCI slot 1 and 64-bit adapters in the 64-bit PCI-X slots 2 through 5.
- You can install full-length adapters in all five expansion slots; however, full-length, double-width adapters will not fit in slot 5 and are not supported. None of the expansion slots are hot-plug.
- The 32-bit PCI slot 1 supports 5.0 V signaling PCI adapters; it does not support 3.3 V signaling adapters or 64-bit adapters.
- The 64-bit PCI-X slots 2 through 5 support 3.3 V signaling PCI or PCI-X adapters; they do not support 5.0 V signaling adapters.
- The PCI bus configuration is as follows:
 - The 32-bit PCI slot 1 and mini-PCI slot 6 (video adapter) are on the 33 MHz PCI bus.

Note: Do not install any adapters other than the standard video adapter in slot 6. Other adapter types are not supported.

- The 64-bit PCI-X slots 2 and 3 and the integrated Ethernet controller are on the 100 MHz PCI-X bus, channel A.
- The 64-bit PCI-X slots 4 and 5 and the integrated SCSI controller with RAID capabilities are on the 100 MHz PCI bus, channel B. If an optional ServeRAID™-5i controller is installed, it overrides the standard functionality of the integrated SCSI controller with RAID capabilities and forces PCI-X slots 4 and 5 to 66 MHz.
- The optional IBM Remote Supervisor Adapter can be installed only in PCI slot 1. Use the ribbon cable that comes with this adapter to connect it to the Remote Supervisor Adapter connector (JMGT1) on the system board.
- The optional ServeRAID-5i controller can be installed only in PCI-X slot 4 and must use the 3-U bracket that comes preinstalled on the controller.
- To provide failover protection, an optional Ethernet adapter can be installed only in PCI-X slots 2 through 5.
- The server scans the AGP slot, mini-PCI slot 6, PCI expansion slot 1, and PCI-X expansion slots 2 through 5 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: AGP slot, mini-PCI slot 6, PCI expansion slot 1, system-board integrated drive electronics (IDE) or SCSI devices (including optional ServeRAID-5i controller), and then PCI-X expansion slots 2 through 5.
- For a list of supported options for your server, go to <http://www.ibm.com/pc/support/> on the World Wide Web.

Installing an adapter

Note: You can install an optional ServeRAID-5i controller only in PCI-X slot 4. Slot 4 is the only PCI-X slot that supports the ServeRAID-5i controller requirements. Install the ServeRAID-5i controller using the 3-U bracket that comes preinstalled on the controller. See the documentation that comes with the ServeRAID-5i controller for additional information.

Complete the following steps to install a PCI or PCI-X adapter in your server:

1. Review the safety information beginning on page v, “Installation guidelines” on page 7, and “Handling static-sensitive devices” on page 8.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.

4. Remove the side cover (see “Removing the side cover” on page 11).
5. Determine which slot you will use for the adapter. 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.
6. Rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the server. Rotate the front adapter-retention bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
7. If there is an adapter already installed in the slot, remove it and place it on a static-protective surface.

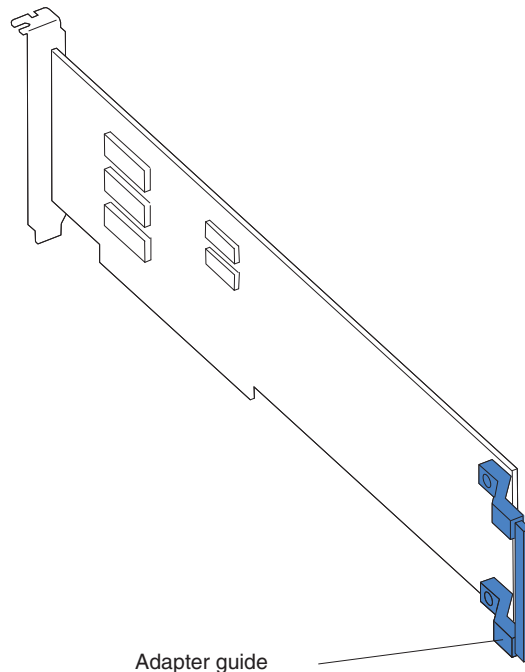
If the slot is empty, remove the expansion-slot cover. From the rear of the server, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

Attention: 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.

8. Set any jumpers or switches on the adapter or system board according to the documentation that comes with the adapter.

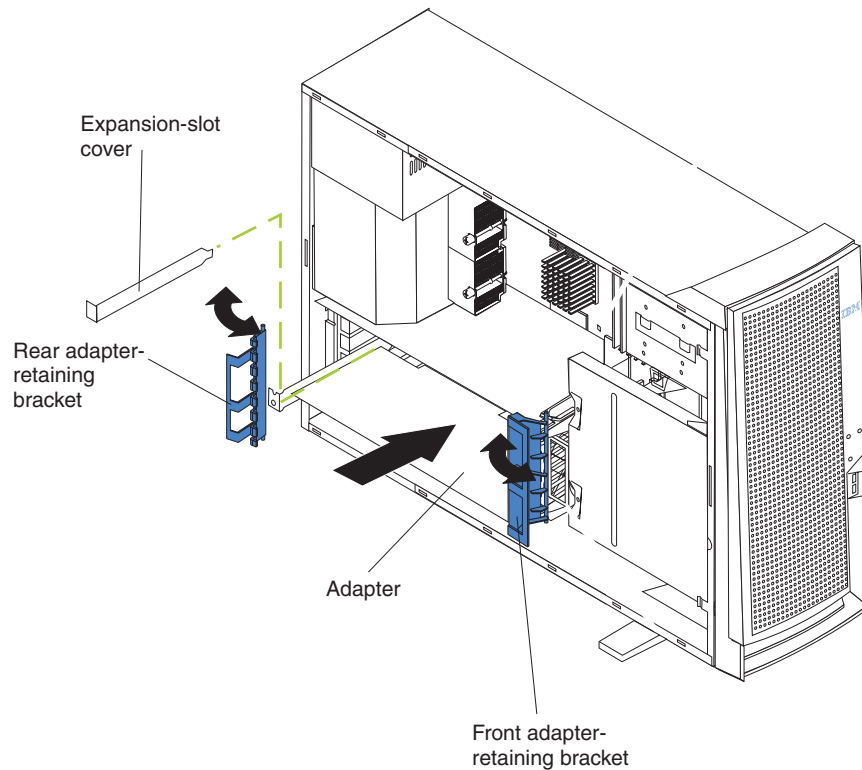
Attention: Avoid touching the components and gold-edge connectors on the adapter.

9. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



Attention: Be certain 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.

- 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. Move the adapter directly from the static-protective package to the adapter slot.



- Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see “Cabling an optional SCSI adapter” on page 17 for additional information.
- If you have another adapter to install, repeat steps 5 through 11.
- If you have installed a full-length adapter, rotate the front adapter-support bracket to the closed (locked) position.
- Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

Note: If any adapters in your server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws. The expansion-slot screws are stored on the back of the server next to slot 1.

- If you have other options to install, do so now; otherwise, continue with step 16.
- Replace the support bracket (see “Removing and installing the support bracket” on page 13).
- Replace the side cover (see “Replacing the side cover” on page 40).
- Reconnect the external cables and power cords; then, turn on the attached devices and the server.

Cabling an optional SCSI adapter

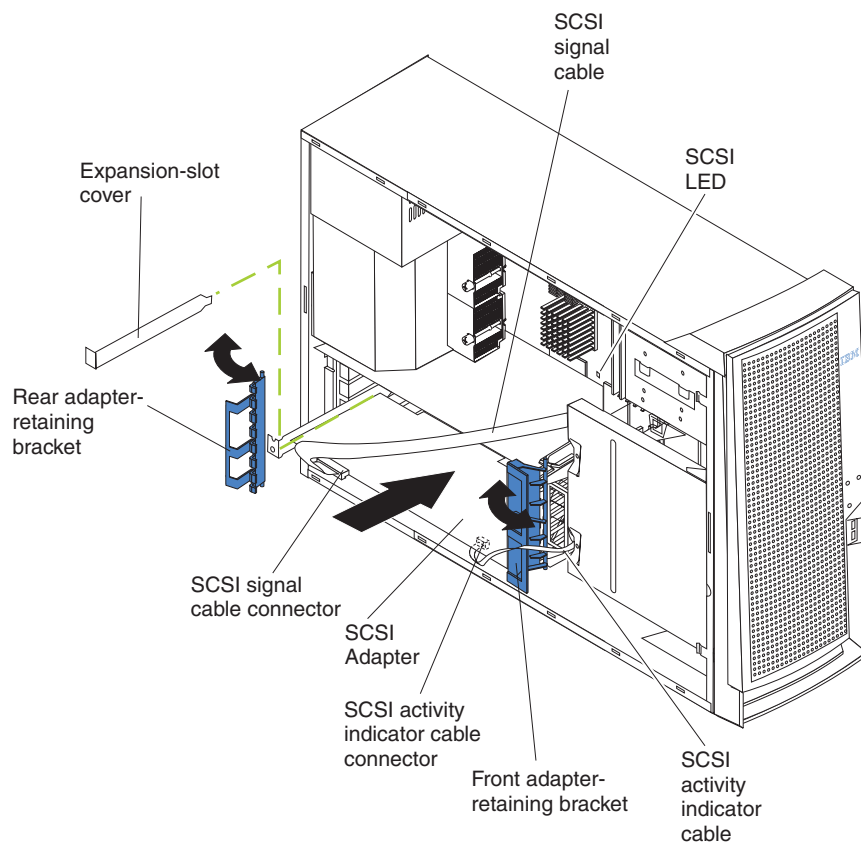
You can install an optional SCSI adapter in your server to control the internal hard disk drives. With a SCSI adapter installed, you can configure the internal hard disk drives into disk arrays. You can also cable a SCSI adapter to external hard disk drives. See your SCSI adapter option documentation for complete instructions for installing a SCSI adapter in your server and for additional information about SCSI adapters.

Notes:

1. This information in this section does not apply to the ServerRAID-5i controller, which uses the integrated SCSI controller with RAID capabilities on the system board.
2. An optional SCSI adapter or cable option is required to connect external SCSI devices.

Complete the following steps to cable an optional SCSI adapter:

1. Install the SCSI adapter (see “Installing an adapter” on page 14).
2. Connect the SCSI signal cable to the adapter and to one or more of the signal-cable connectors to the rear of the SCSI devices.
3. Connect the SCSI-activity-indicator cable to the adapter and to the SCSI-LED connector (J18) on the system board. See “System-board internal connectors” on page 3 for the location of the SCSI-LED connector.



4. Complete the installation of the optional SCSI adapter.

Installing internal drives

Several types of drives are available, such as:

- Diskette
- Hard disk
- CD-ROM
- Tape, including digital linear tape (DLT), super digital linear tape (SDLT), and linear tape-open (LTO)

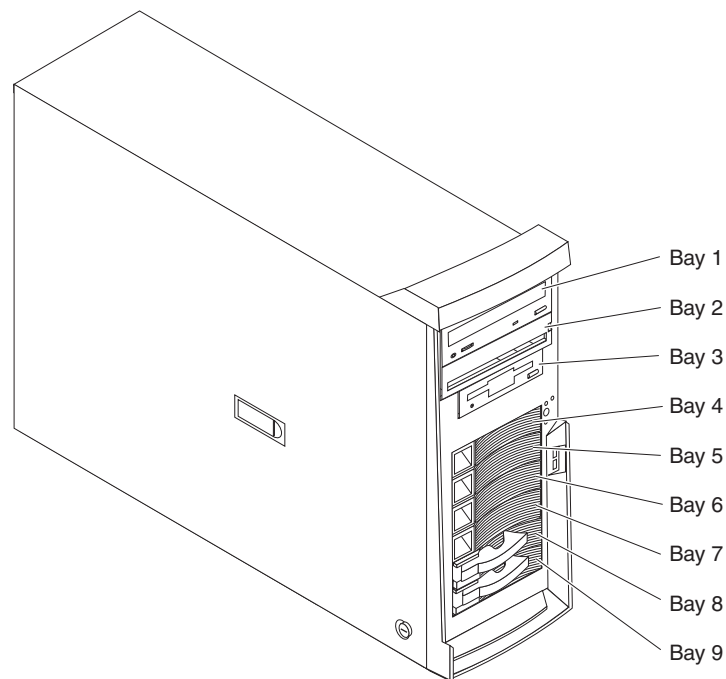
Note: The server supports both internal and external tape drives.

Some server models have hardware that supports hot-swap drives, which you can replace without turning off the server.

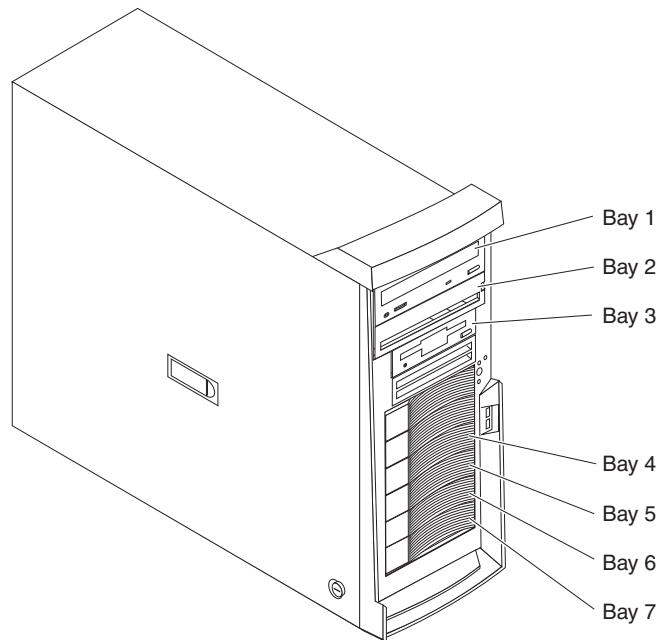
Internal drive bays

All server models come with an IDE CD-ROM drive in bay 1 and a 3.5-in., 1.44 MB diskette drive in bay 3. Depending on your server model it will also come with either six hot-swap hard disk drive bays or a hard disk drive in bay 7.

Server with hot-swap hard disk drives



Server with non-hot-swap hard disk drives



Note: The SCSI IDs for the hot-swap drives are printed on the hot-swap lock bar, immediately adjacent to the hot-swap drive bays (see Table 2 on page 22).

A three-drop power signal cable and a one-drop IDE cable come attached to the CD-ROM drive. Use this power signal cable to connect the removable-media drives. The one-drop SCSI signal cable that comes with your server will need to be replaced with a two-drop SCSI signal cable to provide a signal connection to the removable-media drives.

The integrated IDE controller in your server supports the connection of up to four IDE devices.

Some server models support a maximum of six 1-inch (26 mm) slim-high, 3.5-inch, hot-swap hard disk drives in the standard hot-swap bays. The hot-swap bays are arranged vertically in the standard hard disk drive cage; the bay numbers are 4 through 9 (from top to bottom) with SCSI IDs of 0 through 5 (from bottom to top). The hot-swap bays are below the removable-media drive bays.

Diskette drives, tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.

You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup, CD-RW, or DVD drive, in bay 2. The server supports half-high DLT, SDLT, LTO, and TR7 drives. For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web. To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit, supplied with the option.

The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.

Notes:

1. To minimize the possibility of damage to the hard disk drives when you are installing a hard disk drive in a rack model, install the server in the rack before installing the hard disk drives.
2. You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.

Working with hot-swap drives

The hot-swap drives are attached to a hot-swap hard disk drive *backplane*. The backplane is a printed circuit board behind the drive bays. For more information about drive bays and drive installation, see “Installing internal drives” on page 18. The low voltage differential (LVD) SCSI hot-swap hard disk drive backplane supports a maximum of six slim-high, hot-swap hard disk drives.

Each hot-swap drive that you plan to install must be mounted in a hot-swap-drive tray. The drive must have a Single Connector Attachment (SCA) connector. Hot-swap-drive trays come with hot-swap drives.

Each hot-swap drive has two indicator LEDs (see the *User's Guide* on the IBM *xSeries Documentation* CD). If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and requires replacement. When the hard disk drive status LED indicates a drive fault, you can replace the drive without turning off the server.

For increased security, the hot-swap drives and filler panels are locked in the server by the hot-swap lock bar. The hot-swap lock bar cannot be released, allowing installation and removal of the hot-swap drives and filler panels, unless the key lock on the server side cover is unlocked.

Note: All drives being used in the server should have the same speed rating; mixing speed ratings will cause all drives to operate at the lower speed.

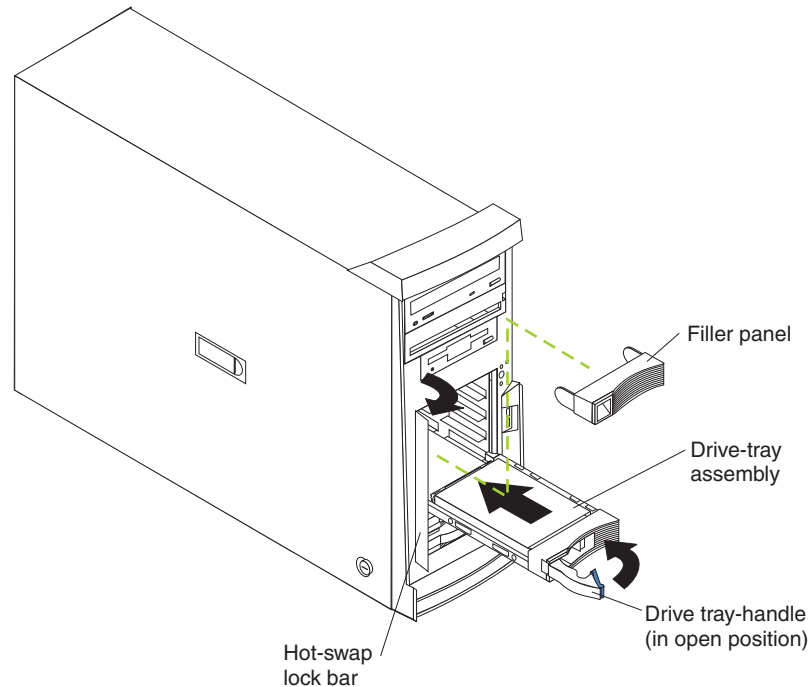
The hard disk drives that are connected to the standard backplane are attached to channel A.

Notes:

1. Table 2 on page 22 lists the SCSI identifiers (IDs) for the standard LVD SCSI backplane and hard disk drives.
2. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors.
3. For additional information about cabling, see “Cabling an optional SCSI adapter” on page 17 and Chapter 3, “Input/output ports” on page 43.

Installing a hot-swap hard disk drive

The following illustration shows how to install a hot-swap hard disk drive.



Complete the following steps to install a drive in a hot-swap bay.

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

Note: All hot-swap drives being used in the server should have the same speed rating; mixing speed ratings will cause all drives to operate at the lower speed.

1. Review the safety information beginning on page v and “Installation guidelines” on page 7.
2. Open the server door.
3. Remove the hot-swap lock bar:
 - a. Unlock the side-cover lock.
 - b. Rotate the hot-swap lock bar forward and remove it from the bezel. If the hot-swap lock bar will not rotate, press the top of the hot-swap lock bar to release the lock mechanism.
4. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.
5. Install the hard disk drive in the hot-swap bay:
 - a. Ensure that the tray handle is open (that is, perpendicular to the drive).
 - b. Align the drive assembly with the guide rails in the bay.
 - c. Gently push the drive assembly into the bay until the drive stops.
 - d. Push the tray handle to the closed (locked) position.
 - e. Check the hard disk drive status indicator to verify that the hard disk drive is operating properly.

If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and needs to be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

Note: If your server is configured for RAID operation using the integrated SCSI controller with RAID capabilities or an optional ServeRAID controller, you might need to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support CD* for additional information about RAID operation and complete instructions for using ServeRAID Manager.

6. If you are installing additional hot-swap hard disk drives, do so now; otherwise, continue with step 7.
7. Make sure the side cover is unlocked; then insert the hot-swap lock bar into the slots on the bezel and rotate it to the locked position.
8. Hold the hot-swap lock bar in the closed position, lock the side cover key lock, and close the server door.

SCSI IDs for hot-swap hard disk drives

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. The SCSI ID for each hot-swap hard disk drive is printed on the hot-swap lock bar. Table 2 lists the SCSI IDs for the hard disk drives and backplane that are connected to one channel in hot-swap hard disk drive models. In the typical configuration, the standard hard disk drives and backplane are connected to channel A.

Table 2. SCSI IDs for standard hot-swap hard disk drives and backplane

Device	SCSI ID
Drive bay 9	0
Drive bay 8	1
Drive bay 7	2
Drive bay 6	3
Drive bay 5	4
Drive bay 4	5
Backplane	8

Installing non-hot-swap hard disk drives

Bays 4, 5, 6, and 7 are in the drive cage. The drive cage is behind the front of the adapter-support bracket. Drives are installed starting at the bottom in bay 7. Additional drives are then installed in bays 6, 5, and 4.

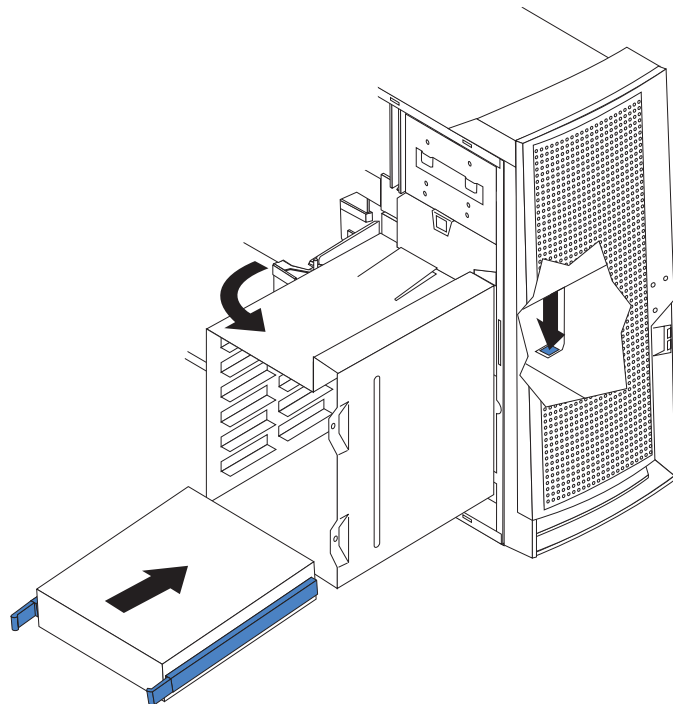
Notes:

1. You can install up to four non-hot-swap hard disk drives in your server. The additional space in the drive cage above bay 4 is not designed to accommodate any additional drives.
2. When installing non-hot-swap hard disk drives, you might find it easier to lay the server on its side. If you do so, and your server has stabilizing feet that rotate, move the feet inward toward the server, so that they do not break.

Complete the following steps to install a drive in bay 4, 5, 6, or 7:

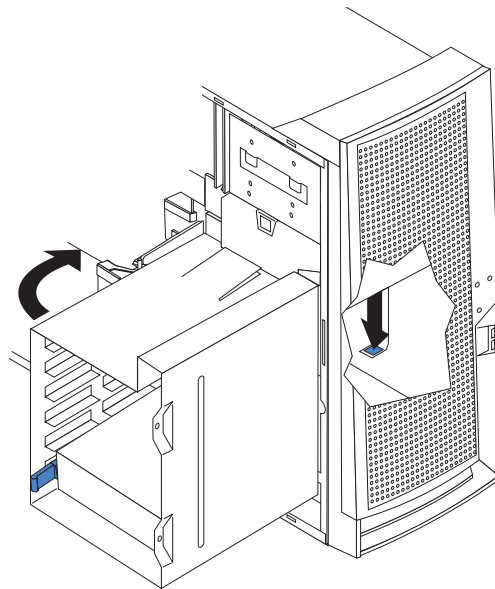
1. Review the safety information beginning on page v and "Installation guidelines" on page 7.

2. Turn off the server and all attached devices.
3. Disconnect all power cords; then disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 11).
5. Remove the support bracket (see “Removing and installing the support bracket” on page 13).
6. Press the drive cage release lever down and then rotate the cage out of the server until the drive-cage retention tab locks into place and the open ends of the drive slots and installed drives are facing you. Ensure that the drive cage locks into place over the drive-cage retention tab by rotating the drive cage all the way out of the server.



7. Attach the blue guide rails to the side of the drive using the screws that are provided.
8. Slide the drive into the drive cage until the plastic tabs on the drive guide rails lock into place in the drive cage. Clear any cables that might impede the replacement of the drive cage.
9. Connect one end of the SCSI signal cable into the back of the drive and make sure that the other end of this cable is connected into the SCSI connector on the system board. See “Power and signal cables for internal drives” on page 27 for additional information about cabling drives and “System-board internal connectors” on page 3 for the location of SCSI connectors on the system board. If there are open connectors on the cables connecting existing SCSI drives, these cables can be used to connect the new drive.
10. Route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor and memory.
11. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

12. Push the drive cage outward, and press in on the drive-cage release tab; then, rotate the cage back into the server.



13. If you have other options to install or remove, do so now.
14. Replace the support bracket (see “Removing and installing the support bracket” on page 13).
15. Replace the side cover (see “Replacing the bezel” on page 39).
16. Reconnect the external cables and power cords; then, turn on the attached devices and the server.

Installing a 5.25-inch removable-media drive

Your server comes with one integrated drive electronics (IDE) CD-ROM drive. The CD-ROM drive bay supports a 5.25-inch, half-high, removable-media drive.

You can install an additional 5.25-inch, half-high, removable-media drive in bay 2.

A three-drop power cable comes with your server. Use this cable to connect power to the removable-media drives.

Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Verify that you have all the cables and other equipment specified in the documentation that comes with the drive.

Complete the following steps to install a removable-media drive in bay 2 (see “Internal drive bays” on page 18):

1. Review the safety information beginning on page v and “Installation guidelines” on page 7.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 11).
5. Remove the bezel (see “Removing the bezel” on page 12).
6. Remove the support bracket (see “Removing and installing the support bracket” on page 13).
7. Use a screwdriver to pry the filler panel and EMC shield away from the server.

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

Statement 3



CAUTION:

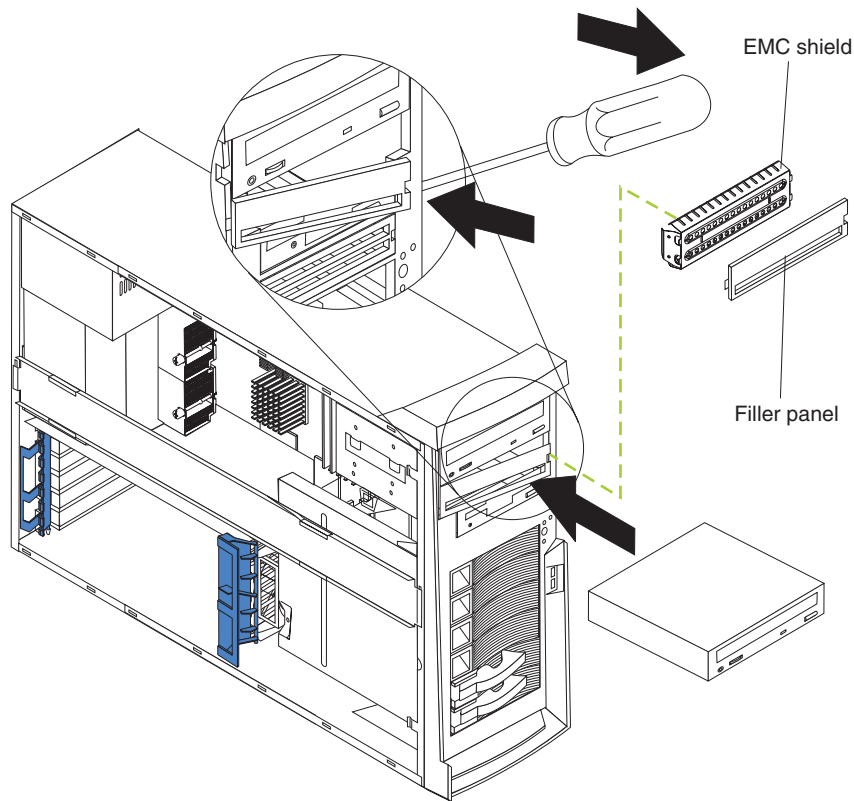
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- 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.



8. Touch the static-protective package containing 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.
9. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

Note: You might find it easier to install the new drive into the appropriate opening on the front, and then attach the cables.

10. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay; then, use the two screws to attach the drive to the drive cage. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in. conversion kit, supplied with the option, to the 3.5-in. drive.
11. Determine whether the drive is an IDE or SCSI device; then, connect one end of the appropriate signal cable into the back of the drive and make sure that the other end of this cable is connected into the appropriate IDE or SCSI connector on the system board.
 - If you are installing a SCSI removable-media drive, use the one-drop SCSI cable that comes with the drive and connect it to SCSI channel B (SCSI2). See “Power and signal cables for internal drives” on page 27 for additional information about cabling drives and “System-board internal connectors” on page 3 for the location of IDE and SCSI connectors on the system board.
 - If there are open connectors on the cables connecting an existing IDE drive, this cable can be used to connect the new drive. The 4-connector SCSI cable that comes with non-hot-swap model servers cannot be used to connect a SCSI drive in bay 2.
12. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and memory.

13. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
14. If you have other options to install or remove, do so now.
15. Replace the support bracket (see “Removing and installing the support bracket” on page 13).
16. Replace the bezel (see “Replacing the bezel” on page 39).
17. Replace the side cover (see “Replacing the bezel” on page 39).
18. Reconnect the external cables and power cords; then, turn on the attached devices and the server.

Power and signal cables for internal drives

Your server uses cables to connect IDE and SCSI devices to the power supply and to the system board. (See “System-board internal connectors” on page 3 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 your 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, ensure that one of the drive connectors of the signal cable is connected to the drive and that the connector at the other end of the signal cable is connected to the system board.
- The server has two IDE buses, primary and secondary. Each of these buses supports up to two IDE devices. The primary IDE bus uses connector IDE1 on the system board and the secondary IDE bus uses connector IDE2.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the server might not recognize some of the IDE devices. The master and subordinate designation is determined by switch or jumper settings on each IDE device.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size.
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect IDE, SCSI, and diskette drives to the system board. Two or three types of signal cable come with your server.
 - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the primary or secondary IDE connector on the system board. The spare connector can be used to connect an additional IDE drive to your server.

The CD-ROM drive is attached to an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device.
 - **Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is attached to the connector (FDD1) on the system board.
 - **SCSI:** A round SCSI cable connects SCSI devices to the integrated SCSI controller with RAID capabilities on the system board. For hot-swap models,

the maximum cable length that supports Ultra320 SCSI hard disk drives is 16 inches. For more information about connecting SCSI devices, see the SCSI documentation.

Installing memory modules

You can increase the amount of memory in your server by installing memory modules. Your server uses industry-standard PC2100 double-data-rate (DDR) dual inline memory modules (DIMMs).

Notes:

1. The system board contains four DIMM connectors and supports two-way memory interleaving.
2. The DIMM options available for your server are 128 MB, 256 MB, 512 MB, 1 GB, and 2 GB. Your server supports a minimum of 256 MB and a maximum of 8 GB of system memory.
3. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.
4. Your server comes with two 256 MB or 512 MB DIMMs (for a total of 512 MB or 1024 MB) installed in the DIMM 3 and DIMM 4 memory connectors. When you install additional DIMMs, be sure to install them as a pair in DIMM connectors 1 and 2.
5. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 3 and DIMM 4 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers. If you install a second pair of DIMMs in DIMM 1 and DIMM 2 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs you installed in DIMM 3 and DIMM 4 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 1 and DIMM 2 memory connectors must match each other.
6. Install only 133 MHz (memory bus), 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM Registered DIMM specification. For a list of supported options for your server, go to <http://www.ibm.com/us/compat/> on the World Wide Web.
7. Your server supports Chipkill™ memory if the DIMMs are all type x4 and are 256 MB or larger. Using any 128 MB DIMMs or DIMMs that are not type x4 on your server disables Chipkill memory.

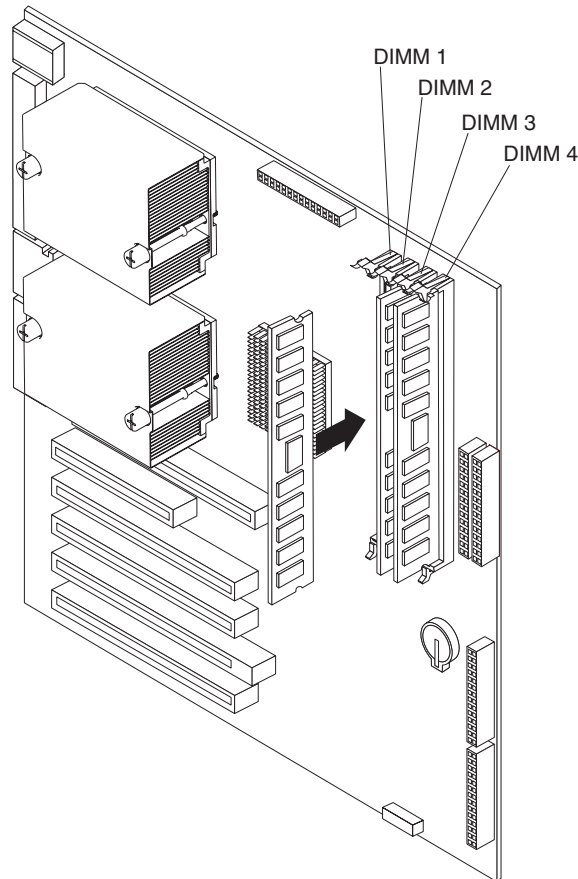
Complete the following steps to install a DIMM:

1. Review the safety information beginning on page v, “Installation guidelines” on page 7, and “Handling static-sensitive devices” on page 8.
2. Turn off the server and disconnect all power cords and external cables; then, remove the side cover (see “Removing the side cover” on page 11).
3. Remove the support bracket (see “Removing and installing the support bracket” on page 13).
4. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the order shown in the following table.

Table 3. DIMM installation sequence

Installation order	DIMM connectors	Diagnostic reference
First	DIMM 3 and DIMM 4	Bank 2
Second	DIMM 1 and DIMM 2	Bank 1

5. Open the retaining clips and, if necessary, remove any existing DIMM.
6. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then remove the new DIMM from the package.
7. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
8. Insert the DIMM into the 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.



9. If you have other options to install or remove, do so now.
10. Replace the support bracket (see “Removing and installing the support bracket” on page 13).
11. Replace the side cover (see “Replacing the bezel” on page 39).
12. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the server.

Installing an additional microprocessor

Your server comes with one microprocessor installed on the system board. Your server supports up to two microprocessors. With two microprocessors, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.

Before you begin:

- Thoroughly review the documentation that comes with the microprocessor to determine the required BIOS update. The latest level of BIOS code for your server is available from the World Wide Web. See the *User's Guide* on the IBM *xSeries Documentation* CD for the World Wide Web addresses.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems and other options, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

Attention: To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical. You can use the Configuration/Setup Utility program in your server to determine the specific type of microprocessor on your system board.

Important: A microprocessor must always be installed in socket CPU1 of the system board.

Notes:

1. To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.
2. Terminator cards are not required for empty microprocessor sockets. However, for airflow, an empty microprocessor socket must contain a microprocessor baffle.
3. The microprocessor speeds are automatically set for this server; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.
4. If you need to replace a microprocessor, call for service.
5. For additional illustrations of the system-board components, see "System-board option connectors" on page 3.

Configuring the operating system

Some operating systems need to be configured to support an additional microprocessor. See your operating-system documentation for information.

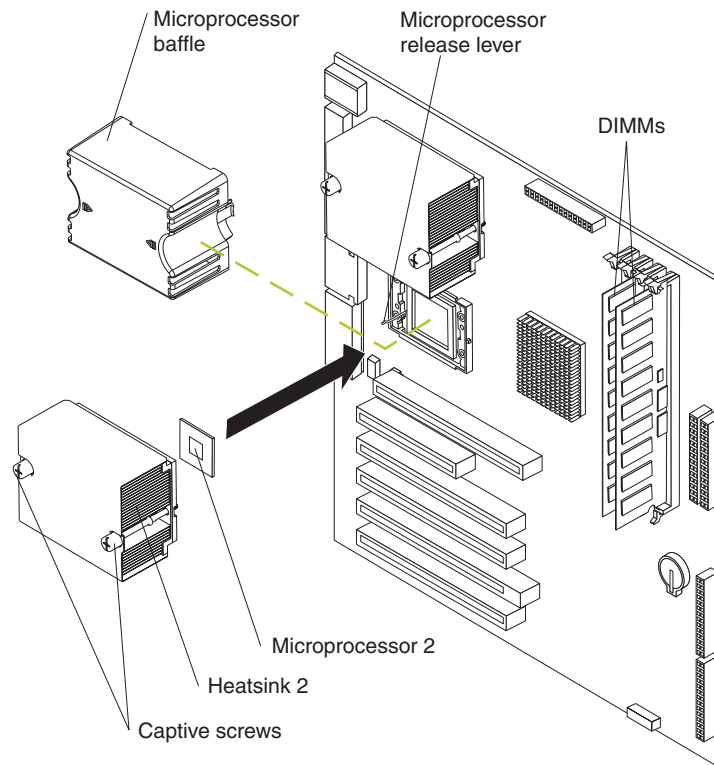
If Windows 2000 is installed in the server, complete the following steps to configure the operating system. Check the Microsoft web page at <http://www.microsoft.com> for updates to these instructions. In the Microsoft Web page, type `multiprocessor support` in the **Search** field and press Enter.

1. Back up the hard disk.
2. From the desktop, click **Start → Settings → Control Panel**.
3. In the Control Panel window, double-click the **System** icon.
4. In the System Properties window, click the **Hardware** tab; then, click **Device Manager**.
5. In the Device Manager window, click on the plus sign (+) beside **Computer** to expand the list; then, double-click **ACPI Uniprocessor PC**.

6. In the Advanced Configuration and Power Interface (ACPI) PC Properties window, click the **Driver** tab; then, click **Update Driver**.
7. In the Update Device Driver Wizard window, click **Next**.
8. In the next window, click **Display a list of known drivers for this device so that I can choose a specific driver**; then, click **Next**.
9. In the next window, click **Show all hardware of this device class**. From the **Models** list, select **ACPI Multiprocessor PC**; then, click **Next**.
10. If the configuration shown in the wizard is satisfactory, click **Next** to save the configuration.
11. Click **Finish** to complete the process.
12. Click **Yes** to restart the server.
13. Continue with step 1 of “Installing the additional microprocessor”.

Installing the additional microprocessor

The following illustration shows how to install an additional microprocessor.



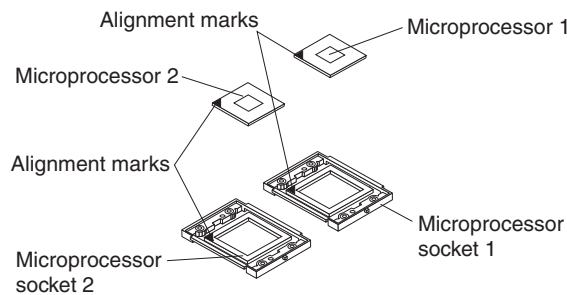
Complete the following steps to install an additional microprocessor:

1. Review the safety information beginning on page v, “Installation guidelines” on page 7, and “Handling static-sensitive devices” on page 8.
2. Turn off the server and all attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 11).
5. Remove the support bracket (“Removing and installing the support bracket” on page 13).
6. Remove the adapter airflow guide:
 - a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.

- b. Slide the adapter airflow guide out of the guides on the air baffle and front adapter-support bracket; then, remove it from the chassis.
7. Remove the air baffle by unhooking it from its retaining tabs and lifting it off the chassis.
8. Locate the second microprocessor socket (connector CPU2) on the system board.
9. Remove the microprocessor baffle from the second microprocessor socket.
10. If the second microprocessor socket is covered with protective film, peel and remove the film.
11. Install the microprocessor:
 - a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
 - b. Pull out and lift up on the microprocessor-release lever to unlock the microprocessor socket.

Attention:

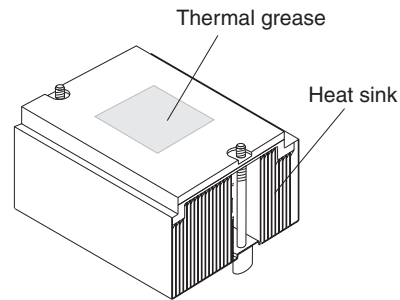
- 1) Do not use excessive force when pressing the microprocessor into the socket.
- 2) Make sure that the microprocessor is oriented and aligned correctly with pin number 1 in the socket before you try to close the microprocessor-release lever. The following illustration shows the alignment marks for both microprocessors and sockets.



- c. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.
 - d. Carefully close the microprocessor-release lever to secure the microprocessor in the socket.

Attention: Do not set the heat sink down after you remove the plastic cover and do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, contact your service technician.

12. Install the heat sink on the microprocessor.



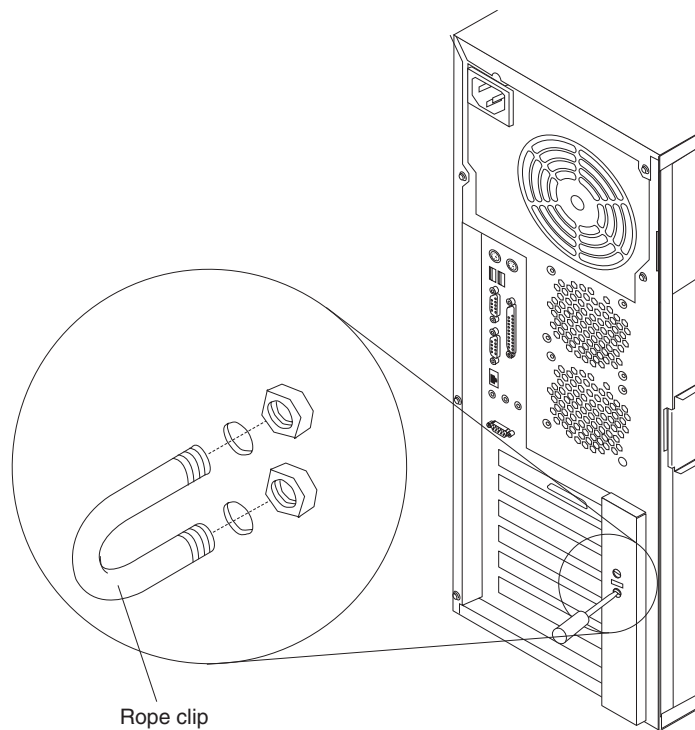
- a. Remove the plastic cover from the bottom of the heat sink.
 - b. Align and place the heat sink on top of the microprocessor, grease side down, in the retention bracket. Press firmly on the heat sink.
Attention: Alternate the tightening of the two captive screws to prevent damage to the microprocessor. Ensure that the screws are completely tightened (until they stop); otherwise, damage to the microprocessor will occur.
 - c. Secure the heat sink to the microprocessor by tightening the captive screws. Alternate between the two captive screws in the heat sink while tightening them.
13. Install the air baffle.
 14. Install the adapter airflow guide:
 - a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
 - b. Slide the adapter airflow guide into the guides on the air baffle and front adapter-support bracket; then, push it into place, using care to not damage any cables.
 - c. Rotate the front and rear adapter-retention brackets to the closed (locked) position.
 15. If you have other options to install or remove, do so now.
 16. Replace the support bracket (see “Removing and installing the support bracket” on page 13).
 17. Replace the side cover (see “Replacing the bezel” on page 39).
 18. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the server.

Installing a security rope clip

To help prevent theft, you can add a security rope clip and cable to your server.

Complete the following steps to install a rope clip:

1. Remove the side cover (see “Removing the side cover” on page 11).
2. Use a screwdriver to remove the two metal knockouts.
3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.
4. Thread a cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, be certain it does not interfere with other cables connected to the server.



5. If you have other options to install or remove, do so now; otherwise, go to “Completing the option installation” on page 39.

Replacing a hot-swap power supply

Some models of your server come with two hot-swap power supplies. You do not need to turn off the server to replace a hot-swap power supply, but you must replace only one power supply at a time.

If you install or remove a power supply, observe the following precautions.

Statement 8



CAUTION:

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



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

Statement 12



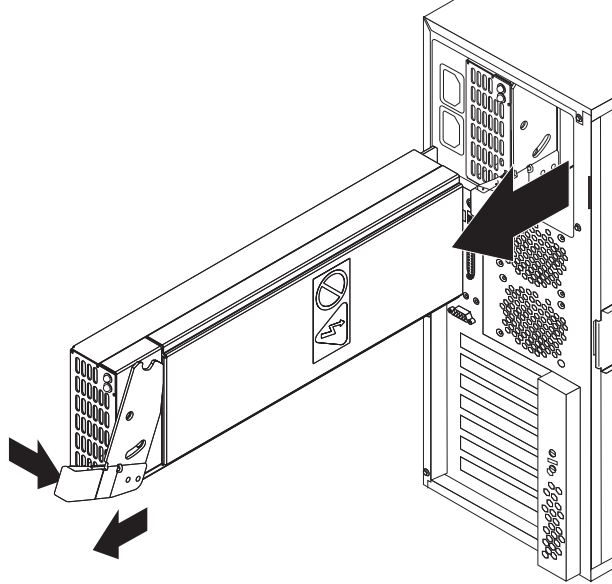
CAUTION:

The following label indicates a hot surface nearby.

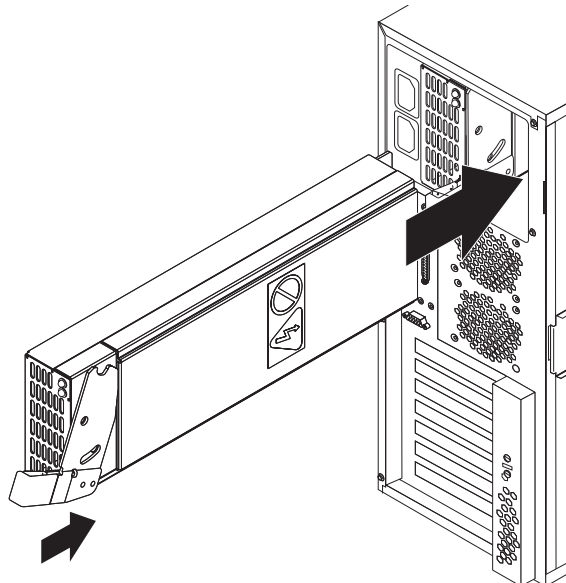


Complete the following steps to replace a hot-swap power supply:

1. Review the safety information beginning on page v and “Installation guidelines” on page 7.
2. Press the orange release lever on the selected power supply; then, pull the power supply out of the bay and set it aside.



3. Make sure the power-supply handle is in the open position; then, slide the power supply all the way into the chassis before placing the power-supply handle into the locked position.



4. If the server is not on, turn on the server.
5. Verify that the dc power LED and the ac power LED on the power supply are lit, indicating that the power supply is operating properly.

Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

To order replacement batteries, call 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Note: After you replace the battery, you must reconfigure your server and reset the system date and time.

Statement 2



CAUTION:

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

Do not:

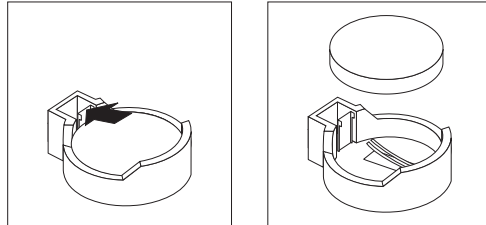
- **Throw or immerse into water.**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

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

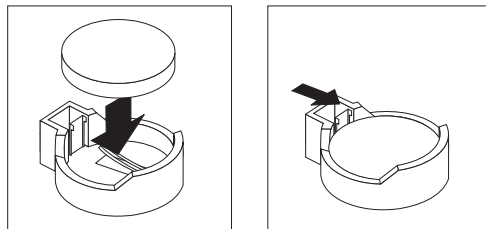
Complete the following steps to replace the battery:

1. Review the safety information beginning on page v and “Installation guidelines” on page 7.
2. Follow any special handling and installation instructions supplied with the replacement battery.
3. Turn off the server and all attached devices.
4. Disconnect all power cords; then, disconnect all external cables.
5. Remove the side cover and support bracket (see “Removing the side cover” on page 11).
6. Remove the adapter airflow guide:
 - a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.

- b. Slide the adapter airflow guide out of the guides on the air baffle and on the front adapter-support bracket; then, remove it from the chassis.
- 7. Remove any adapters that impede access to the battery.
- 8. Remove the battery:
 - a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
 - b. Use your thumb and index finger to lift the battery from the socket.



- 9. Insert the new battery:
 - a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
 - b. Press the battery down into the socket until it clicks into place. Make sure the battery clip holds the battery securely.



- 10. Replace any adapters that were removed.
- 11. Install the adapter airflow guide:
 - a. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
 - b. Slide the adapter airflow guide into the guides on the air baffle and front adapter-support bracket; then, push it into place, using care to not damage any cables.
 - c. Rotate the front and rear adapter-retention brackets to the closed (locked) position.
- 12. Replace the support bracket and side cover. (See “Removing and installing the support bracket” on page 13 and “Replacing the bezel” on page 39.)
- 13. Connect all external cables; then, connect the power cords.
- 14. Turn on the server.
- 15. Start the Configuration/Setup Utility program and set configuration parameters as needed. See the *User’s Guide* on the IBM xSeries Documentation CD.

Completing the option installation

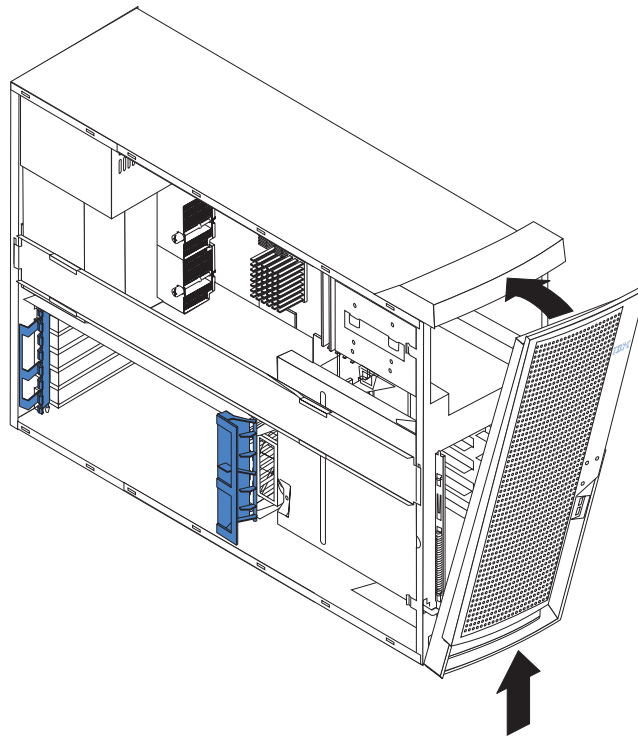
To complete installation of an option, you must reinstall the bezel, reinstall the server cover, reconnect all the cables that you disconnected earlier and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

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

Note: If you have just plugged the power cords of your server into electrical outlets, you will have to wait approximately 20 seconds before pressing the power-control button.

Replacing the bezel

The following illustration shows how to install the bezel on the server.



Complete the following steps to replace the bezel:

1. Insert the two tabs on the bottom of the bezel into the matching holes on the server chassis.
2. Push the top of the bezel toward the server until the two tabs at the top of the bezel snap into place.
3. For hot-swap hard disk drive models, make sure the side cover is unlocked; then, insert the hot-swap lock bar into the slots on the bezel and rotate it to the locked position. The hot-swap lock bar locks when you lock the side cover key lock.

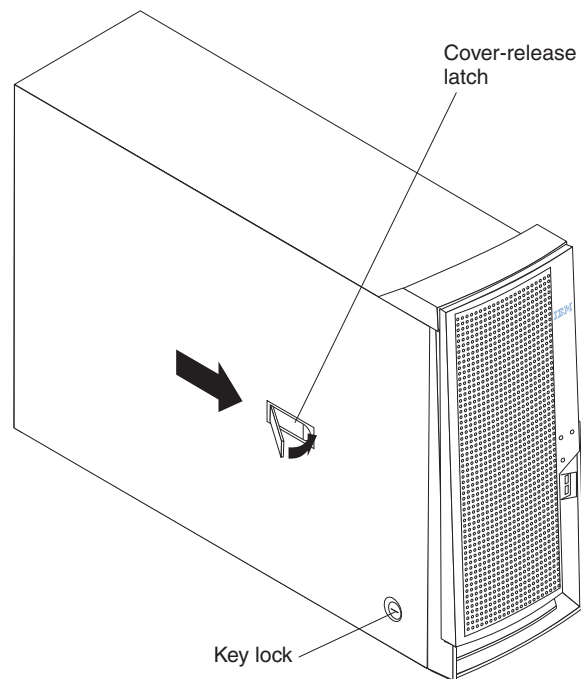
Replacing the side cover

If you removed the support bracket or bezel, reinstall it before you replace the side cover. See “Removing and installing the support bracket” on page 13 and “Replacing the bezel” on page 39.

Note: The rear adapter retaining bracket rests against the server side cover. You might find it easier to lay the server on its side to replace the side cover.

Complete the following steps to replace the side cover:

1. Before installing the cover, check 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.
2. Place the bottom lip of the side cover over the bottom edge of the server chassis.
3. Rotate the side cover to a vertical position, inserting the tabs at the top of the side cover into the matching slots in the server chassis.
4. Slide the side cover forward until it locks in place. Press down on the cover-release-latch button as you close the cover-release latch to lock the side cover.



5. For hot-swap hard disk drive models, open the server door and hold the hot-swap lock bar in the closed position, lock the side cover key lock, and close the server door.
6. If your server has stabilizing feet that rotate, make sure that the four stabilizing feet are rotated outward so that they properly support the server. Rotate each foot outward 90 degrees (see “Moving the stabilizing feet” on page 10).
7. Reconnect the external cables and power cords to the server; then, connect the power cords to electrical outlets.
8. Turn on the attached devices; then, turn on the server.

Updating your server configuration

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration information. See the *User's Guide* on the *IBM xSeries Documentation CD* for more information about the Configuration/Setup Utility program.

Some options have device drivers that you need to install. See the documentation that comes with your option for information about installing any required device drivers.

Your server comes with one or two microprocessors installed on the system board. If your server comes with two microprocessors, or if your server comes with one microprocessor and you have installed an additional microprocessor, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system to support SMP. See the ServerGuide™ information in the *User's Guide* on the *IBM xSeries Documentation CD* and to your operating-system documentation for additional information.

If your server has a RAID configuration using the integrated SCSI controller with RAID capabilities or has a ServeRAID controller installed and you have installed or removed a hard disk drive, see the ServeRAID documentation on the *IBM ServeRAID Support CD* for information about configuring your disk arrays.

Connecting external options

If you install an optional SCSI adapter, or use channel B on the integrated SCSI controller for external devices, you can attach external SCSI devices, such as a SCSI storage expansion enclosure, to your server. To use channel B for external SCSI devices, remove the SCSI knockout from the rear of the server and secure the free end of the channel B cable in the new opening.

You can attach additional external options to the input/output (I/O) connectors on the front and rear of your server. (See Chapter 3, "Input/output ports" on page 43 for more information.)

Complete the following steps to attach an external device:

1. Review the safety information beginning on page v, "Installation guidelines" on page 7, and the documentation that comes with your options.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

Note: If you are attaching an external SCSI device, see "Ultra320 SCSI connector" on page 45 for information about SCSI cabling and SCSI IDs.

Installing the server in a rack

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

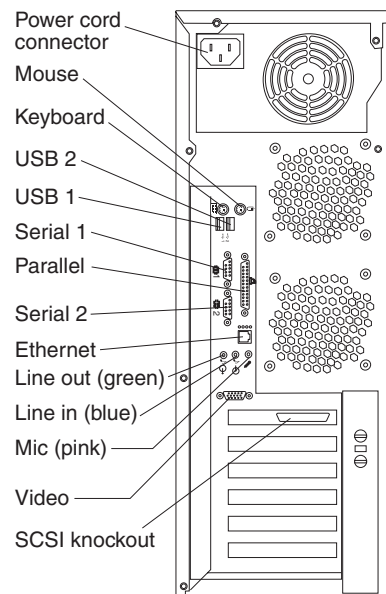
Chapter 3. Input/output ports

Connect optional external devices to the connectors on the front and rear of the server.

Your server has the following input/output (I/O) connectors:

- Three audio (line-in, line-out, and microphone)
- One auxiliary-device (pointing-device)
- One Ethernet (RJ-45)
- One keyboard
- One parallel
- Two serial
- One Ultra320 SCSI (some models)
- Four Universal Serial Bus (USB) v 2.0
- One video

The following illustration shows the locations of these connectors.

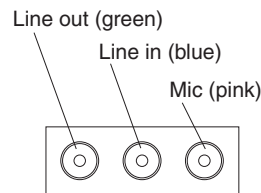


The following sections describe these connectors.

If you have an optional Remote Supervisor Adapter (system-management adapter) installed in PCI slot 1, your server also has an additional Ethernet connector, an additional serial connector, and an Advanced System Management (ASM) Interconnect connector. See the documentation that comes with the Remote Supervisor Adapter for more information about the ASM Interconnect network.

Audio connectors

Use the audio connectors to connect external audio equipment to the server. The following illustration shows the audio connectors.



Line in

The server receives audio signals through this connector from an external audio device.

Line out

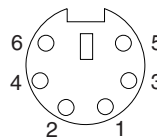
The server sends audio signals through this connector to powered speakers with built-in amplifiers, headphones, a multimedia keyboard, or the audio line-in connector on a stereo system. The internal speaker in your server is disabled when any device is attached to the line-out connector.

Microphone

Connect a microphone to this connector to record sounds onto the hard disk or to use speech recognition software.

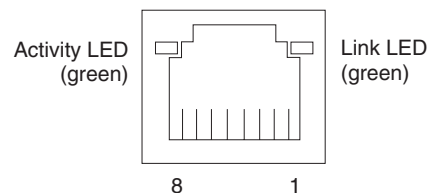
Auxiliary-device (pointing-device) connector

Use this connector to connect a mouse or other pointing device. The following illustration shows an auxiliary-device connector.



Ethernet (RJ-45) connector

The following illustration shows an Ethernet connector.

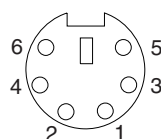


Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

For more information about the Ethernet controller, see the *User's Guide* on the IBM xSeries Documentation CD.

Keyboard connector

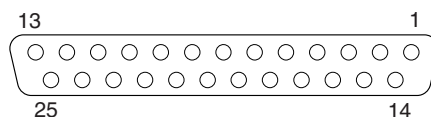
Use this connector to connect a PS/2 (non-USB) keyboard. The following illustration shows a keyboard connector.



If you attach a keyboard to this connector, USB ports and devices are disabled during the power-on self-test (POST).

Parallel connector

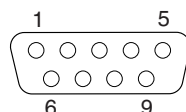
Use this connector to connect a parallel device. The following illustration shows a parallel connector.



The parallel connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP). If you configure the parallel port to operate in bidirectional mode, it supports the ECP and EPP modes of operation. To configure the parallel port, use the **Devices and I/O Ports** option in the Configuration/Setup Utility program. See the *User's Guide* for more information. If you configure the parallel port to operate in bidirectional mode, use an IEEE 1284-compliant cable that does not exceed 3 meters (9.8 ft).

Serial connectors

Use the serial connectors to connect serial devices. The following illustration shows a serial connector.



Ultra320 SCSI connector

You can install up to four internal SCSI devices using the SCSI cable that comes with some models of the server. Other server models might come with one SCSI cable that is connected from the internal SCSI channel A connector to the standard hot-swap-drive backplane. You can attach additional internal SCSI devices to the other internal SCSI channel B connector, or you can use channel B for external SCSI devices. To use channel B for external SCSI devices, remove the SCSI knockout from the rear of the server and secure the free end of an optional channel B cable in the new opening.

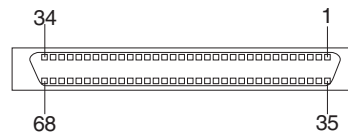
If you want to attach external SCSI devices to the server without using the internal SCSI channel B, you must install an optional SCSI adapter.

Notes:

1. External SCSI devices connected to internal SCSI channel B will operate asynchronously.

2. If you install a PCI RAID adapter to configure and manage the internal hot-swap drives, you must move the SCSI cable from the system-board SCSI connector to an internal channel connector on the RAID adapter (except for the ServeRAID-5i controller, which uses the system-board integrated SCSI controller with RAID capabilities). See “Cabling an optional SCSI adapter” on page 17 for additional information.

An optional external SCSI connector might be installed on the rear of the server. Use this connector to connect external SCSI devices. The following illustration shows the SCSI standard 68-pin, female D-shell SCSI connector.



Your server has an integrated SCSI controller with RAID capabilities. This dual-channel controller supports two independent, Ultra320 SCSI channels. The SCSI connectors for both channels are on the system board. Each channel supports up to 15 SCSI devices. This controller uses:

- Double-transition clocking to achieve up to 320 MB-per-second data-transfer rates
- Domain name validation to negotiate compatible data-transfer speeds with each device
- Cyclic-redundancy checking (CRC), instead of the usual parity checking, to improve data reliability
- An active terminator for SCSI bus termination

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs.

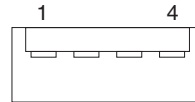
The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach an external SCSI device to an optional SCSI adapter, you must set a unique ID for the device. See the information that comes with the device for instructions to set its SCSI ID.

SCSI cabling requirements

You can install four internal SCSI devices using the SCSI signal cable that comes with some server models. If you plan to attach external SCSI devices, you must order an additional SCSI cable, remove the SCSI knockout from the rear of the server, and connect the new cable from the system board to this opening. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative. When using an optional SCSI adapter, you must also connect the SCSI adapter to the SCSI LED (J18) connector on the system board receive an indication of SCSI hard-disk drive activity. See “System-board internal connectors” on page 3 for the location of the SCSI connectors. For information about the maximum length of SCSI cable, see the American National Standards Institute (ANSI) SCSI standards on the ANSI Web site at <http://www.ansi.org/> on the World Wide Web. Adhering to these standards will help to ensure that your server operates properly.

Universal Serial Bus connectors

Use a Universal Serial Bus (USB) connector to connect a USB device. USB technology transfers data at up to 12 Mb per second (Mbps) with a maximum of 127 devices and a maximum signal distance of 5 meters (16 ft) per segment. Using Plug and Play technology, USB devices are configured automatically. The following illustration shows a USB connector.



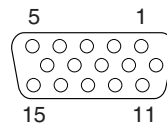
Use a 4-pin cable to connect a device to a USB connector. If you need to connect more USB devices than the server has USB connectors for, use a USB hub to connect additional devices.

If you connect a PS/2 (non-USB) keyboard to the keyboard connector, USB ports and devices are disabled during POST.

If you connect a USB keyboard that has a mouse port, the keyboard emulates a mouse, and you cannot disable the mouse settings in the Configuration/Setup Utility program.

Video connector

The super video graphics array (SVGA) video adapter is installed in mini-PCI slot 6 on the system board. There is one video connector on the rear of the server. Use the video connector to connect a monitor or other display. The following illustration shows an industry-standard 15-pin analog video connector on the rear of the server.



Appendix. Notices

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Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1000000 bytes, and GB stands for approximately 1000000000 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 may 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 available from IBM.

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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.

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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.

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

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

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

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand

IBM power cord part number	Used in these countries and regions
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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