IBM

@server

xSeries 206
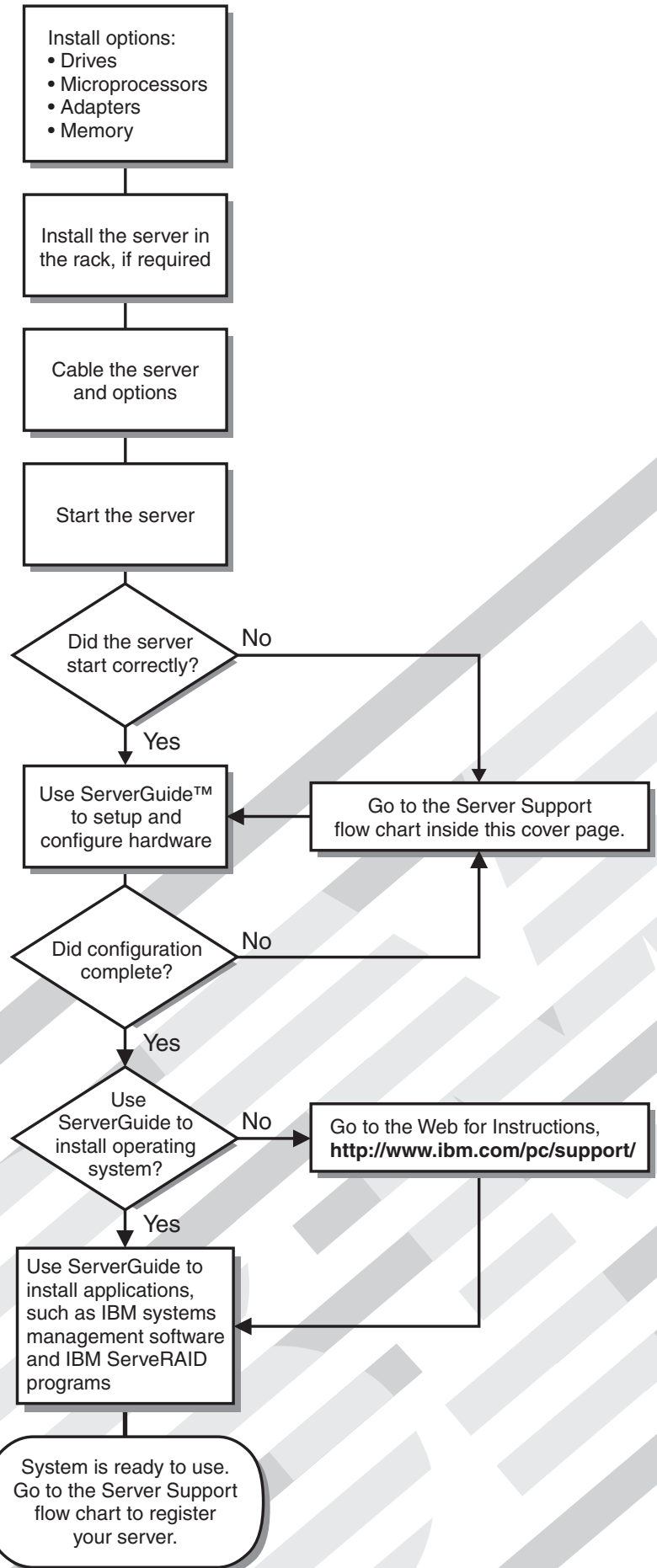### Type 8482

Installation Guide

Welcome. . .

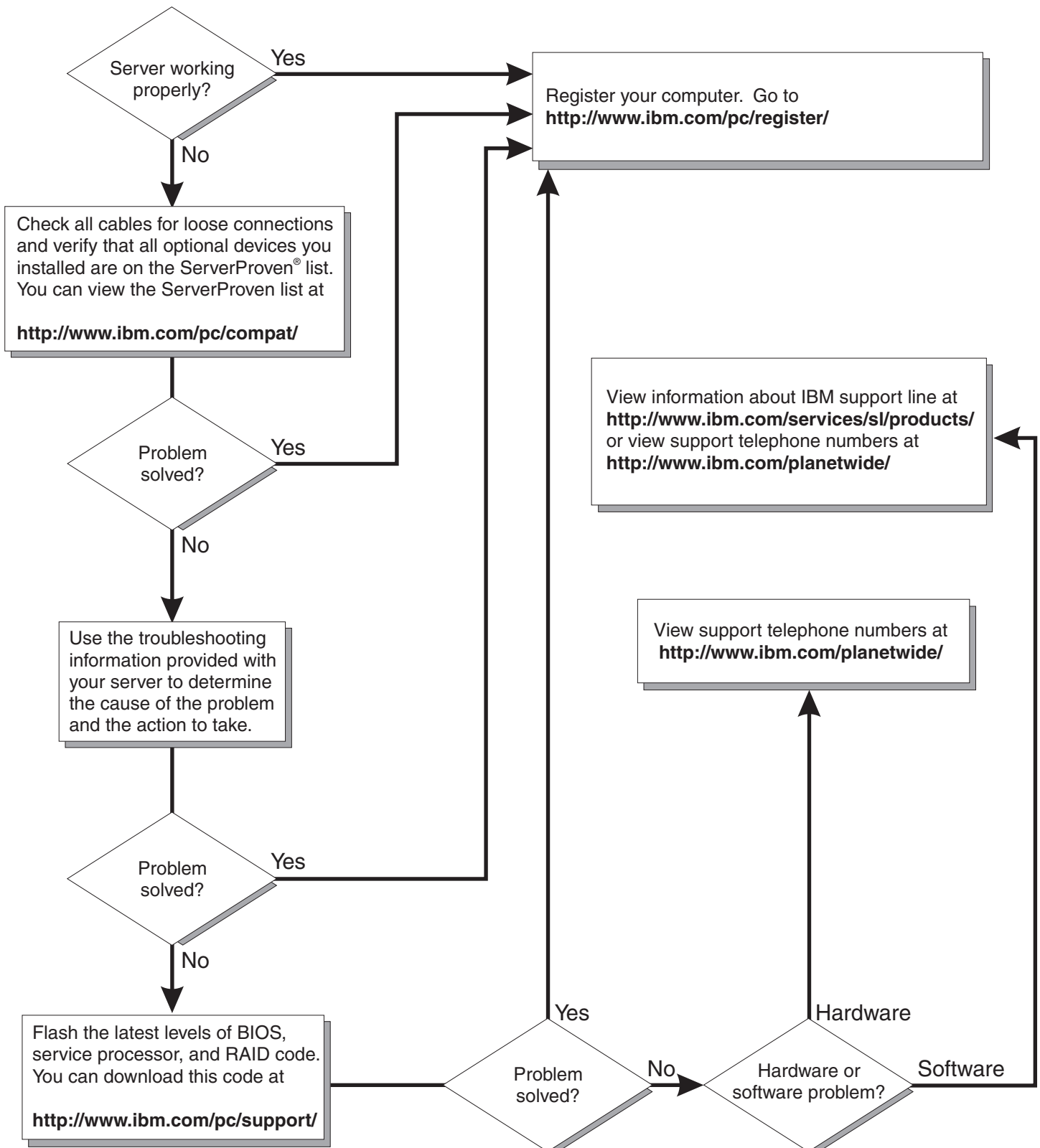Thank you for buying an IBM xSeries server.

This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the *User's Guide* on the Documentation CD.

You can also find the most current information about your server on the IBM Web site at: http://www.ibm.com/pc/support

---

Install options:
• Drives
• Microprocessors
• Adapters
• Memory

↓

Install the server in the rack, if required

↓

Cable the server and options

↓

Start the server

↓

Did the server start correctly? — No → Go to the Server Support flow chart inside this cover page.

Yes ↓

Use ServerGuide™ to setup and configure hardware ←

↓

Did configuration complete? — No →

Yes ↓

Use ServerGuide to install operating system? — No → Go to the Web for Instructions, **http://www.ibm.com/pc/support/**

Yes ↓

Use ServerGuide to install applications, such as IBM systems management software and IBM ServeRAID programs

↓

System is ready to use. Go to the Server Support flow chart to register your server.

Server Support

Server working properly? — **Yes** →

Register your computer. Go to
http://www.ibm.com/pc/register/

↓ **No**

Check all cables for loose connections and verify that all optional devices you installed are on the ServerProven® list. You can view the ServerProven list at

http://www.ibm.com/pc/compat/

↓

Problem solved? — **Yes** →

↓ **No**

Use the troubleshooting information provided with your server to determine the cause of the problem and the action to take.

↓

Problem solved? — **Yes** →

↓ **No**

Flash the latest levels of BIOS, service processor, and RAID code. You can download this code at

http://www.ibm.com/pc/support/

→ Problem solved? — **No** → Hardware or software problem?

Yes ↑

Hardware ↑

View support telephone numbers at
http://www.ibm.com/planetwide/

Software →

View information about IBM support line at
http://www.ibm.com/services/sl/products/
or view support telephone numbers at
http://www.ibm.com/planetwide/

IBM

@server

xSeries 206
Type 8482

Installation Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-07 11/2002," on page 73 and Appendix C, "Notices," on page 89.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1:

DANGER

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

To avoid a shock hazard:

• **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**

• **Connect all power cords to a properly wired and grounded electrical outlet.**

• **Connect to properly wired outlets any equipment that will be attached to this product.**

• **When possible, use one hand only to connect or disconnect signal cables.**

• **Never turn on any equipment when there is evidence of fire, water, or structural damage.**

• **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**

• **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

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

Statement 2:

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

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

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

Statement 3:

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

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

DANGER

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

Statement 4:

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
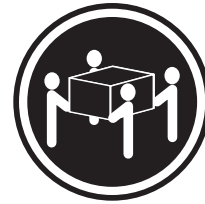
CAUTION:
Use safe practices when lifting.

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 branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.**

Statement 15:

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

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. *Lávese las manos después de usar el producto.*

Important:

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

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

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

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® @server™ xSeries™ 206 Type 8482 server and basic instructions for installing some options. More detailed instructions for installing options are in the *Option Installation Guide* on the IBM *xSeries Documentation* CD, which comes with your server. This document contains information about:

- Setting up and cabling your server
- Starting and configuring your server
- Installing some options
- Solving problems

Your server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in your server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the ″Online publications″ page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **xSeries 206**.
5. Click **Continue**.

Your server comes with an IBM *ServerGuide™ Setup and Installation* CD to help you configure the hardware, install device drivers, and install the operating system.

Your server comes with a limited warranty. You can obtain up-to-date information about your server and other IBM server products at http://www.ibm.com/eserver/xseries/.

Record information about your server in the following table. You will need this information when you register your server with IBM.

Product name	IBM @server xSeries® 206 server
Machine type	8482
Model number	_____
Serial number	_____
Key serial number	_____
Key manufacturer	_____
Key phone number	_____

The model number and serial number are on the lower-right side of the bezel, as shown in the following illustrations. These illustrations might differ slightly from your hardware.

The following illustration shows the SCSI hot-swap model.

Model number
and serial number
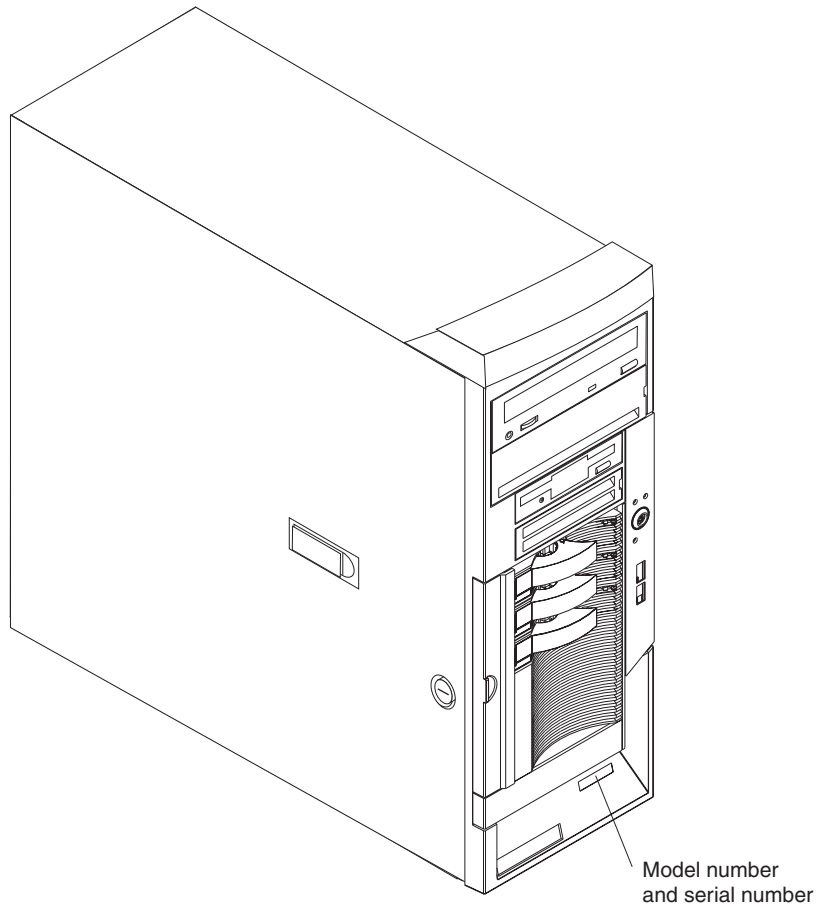
The following illustration shows the non-hot-swap and simple-swap model.

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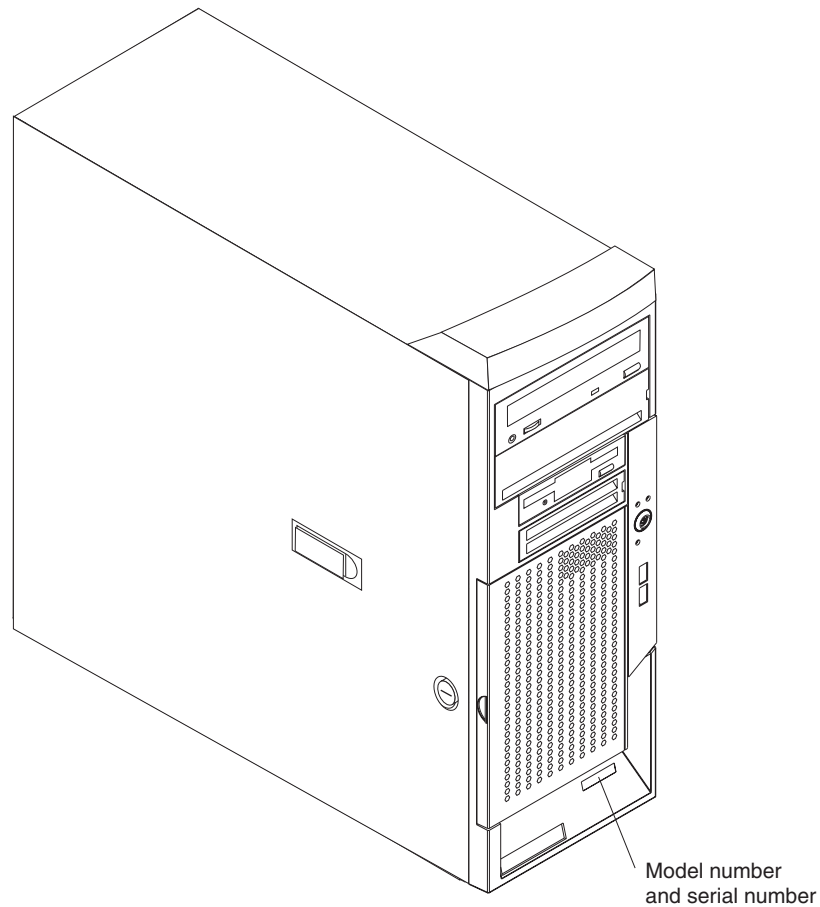
Important: Your server keys cannot be duplicated by a locksmith. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag that is attached to the keys.

If you plan to install your server in a rack, you must purchase a Tower-to-Rack Kit conversion kit. For a list of supported options for your server, see the ServerProven® list at http://www.ibm.com/pc/compat/.

See the *Rack Installation Instructions* document for complete rack installation and removal instructions.

The IBM xSeries Documentation CD

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

Hardware and software requirements

The IBM *xSeries Documentation* CD requires the following minimum hardware and software:

- Microsoft Windows NT 4.0 (with Service Pack 3 or later), Windows 98, or Windows 2000, or Red Hat Linux.
- 100 MHz Intel Pentium microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems.

Note: Acrobat Reader software is included on the documentation CD, and you can install it when you run the IBM Documentation Browser.

Using the Documentation Browser

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

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into your CD-ROM drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users:
  - If you are using a Windows operating system, insert the CD into your CD-ROM drive; then, click **Start --> Run**. In the **Open** field, type

    `e:\win32.bat`

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

    `sh runlinux.sh`

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

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

To search all the books, type a word or word string in the **Search** field and click **Search**. The books in which the word or word string appears are listed in order of

the most occurrences. Click a book to view it, and press Crtl+F to use the Acrobat search function or Alt+F to use the xpdf search function within the book.

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

Notices and statements used in this document

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

The following notices and statements are used in this document:
- **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.

Features and specifications

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

You can use the Configuration/Setup Utility program in your server to determine the specific type of microprocessor that is on the system board.

Table 1. Features and specifications

Microprocessor:
• Intel™ Pentium 4 Processor
• 1 MB Level-3 cache
• 800 MHz front-side bus (FSB)
 	
Memory:
• Minimum: 256 MB
• Maximum: 4 GB
• Types: PC2700 and PC3200, double-data-rate (DDR)
• Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved
 	
Drives: (depending on your model)
• Diskette: 1.44 MB (two mode)
• Hard disk drive: SATA or SCSI
• One of the following drives:
  – CD-ROM: IDE
  – CD-RW: IDE
  – DVD-ROM: IDE
 	
Expansion bays: (depending on your model)
• Two 5.25-in. bays (one CD-ROM drive installed)
• Two 3.5-in. removable-media drive bays (one diskette drive installed)
• Three 3.5-in. hard disk drive bays with one the following types of drives:
  – Open hot-swap bays
  – Non-hot-swap bays with one hard disk drive installed
  – Serial ATA (SATA) bays with one hard disk drive installed
 	
PCI expansion slots:
• Two PCI-X 66 MHz/64-bit
• Three PCI 33 MHz/32-bit
 	
Video controller: ATI 7000M video controller with 16 MB SDRAM video memory on the system board
 	
Fans:
Two or three speed-controlled fans
	Power supply: One 340 watt (90-240 V ac)
	
	Size:
	• Height: 448 mm (17.25 in.)
	• Depth: 483 mm (19 in.)
	• Width: 265 mm (6.5 in.)
	• Weight: 16.3 kg (36 lb) to 20.8 kg (45.8 lb) depending upon configuration
	
	Integrated functions:
	• Intel Ethernet controller on the system board with RJ-45 Ethernet port
	• Two serial ports
	• One parallel port
	• Dual port Serial ATA controller
	• One internal Ultra320 SCSI port (mini-PCI slot)
	• Integrated RAID capability
	• Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)
	• Keyboard port
	• Mouse port
	• ATA-100 single-channel IDE controller
	• ATI 7000M video
	  – Compatible with SVGA and VGA
	  – 16 MB video memory
	
	Diagnostic LEDs:
	• Fans
	• Memory
	• Microprocessor
	
	Acoustical noise emissions:
	• Sound power, idling: 5.3 bel
	• Sound power, operating: 5.5 bel
		Environment:
		• Air temperature:
		  – Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft)
		  – Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft)
		• Humidity (operating and storage): 8% to 80%
		
		Heat output:
		Approximate heat output in British thermal units (Btu) per hour
		• Minimum configuration: 630 Btu/hour (185 watts)
		• Maximum configuration: 1784 Btu/hour (523 watts)
		
		Electrical input:
		• Sine-wave input (50 or 60 Hz) required
		• Input voltage and frequency ranges automatically selected
		• Input voltage low range:
		  – Minimum: 100 V ac
		  – Maximum: 127 V ac
		• Input voltage high range:
		  – Minimum: 200 V ac
		  – Maximum: 240 V ac
		• Input kilovolt-amperes (kVA) approximately:
		  – Minimum: 0.20 kVA (all models)
		  – Maximum: 0.55 kVA
		
		Notes:
		1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
		2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Major components of the xSeries 206 Type 8482 server

Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustration shows the major components in the server.

Note: The illustrations in this document might differ slightly from your hardware.
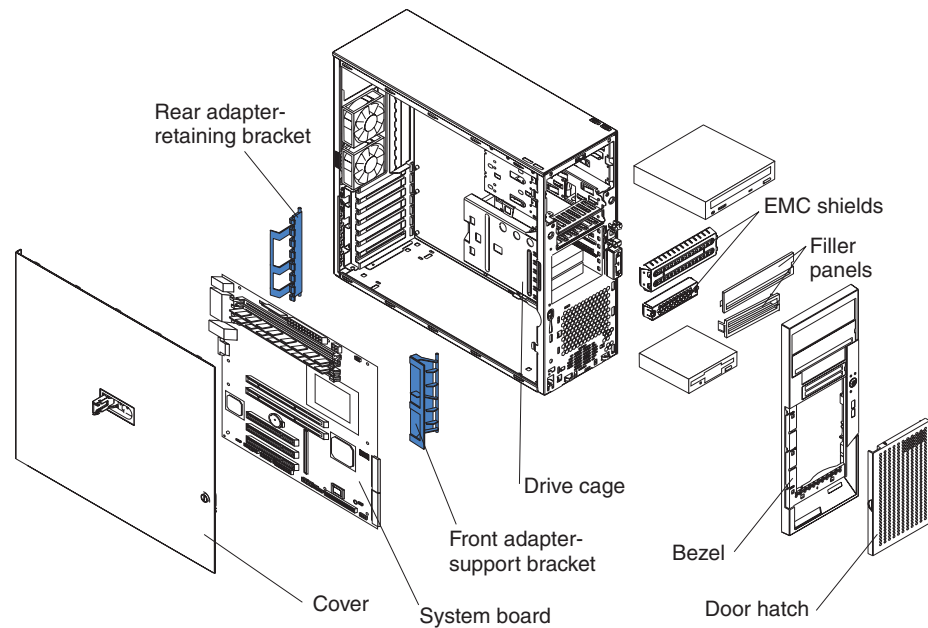
System-board option connectors

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

DIMM 4
DIMM 3
DIMM 2
DIMM 1

Microprocessor

PCI-X slot 1
PCI-X slot 2
PCI slot 3
PCI slot 4
PCI slot 5

Battery
Remote Supervisor Adapter II
SCSI adapter mini-PCI-X slot

System-board internal connectors

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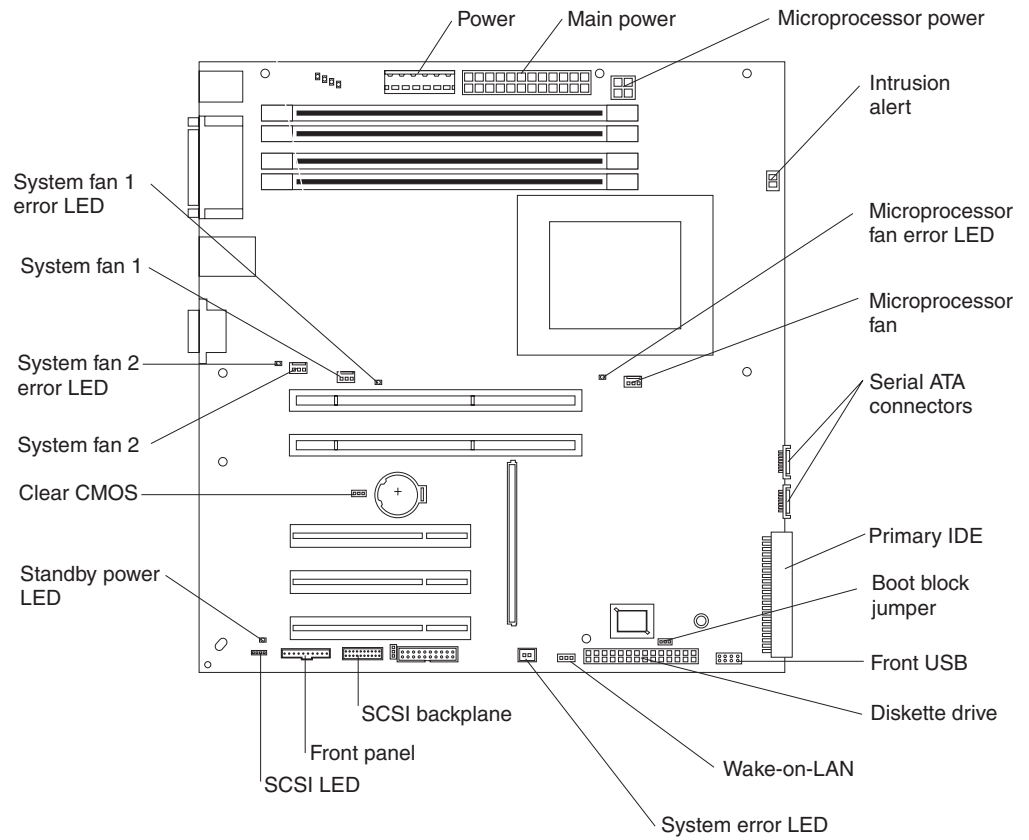
System-board external connectors

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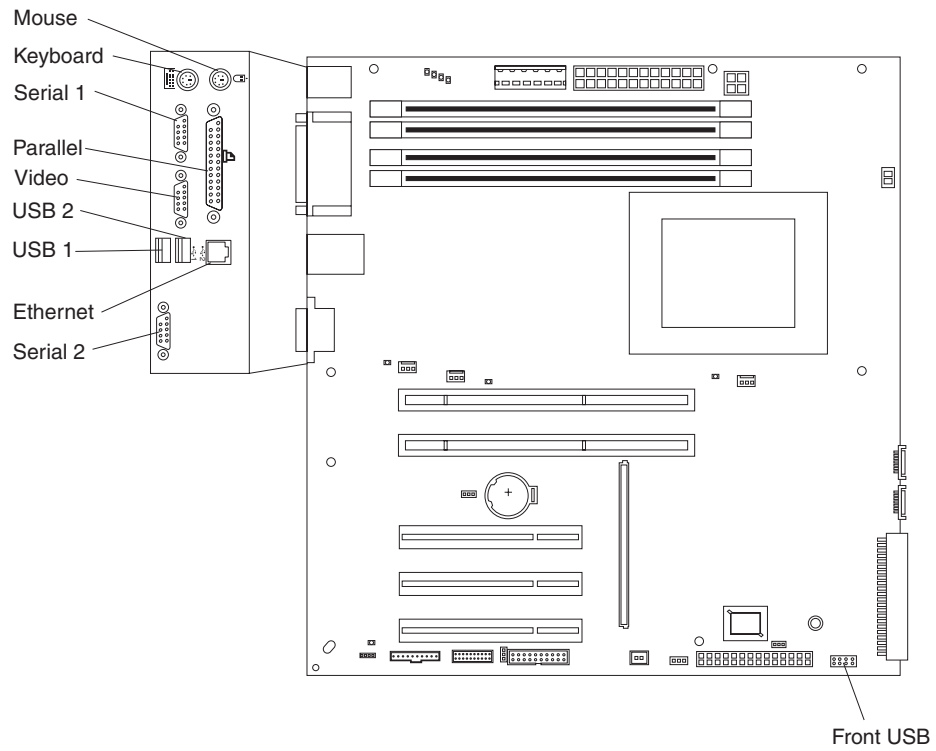
System-board LEDs

The following illustration shows the LEDs on the system board. You might need to refer to this illustration when solving problems with the server.
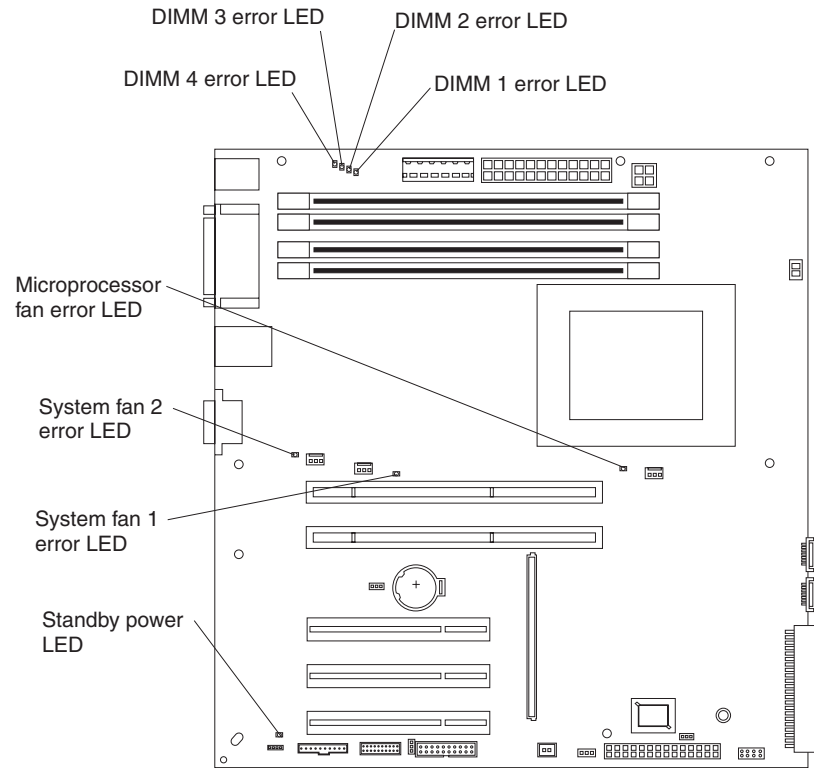
Chapter 2. Installing options

This chapter provides basic instructions for installing hardware options in your server. These instructions are intended for users who are experienced with setting up IBM server hardware. If you need more detailed instructions, see the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

Installation guidelines

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

- Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 14. This information will help you work safely with your server and options.
- 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 drives or hot-plug Universal Serial Bus (USB) devices.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
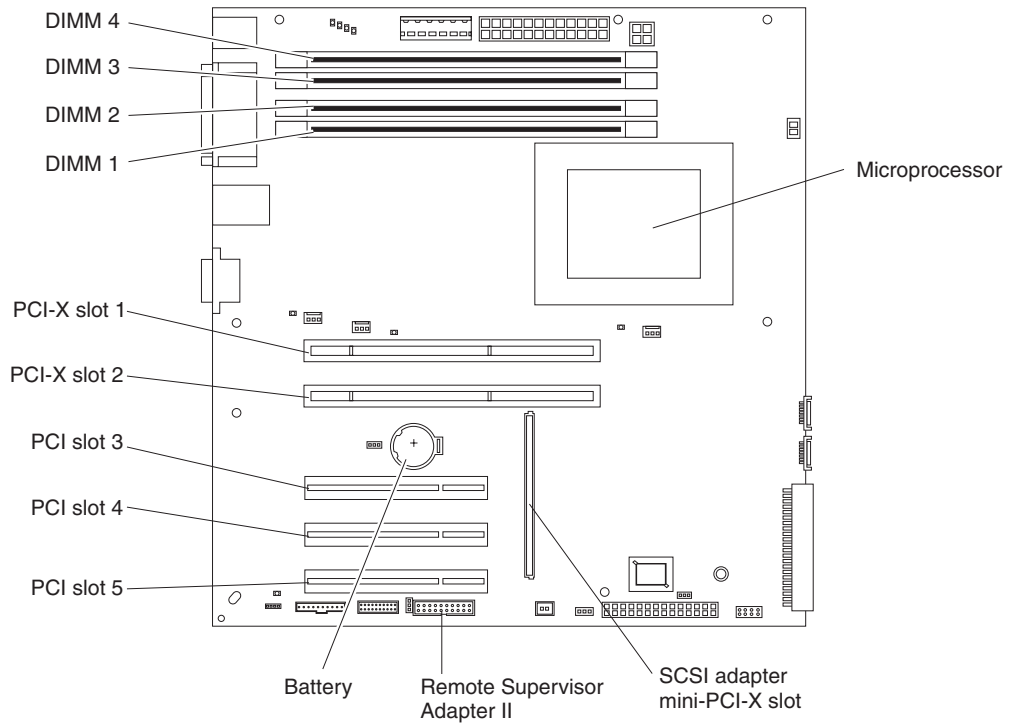- When you need to access the inside of the server to install options, you might find it easier to lay the server on its side.
- For a list of supported options for your server, go to http://www.ibm.com/pc/us/compat/.

System reliability guidelines

To help ensure proper 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 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 (more than 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 within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of its removal.

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.

Removing the side cover

Complete the following steps to remove the server side cover:

1. Review the safety information beginning on page vii and the "Installation guidelines" on page 13.
2. Turn off the server and all attached devices (see "Turning off the server" on page 44); then, disconnect all power cords and external cables.
3. Lay the server on its side.
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.

Cover-release latch

Key lock
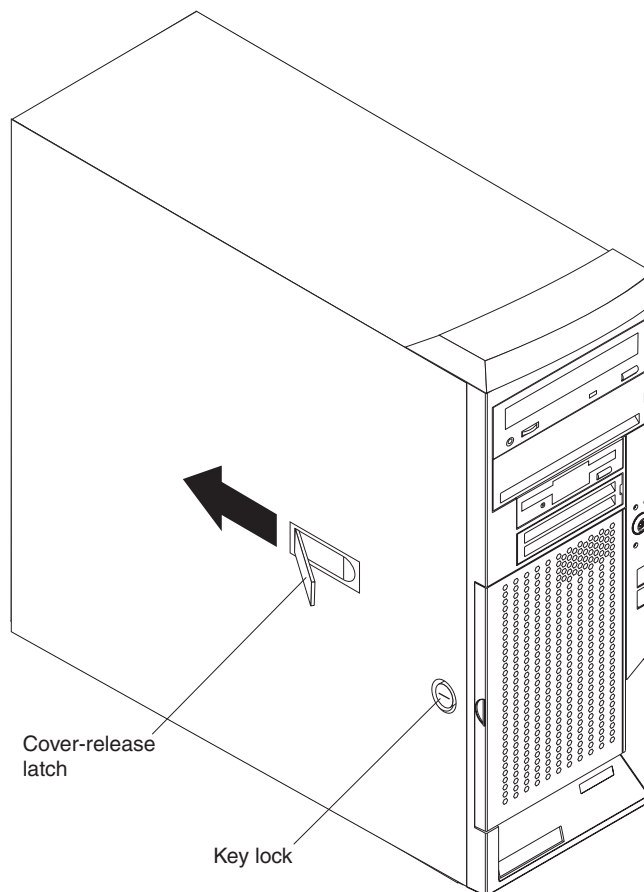
To replace the side cover, see "Replacing the side cover" on page 38.

Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) 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. Unlock the side-cover lock.
2. Remove the side cover (see "Removing the side cover" on page 15).
3. Locate the bezel-release lever; then, press the bezel-release lever toward the front of the server.
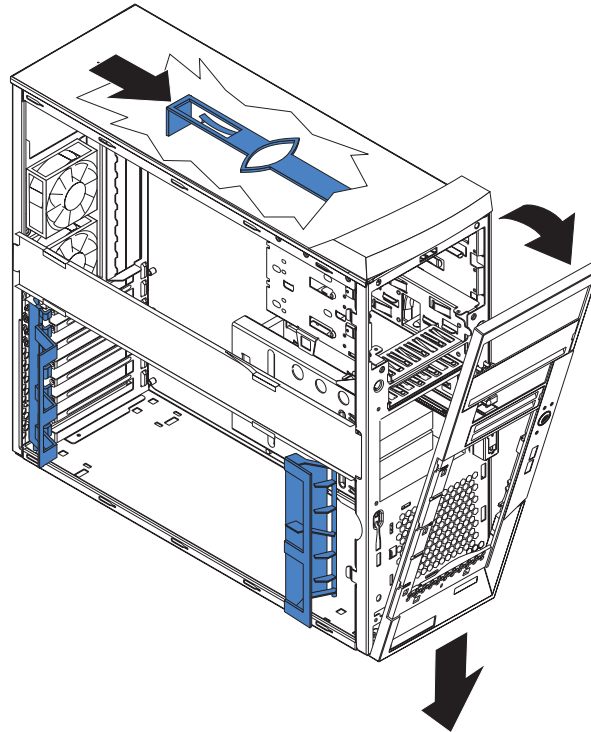
4. Pull the top of the bezel away from the chassis; then, push the bezel down to disengage the bottom tabs.
5. Remove the bezel from the server and store the bezel in a safe place.

For instructions for replacing the bezel, see "Replacing the bezel" on page 38.

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. Read the safety information beginning on page vii and "Installation guidelines" on page 13.
2. Remove the side cover (see "Removing the side cover" on page 15).
3. Pull out on the rear end of the support bracket at a 45° angle.
4. Disengage the front end of the support bracket from the server and set the bracket aside.
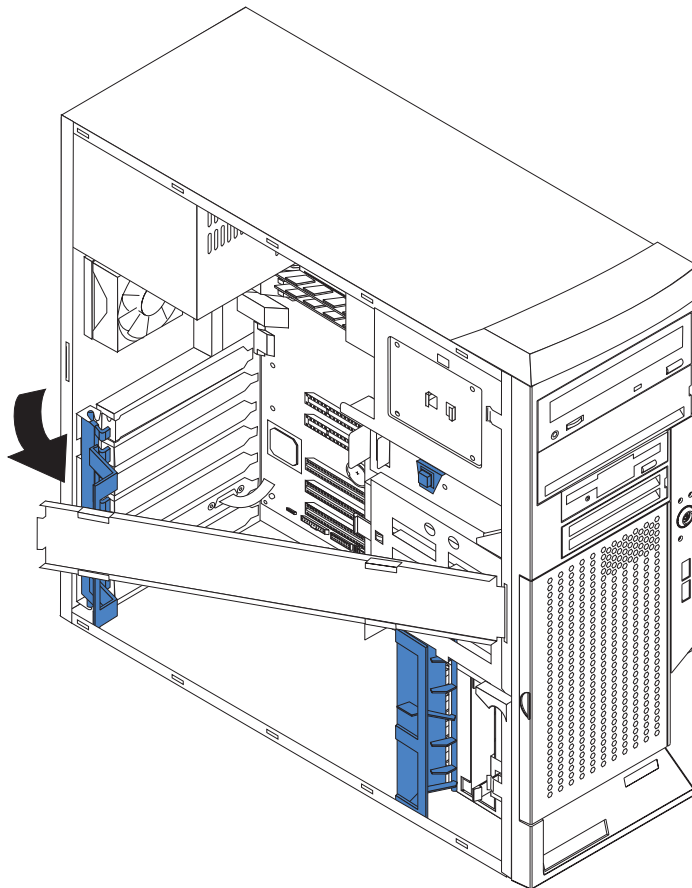
To reinstall the support bracket, reverse the previous steps.

Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that your server supports and other information that you must consider when installing DIMMs:

- Your server supports industry-standard PC2700 and PC3200 double-data-rate (DDR) dual inline memory modules (DIMMs).
- The system board contains four DIMM connectors and supports two-way memory interleaving.
- You can install 1, 2, or 4 DIMMs in your server, but not 3 DIMMs. It is not supported.
- The DIMM options that are available for your server are 256 MB, 512 MB, and 1 GB. Your server supports a minimum of 256 MB and a maximum of 4 GB of system memory.
- 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.
- Your server comes with one 256 MB or 512 MB DIMM installed in the DIMM 1 memory connector. If your server has one DIMM installed, when you install an additional DIMM, it must be installed in DIMM 3 memory connector, and it must be the same size, speed, type, and technology as the DIMM in the DIMM 1 memory connector. You can mix compatible DIMMs from various manufacturers. When one DIMM is installed, the server runs as a single-channel server. When you add a DIMM in the DIMM 3 memory connector, the server defaults to a dual-channel server.
- DIMMs must be installed in matched pairs. If you install a second pair of DIMMs in the DIMM 2 and DIMM 4 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs in the DIMM 1 and DIMM 3 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in the DIMM 2 and DIMM 4 memory connectors must match each other.
- Install only 2.5 V, 184-pin, double-data-rate (DDR), PC2700 or PC3200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2700 and PC3200 SDRAM unbuffered DIMM specification. For a list of supported options for your server, go to http://www.ibm.com/us/compat/; then, select your country and navigate to the list of options for your computer.
- When you restart your server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

Complete the following steps to install a DIMM:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 13.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see "Removing the side cover" on page 15).
4. Remove the support bracket (see "Removing and installing the support bracket" on page 17).
5. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.

Memory installation sequence	
DIMMs	**Slots**
1 DIMM	1
2 DIMMs	1, 3
4 DIMMs	1, 2, 3, 4
Note: You can install 1, 2, or 4 DIMMs in your server, but not 3 DIMMs. It is not supported.	

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

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

7. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.

8. Turn the DIMM so that the DIMM keys align correctly with the slot.

9. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.

DIMM 4

DIMM 3

DIMM 2

DIMM 1
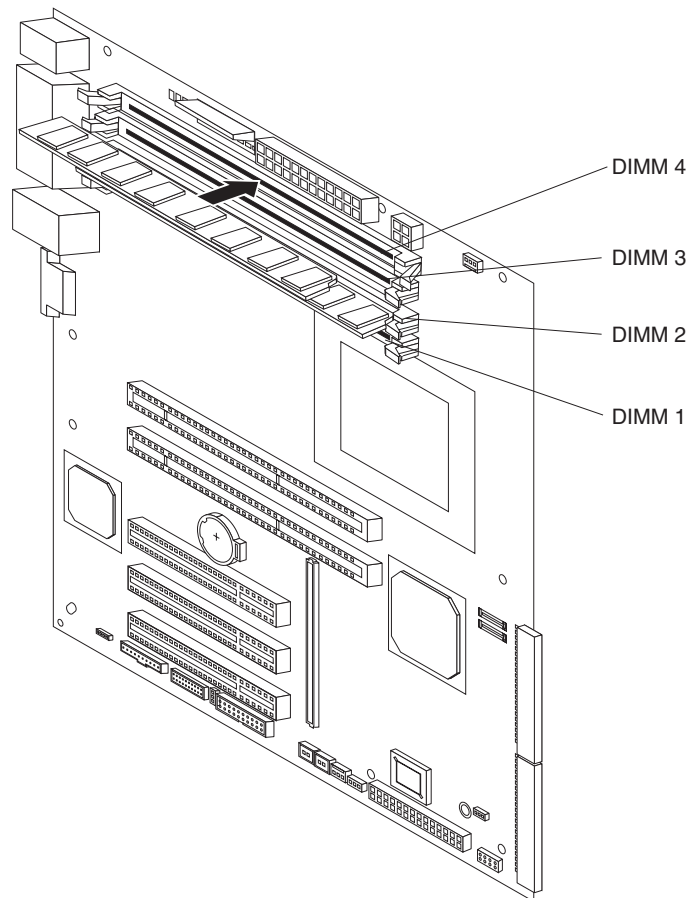
10. If you have other options to install or remove, do so now; otherwise, replace the support bracket (see "Removing and installing the support bracket" on page 17) and go to "Completing the installation" on page 38.

Installing a drive

Depending on your server model, one or more of the following drives might be installed in your server:

- Diskette
- Hard disk drive
- CD-ROM, CD-RW, or DVD/CD-RW combo

Some hot-swap models come with an IDE CD-ROM drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and three hot-swap hard disk drive bays.

Some non-hot-swap models come with an IDE CD-ROM drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and a SCSI hard disk drive in bay 7.

Some simple-swap Serial ATA models come with an IDE CD-ROM drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and a simple-swap Serial ATA hard disk drive in bay 7.
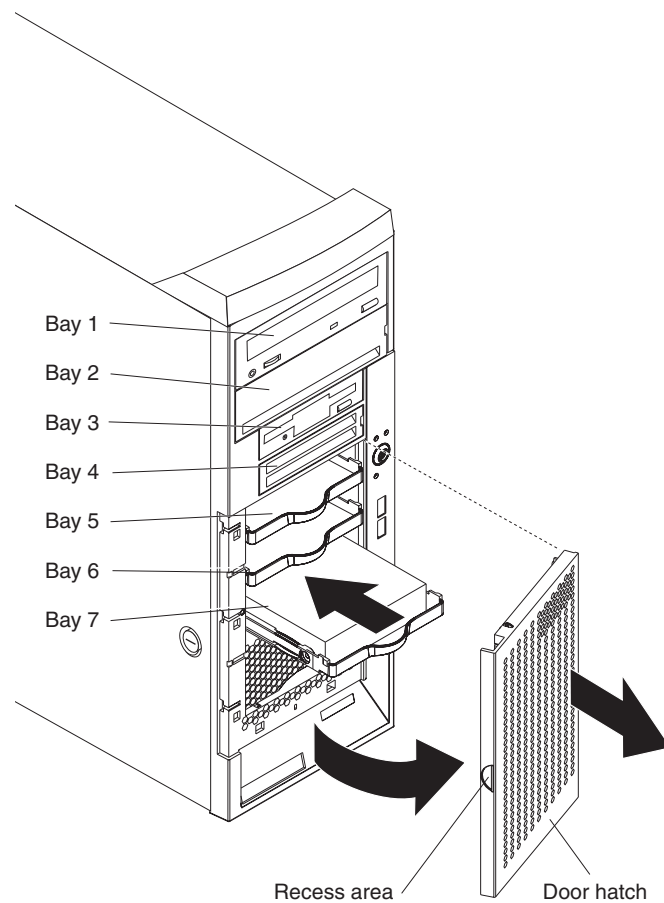
The following notes describe the types of drives that your server supports and other information that you must consider when installing a hard disk drive:

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

- Check the instructions that come with the drive to see whether you 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.
- Diskette drives, tape drives, CD-ROM, CD-RW, and DVD drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, 3, and 4 only.
- The integrated IDE controller in your server supports the connection of up to two IDE devices.
- You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup drive, CD-RW, or DVD drive, in bay 2.
- The server supports only one diskette drive.
- To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit. Contact IBM to order the conversion kit.
- 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.
- For a complete list of supported options for your server, go to http://www.ibm.com/pc/support/.

Installing a drive in bay 2 or 4

Complete the following steps to install a drive in bay 2 or 4:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 13.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see "Removing the side cover" on page 15).
4. Remove the support bracket (see "Removing and installing the support bracket" on page 17).
5. Remove the bezel (see "Removing the bezel" on page 16).
6. 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.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1
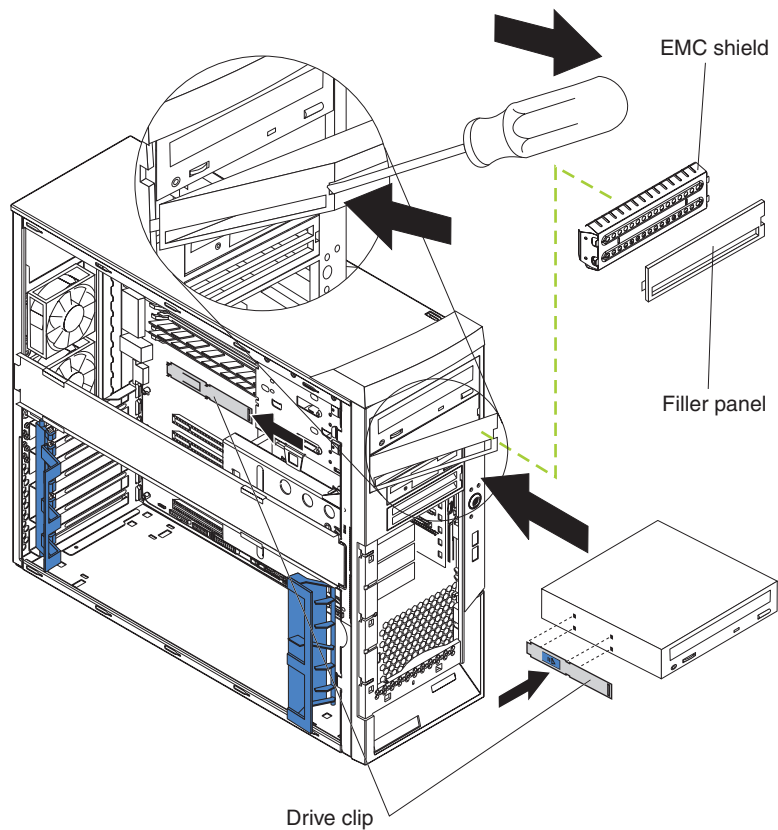
7. Touch the static-protective package containing the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

8. 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 from the front and then attach the cables.

9. Remove the drive clip from the side of the drive cage of bays 1 and 2 (see figure above). Slide the drive clip to the left to remove it from the drive cage; then, snap the drive clip into the screw holes on the side of the drive (the blue side of the drive clip should be facing outward).

10. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in. conversion kit, which you can order from IBM, to the 3.5-in. drive.

    Note: Only a 3.5-in. device can be installed in bay 4.

11. Determine whether the drive is an IDE or SCSI device; then, connect one end of the applicable signal cable into the back of the drive and make sure that the other end of this cable is connected into the applicable IDE or SCSI connector on the system board.

12. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and memory.

13. If you have another drive to install or remove, do so now.

14. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

15. If you have other options to install or remove, do so now; otherwise, replace the support bracket (see "Removing and installing the support bracket" on page 17), replace the bezel (see "Replacing the bezel" on page 38), and then go to "Completing the installation" on page 38.

Installing a hot-swap SCSI hard disk drive in bay 5, 6, or 7

Some server models come with hot-swap SCSI hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

- Inspect the drive tray for signs of damage.

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

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

- All hot-swap drives being used in the server must have the same speed rating; mixing speed ratings will cause all drives to operate at the speed of the slowest drive.

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

- Install hot-swap hard disk drives in this sequence: bay 7, bay 6, and bay 5.

- If your server has an optional RAID adapter, see the documentation that comes with the adapter for instructions for installing a hard disk drive.

- Each hot-swap drive has two LEDs: the hard disk drive activity LED and the hard disk drive status LED. When the green hard disk drive activity LED is flashing, it indicates that the controller is accessing the hard disk drive. When the amber hard disk drive status LED is lit continuously, it indicates that the drive is faulty and must be replaced.

The server hot-swap bays are connected to a SCSI backplane. This backplane is the printed circuit board behind the bay. The backplane controls the SCSI IDs for the hot-swap drives.

The following illustration shows the location of the components on the hot-swap-drive backplane as seen from the front of the server drive cage.

Hard disk drive activity LED (green)

Hard disk drive status LED (amber)

SCSI hot-swap hard disk drive connector
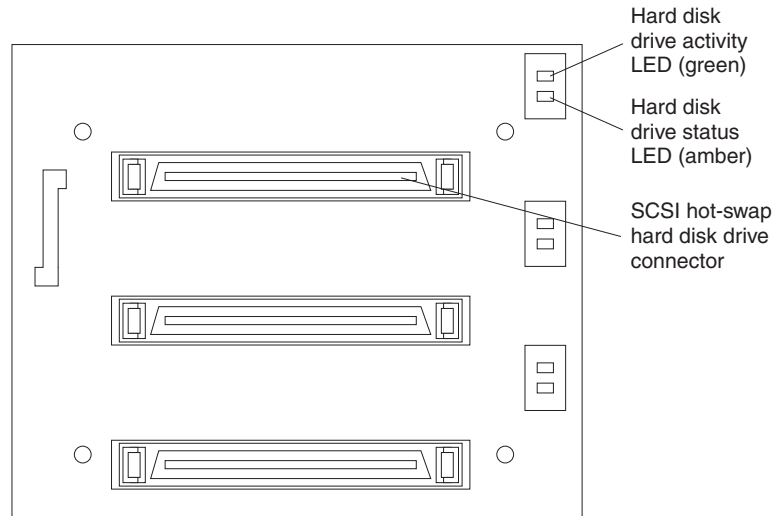
The following illustration shows the rear connectors on the hot-swap-drive backplane as seen from the rear of the server drive cage.

SCSI cable connector

SCSI power cable connector

I²C cable connector
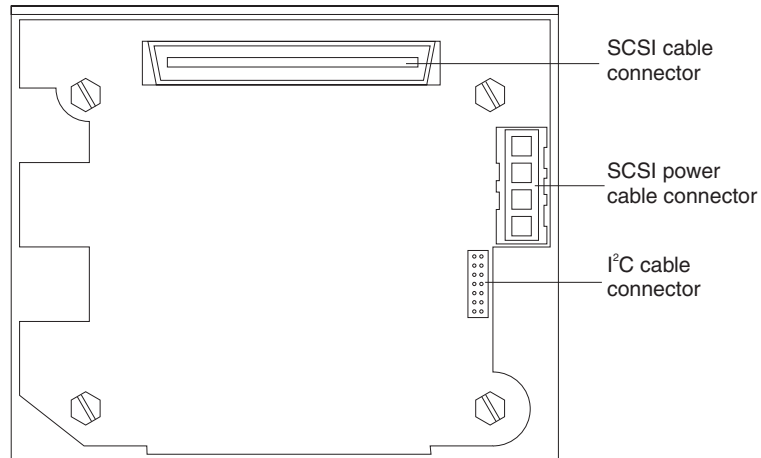
Complete the following steps to install a hot-swap hard disk drive:

1. Read the safety information beginning on page vii and the "Installation guidelines" on page 13,.

2. Unlock the side cover.

3. Slide the drive-bay lock bar to the left to access the drive bays.

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. Make sure 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.

Filler panel

Drive tray
assembly

Drive tray handle
(in open position)

Drive bay
lock-bar
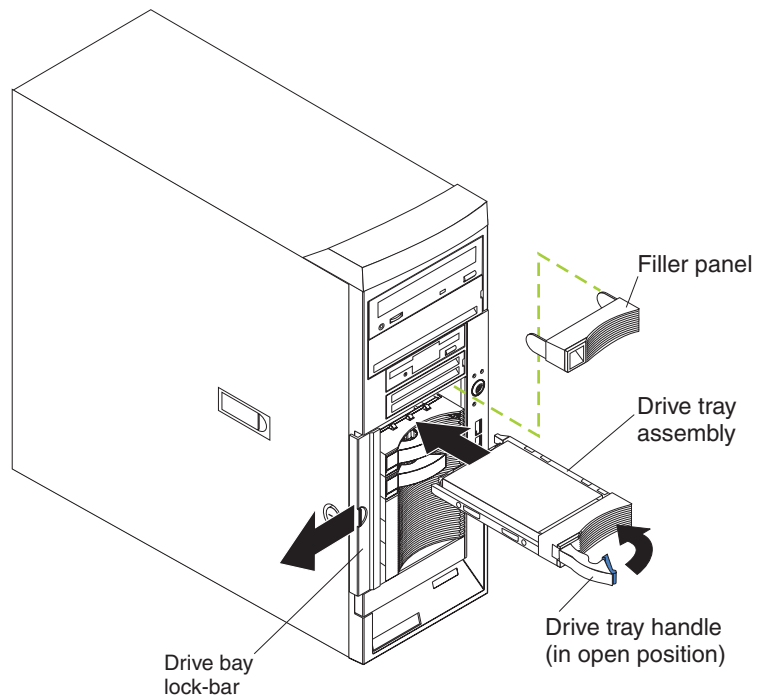
d. Push the tray handle to the closed (locked) position.

e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating properly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must to be replaced. If the green hard disk drive activity LED is flashing, this indicates that the drive is being accessed.

   Note: If your server is configured for RAID operation using an optional ServeRAID™ controller, you might have 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.

7. Slide the drive-bay lock bar to the right.

8. If you have other options to install or remove, do so now; otherwise go to "Completing the installation" on page 38.

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. The following table 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.

Device	SCSI ID
AIC 7901 controller (mini-PCI-X slot)	7
Hot-swap backplane	9
Drive bay 7	12
Drive bay 6	13
Drive bay 5	14

Installing a non-hot-swap SCSI hard disk drive in bay 5, 6, or 7

Some server models come with non-hot-swap SCSI hard disk drives. Before you install a non-hot-swap SCSI hard disk drive, read the following information:

- Read the documentation that comes with the drive for cabling instructions.
- Route the cable before you install the drive. Do not block the airflow from the fans.
- You can install up to four non-hot-swap SCSI hard disk drives in your server.
- Install non-hot-swap SCSI hard disk drives in this sequence: bay 7, bay 6, bay 5, and bay 4. See "Installing a drive in bay 2 or 4" on page 21 for information on how to install a hard disk drive in bay 4.

Complete the following steps to install a non-hot-swap SCSI hard disk drive:

1. Read the safety information beginning on page vii and the "Installation guidelines" on page 13.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover (the door hatch will not disengage from the server if the cover is locked).
4. Remove the side cover (see "Removing the side cover" on page 15).
5. Remove the support bracket (see "Removing and installing the support bracket" on page 17).

6. Grasp the recess area on the door hatch and rotate the door hatch outward until it disengages from the server.

Bay 1
Bay 2
Bay 3
Bay 4
Bay 5
Bay 6
Bay 7

Recess area   Door hatch
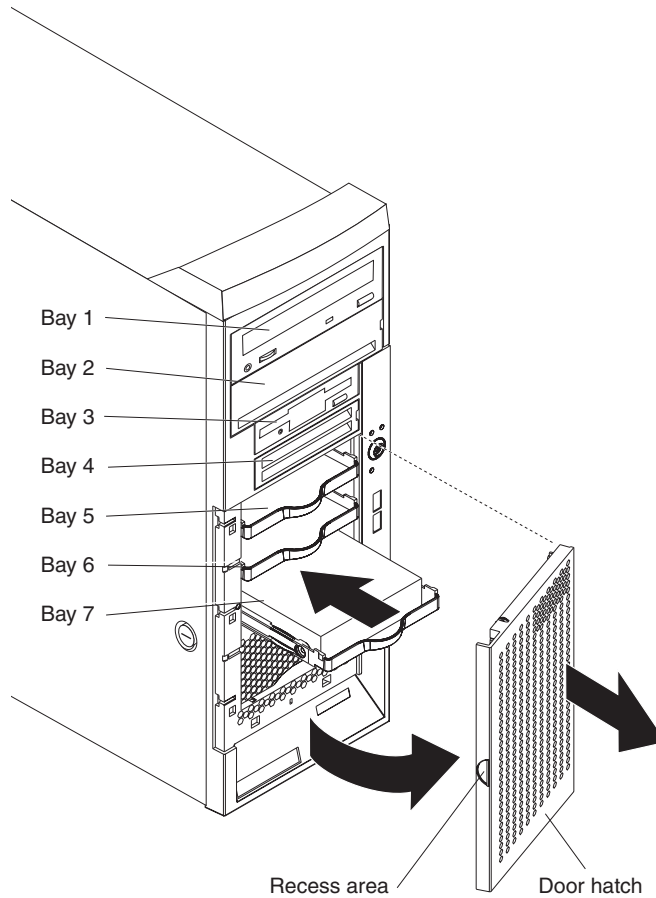
7. Remove the empty drive tray from the drive bay in which you want to install the drive.
8. Touch the static-protective package containing the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
9. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

10. Attach the hard disk drive to the drive tray with the four screws that are attached to the drive tray (use the plastic pins on the drive tray to help line up the drive with the drive tray screw holes).
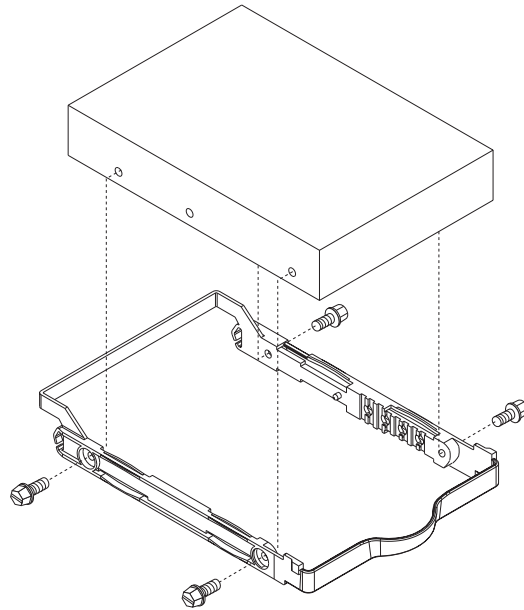
11. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
12. Gently slide the drive assembly into the drive bay as far as it will go.
13. Connect one end of the SCSI signal cable into the back of the drive and make sure that the other end of this cable is connected into the SCSI connector on the system board. See "Power and signal cables for internal drives" on page 32 for additional information about cabling drives and "System-board internal connectors" on page 9 for the location of the SCSI connectors on the system board. If there are open connectors on the cables connecting existing SCSI drives, you can use these cables to connect the new drive.
14. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and memory.
15. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
16. If you have other options to install or remove, do so now. Otherwise, see "Completing the installation" on page 38..

Installing a simple-swap Serial ATA hard disk drive in bay 5, 6, or 7

Some server models come with simple-swap Serial ATA (SATA) hard disk drives, which are easily accessible from the front of the server. Before you install a simple-swap SATA hard disk drive, read the following information:

- Read the documentation that comes with the drive for cabling instructions.
- Route the cable before you install non-hot-swap drives. Do not block the airflow from the fans.
- You can install two simple-swap SATA hard disk drives in your server.

  Note: You can install a third and fourth SATA drive if you install an optional ServeRAID-7t S-ATA controller in your server. The optional ServeRAID-7t S-ATA controller comes with two cables that you can use to cable the third and fourth SATA drives. In addition, if you install the optional ServeRAID-7t S-ATA controller to add a third and fourth drive, all four SATA drives must then be connected to the ServeRAID-7t S-ATA controller instead of the system board. See the optional ServeRAID-7t S-ATA controller documentation for cabling instructions.

- Install simple-swap SATA hard disk drives in this sequence: bay 7, bay 6, bay 5, and bay 4.
- Bays 5, 6, and 7 are simple-swap bays and do not require cabling. Bay 4 is a non-hot-swap drive bay and requires cabling as you would normally cable a non-hot-swap drive. See "Installing a drive in bay 2 or 4" on page 21 for information about how to install a hard disk drive in bay 4.

Complete the following steps to install a simple-swap hard disk drive:

1. Read the safety information beginning on page vii and the "Installation guidelines" on page 13.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover (the door hatch will not disengage from the server if the cover is locked).

4. Grasp the recess area on the door hatch and rotate the door hatch outward until it disengages from the server.

Bay 1
Bay 2
Bay 3
Bay 4
Bay 5
Bay 6
Bay 7

Recess area   Door hatch
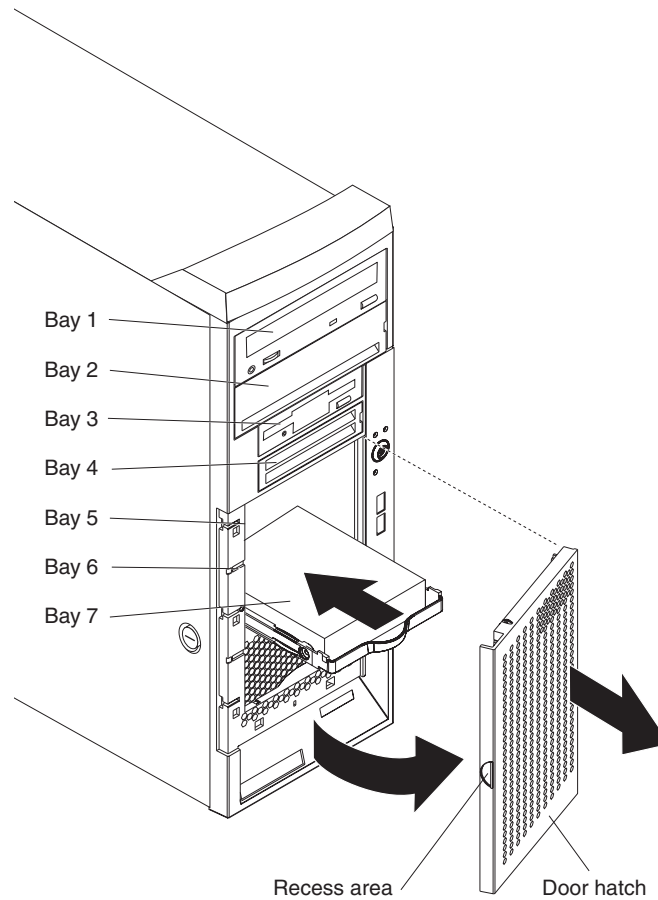
5. Touch the static-protective package containing the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).

7. Gently slide the drive assembly into the drive bay until the drive attaches to the back plate connector at the back of the drive bay (you should hear a click).

   Note: If you install a drive in bay 4, you will have to cable it as you would normally cable a non-hot-swap hard disk drive.

8. If you have other options to install or remove, do so now. Otherwise, see "Completing the installation" on page 38.

Power and signal cables for internal drives

Your server uses cables to connect parallel IDE, simple-swap Serial ATA, and SCSI devices to the power supply and to the system board. (See "System-board internal connectors" on page 9 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, make sure that one of the signal cable drive connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board.
- 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. Use either a four-wire power cable or Serial ATA power cable with Serial ATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect parallel IDE, Serial ATA, SCSI, and diskette drives to the system board. Two or three types of signal cables 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 connected to the connector (FDD1) on the system board.
  - **Serial ATA (SATA):** The narrower, black signal cable has two connectors. One is connected to the simple-swap Serial ATA drive, and the other is attached to the connector on the system board. Each simple-swap Serial ATA drive comes with a cable. If you install an additional simple-swap Serial ATA drive, you will need an additional cable.

    If you install the optional ServeRAID-7t S-ATA controller to add a third and fourth SATA drive, all four SATA drives must then be connected to the ServeRAID-7t S-ATA controller instead of the system board. The optional ServeRAID-7t S-ATA controller comes with two cables that you can use to cable the third and fourth SATA drives. See the optional ServeRAID-7t S-ATA controller documentation for cabling instructions.
  - **SCSI:** A round SCSI cable connects SCSI devices to the SCSI controller on the system board.

- A round SCSI cable connects external SCSI devices to the SCSI controller on the system board. For more information about connecting SCSI devices, see the SCSI documentation.
- An Ultra320 twisted ribbon cable connects the internal Ultra320 SCSI hard disk drive to the SCSI connector on the system board. This cable has four additional connectors for attaching more internal SCSI devices. For hot-swap models, the maximum cable length that supports Ultra320 SCSI hard disk drives is 40 cm (16 in.).

Installing an adapter

The following notes describe the types of adapters that your server supports and other information that you must consider when installing an adapter.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you need to change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- Your server comes with five PCI slots.
- The standard SCSI adapter is installed in the mini-PCI-X slot.
- You can install full-length adapters in all five PCI slots.
- You can install only 32-bit adapters in the 32-bit PCI slots 3 through 5 and 64-bit adapters in the 64-bit PCI-X slots 1 and 2.
- The 32-bit PCI slots 3 through 5 support 5.0 V signaling PCI adapters; they do not support 3.3 V signaling adapters. However, 64-bit adapters are supported if they are universal adapters.
- The 64-bit PCI-X slots 1 and 2 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 slots 3 through 5 and the onboard ATI 7000M video adapter are on the 33 MHz PCI bus.
  – The 64-bit PCI-X slots 1 and 2 and the mini-PCI-X slot are on the 66 MHz PCI-X bus.
- The optional IBM® Remote Supervisor Adapter II can be installed only in PCI-X slot 2. Use the ribbon cable that comes with this adapter to connect it to the Remote Supervisor Adapter II connector on the system board.
- If you install the optional IBM Remote Supervisor Adapter II, you must disconnect the video cable from the system board and connect it to the optional Remote Supervisor Adapter II.
- The optional ServeRAID-6i+ controller can be installed only in PCI-X slot 1.
- The server scans the PCI-X slot 2, PCI-X slot 1, mini-PCI-X slot, and PCI slots 5, 4, and 3 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI-X slot 2, PCI-X slot 1, mini-PCI-X slot, system-board integrated drive electronics (IDE) or SCSI devices (including the optional ServeRAID-6i+ controller), and then PCI slots 5, 4, and 3.
- For a list of supported options for your server, go to http://www.ibm.com/pc/support/.

See "System-board option connectors" on page 8 for the locations of expansion slots on the system board.

Complete the following steps to install an adapter:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 13.

2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See "Removing the side cover" on page 15.

3. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.

4. Follow the instructions that come with the adapter to set jumpers or switches, if any.

5. Remove the frame-support bracket. See "Removing and installing the support bracket" on page 17.

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. 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.

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

8. Touch the static-protective package containing the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.

9. 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 expansion slot.

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

Expansion-slot
cover

Rear adapter-
retaining
bracket

Adapter

Front adapter-
support bracket
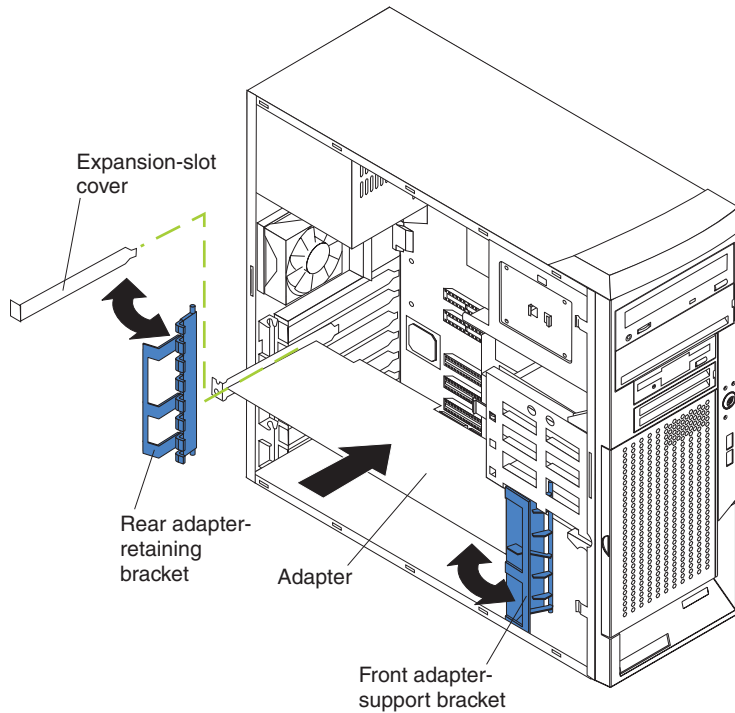
10. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see "Cabling an optional SCSI adapter" on page 36 for additional information.

11. If you have other options to install or remove, do so now.

12. If you have installed a full-length adapter, rotate the front adapter-support bracket to the closed (locked) position.

13. 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 frame-support bracket.

14. Replace the frame-support bracket. See "Removing and installing the support bracket" on page 17; then, go to "Completing the installation" on page 38.

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.

Note: 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 33).
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 on the system board. See "System-board internal connectors" on page 9 for the location of the SCSI LED connector.

SCSI cable

RAID adapter

SCSI connector
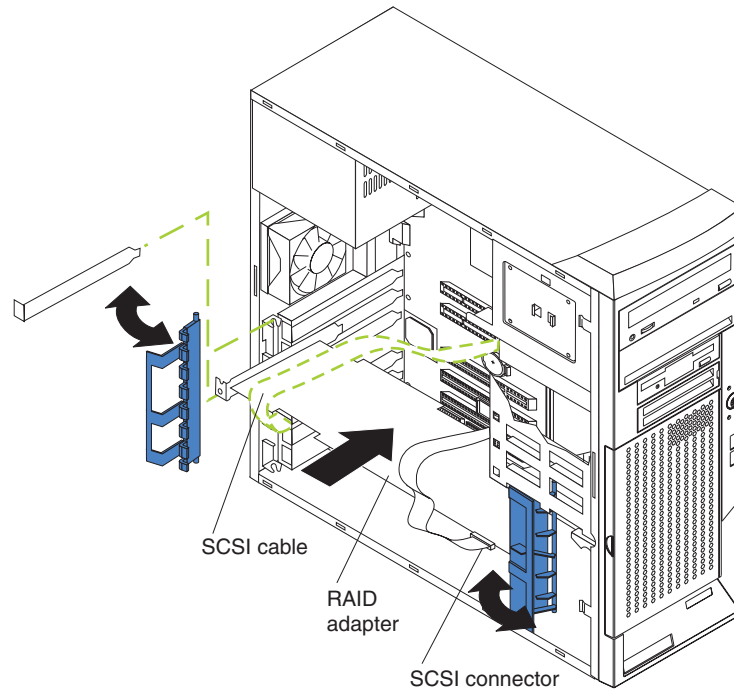
4. Complete the installation of the optional SCSI adapter.

Installing a security rope clip

To help prevent hardware theft, you can add a security rope clip and cable to your server. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

Before you begin, obtain the following items:

- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing number 3230, stock number 176-735)
- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock

Complete the following steps to install a rope clip:

1. Turn off the server and all attached devices. Disconnect all external cables and power cords; then, remove the side cover. See "Removing the side cover" on page 15.
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 the 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, make sure that it does not interfere with other cables that are connected to the server.

Rope clip
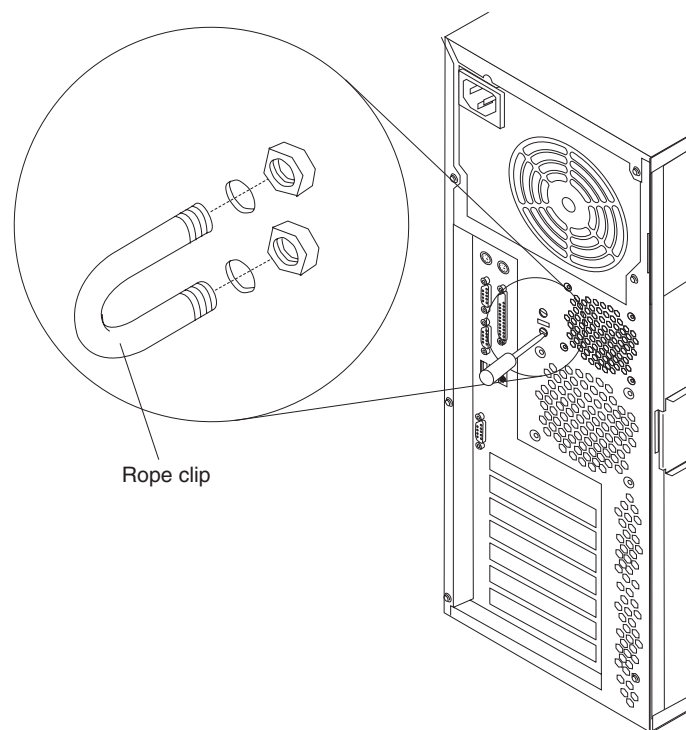
5. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 38.

Completing the installation

To complete the installation, you must reinstall the bezel, reinstall the frame-support bracket (see "Removing and installing the support bracket" on page 17), reinstall the side cover, connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

Replacing the bezel

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 non-hot-swap and simple-swap models, reinstall the door hatch on the server.
4. For hot-swap models, make sure that the side cover is unlocked; then, slide the drive-bay lock bar to the right. The 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 17 and "Replacing the bezel."

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. Insert the tabs inside the cover into the slots on the server chassis.

   Note: The cover-release latch must be in the unlocked (opened) position before you install the side cover.
3. Close the cover-release latch to secure the side cover in place.

   Note: Make sure that each tab on the side cover is in its corresponding slot before closing the cover-release latch.
4. Lock the side cover.

Connecting the cables

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

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

The following illustration shows the input/output (I/O) connectors on the rear of the server.
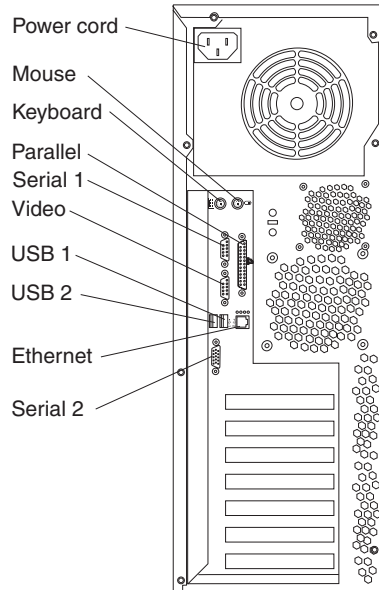
Updating your server configuration

When you start the server for the first time after you add or remove an internal option or an external SCSI device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. See Chapter 4, "Configuring the server," on page 47 for additional information.

Some options have device drivers that you must install. See the documentation that comes with each option for information about installing device drivers.

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

Chapter 3. Server controls, LEDs, and power

This chapter describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls and LEDs on the front of the server.

Ethernet link status LED

CD-eject button

CD-ROM drive activity LED

Diskette-eject button

Diskette drive activity LED

Hard disk drive activity LED

Power-on LED

Power-control button

System error LED

USB ports

Ethernet transmit/receive activity LED
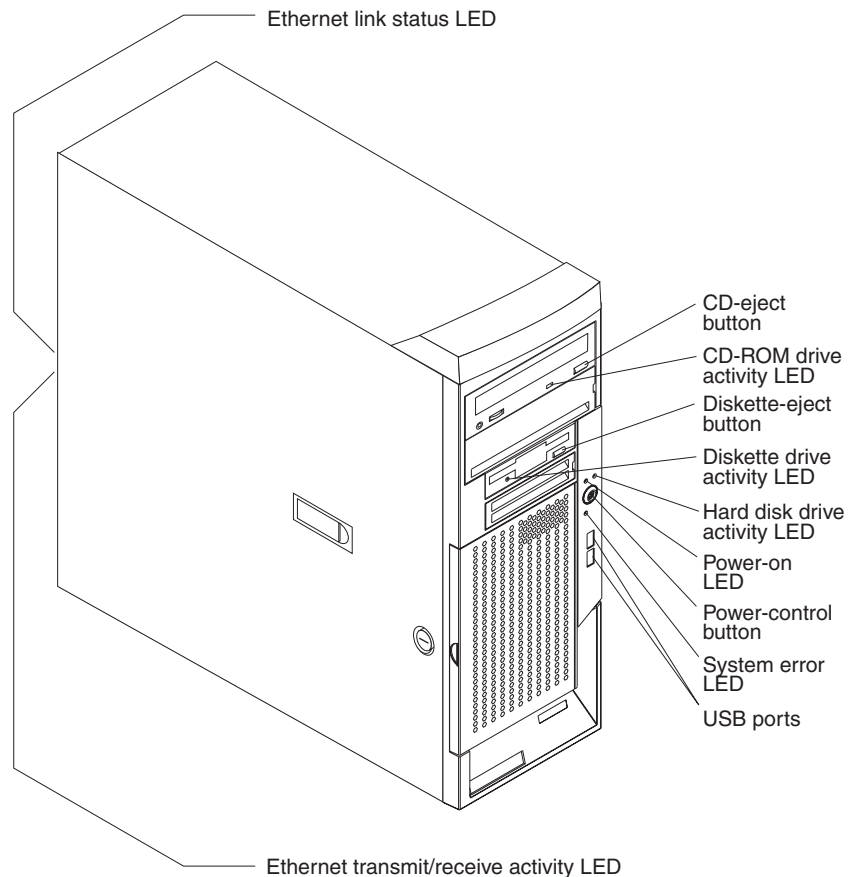
CD-eject button
>   Press this button to release a CD from the CD-ROM drive.

CD-ROM drive activity LED
>   When this LED is lit, it indicates that the CD-ROM drive is in use.

Diskette-eject button
>   Press this button to release a diskette from the diskette drive.

Diskette drive activity LED
>   When this LED is lit, it indicates that the diskette drive is in use.

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

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

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

On some server models, each hot-swap hard disk drive has a amber status LED. If the amber status LED for a drive is lit continuously, that individual drive is faulty. The interpretation of a flashing amber status LED depends on the SCSI controller connected to the hot-swap drive, as follows:

When the drive is connected to an optional ServeRAID controller, a slowly flashing (one flash per second) amber status LED indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Power-on LED

When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is off and still connected to an ac power source (standby mode).

Power-control button

Press this button to turn the server on and off manually.

System-error LED

When this LED is lit, it indicates that a system error has occurred. A LED on the system board might also be lit to help isolate the error. See Chapter 6, "Solving problems," on page 57 for additional information. Detailed troubleshooting information is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

USB ports

Connect a USB device to these connectors.

Ethernet link status LED

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

Ethernet transmit/receive activity LED

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

Rear view

The following illustration shows the connectors on the rear of the server.
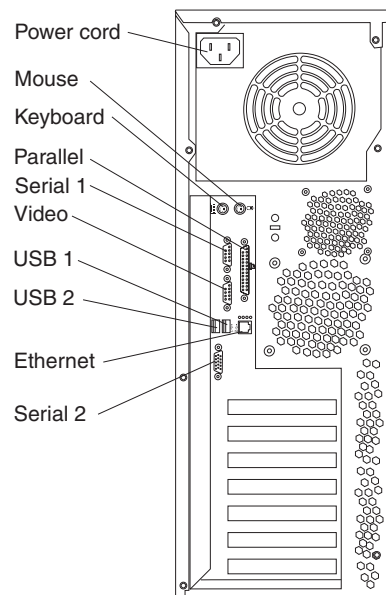
Power-cord connector

Connect the power cord to this connector.

Mouse connector

Connect a mouse or other PS/2 device to this connector.

Keyboard connector

Connect a PS/2 keyboard to this connector.

Parallel connector

Connect a parallel device to this connector.

Serial 1 connector

Connect a 9-pin serial device to this connector.

Video connector

Connect a monitor to this connector.

USB 1 connector

Connect a USB device to this connector.

USB 2 connector

Connect a USB device to this connector.

Ethernet connector

Use this connector to connect the server to a network.

Serial 2 connector

Connect a 9-pin serial device to this connector.

If you have an optional Remote Supervisor Adapter II (systems-management adapter) installed in PCI-X slot 2, your server has additional connectors and LEDs. See the *Option Installation Guide* for more information about these connectors and LEDs. In addition, if you install the optional Remote Supervisor Adapter II, you must disconnect the video cable from the system board and connect it to the optional Remote Supervisor Adapter II.

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.

Turning on the 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 your operating system supports the systems-management software for an optional Remote Supervisor Adapter II, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.
- If an optional Remote Supervisor Adapter II is installed in the server, the server can be turned on from the Remote Supervisor Adapter II user interface.

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.

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 an optional Remote Supervisor Adapter II is installed in the server, the server can be turned off from the Remote Supervisor Adapter II user interface.

- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.

- The server can turn itself off as an automatic response to a critical system failure.

Chapter 4. Configuring the server

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are specifically designed for your IBM server. Use this CD during the initial installation of your server to configure basic hardware features and to simplify your operating system installation. (See "Using the ServerGuide Setup and Installation CD" for more information.)

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize your server hardware:

- Configuration/Setup Utility program
- Adaptec® HostRAID™ configuration programs
  - Adaptec RAID Configuration Utility programs (for Serial ATA RAID)
  - SCSISelect Utility program (for SCSI RAID)
- ServeRAID Manager
- Boot Menu program
- Intel Gigabit Ethernet Utility program

For more information about these programs, see "Configuring your server" in the *User's Guide* on the IBM *xSeries Documentation* CD.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides state-of-the-art programs to detect the server model and hardware options that are installed, configure the server hardware, provide device drivers, and help you install your operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with your server, you can download the latest version from the ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html.

Complete the following steps to start the *ServerGuide Setup and Installation* CD:

1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide problems" on page 60.
2. Follow the instructions that appear on the screen to:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips about your operating system and adapter.
   e. Start the setup and hardware configuration programs.
   f. Start the operating system installation. You will need your copy of the operating-system CD.

Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS code. You can use it to:

- Change interrupt request (IRQ) settings
- Change the startup drive sequence
- Configure serial-port assignments

- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords and security settings

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1. If an administrator password has been set, you must type the administrator password to access the full Configuration/Setup Utility menu.
3. Follow the instructions on the screen.

See the *User's Guide* on the IBM *xSeries Documentation* CD for more detailed information about the Configuration/Setup Utility program.

Using the Adaptec HostRAID configuration programs

Use the Adaptec RAID Configuration Utility programs and SCSISelect Utility (also referred to as IBM ServeRAID-7e) to add RAID levels 0 and 1 functionality to the integrated Serial ATA controller and the SCSI controller. Be sure to use these programs as described in this document. Use these programs to:

- Configure a redundant array of independent disks (RAID) array
- View or change your RAID configuration and associated devices

Consider the following information when using the Adaptec RAID Configuration Utility programs and SCSISelect Utility program to configure and manage arrays:

- The SCSI controller with integrated SCSI RAID (SCSI models) and the integrated Serial ATA controller (SATA models) with integrated SATA RAID supports RAID levels 0 and 1 with the option of having a hot-spare drive. Installing an optional ServeRAID controller provides additional RAID levels.
- You cannot use the *ServerGuide Setup and Installation* CD to configure the integrated Serial ATA controller with integrated RAID and the SCSI controller with integrated RAID.
- Hard disk drive capacities affect how you create arrays. Drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.
- If you install a different type of RAID controller in your server, use the configuration method described in the instructions that come with that RAID controller to view or change SCSI settings for attached devices.

Using the Adaptec RAID Configuration Utility programs (for Serial ATA RAID)

Use the Array Configuration Utility within the Adaptec RAID Configuration Utility programs to add RAID levels 0 and 1 functionality to the integrated Serial ATA (SATA) controller. This utility is a part of the BIOS code in your server. For additional information about using the Adaptec RAID Configuration Utility programs, see the documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD.

If this CD did not come with your server, you can download the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD from the IBM Web site at: http://www.ibm.com/pc/support/.

The integrated Serial ATA RAID feature (SATA HostRAID) comes disabled by default. You must enable the SATA RAID feature and install the device drivers before you can use it. The SATA RAID feature configuration utilities, device drivers, and information are available on the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD.

Enabling the Serial ATA HostRAID feature

Complete the following steps to enable the SATA RAID feature:

1. Turn on the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1. If you have set a supervisor password, you are prompted to type the password.
3. Select **Devices and I/O Ports**.
4. Scroll down and select **SATA RAID Enable**.
5. Select **Enabled**.
6. Press Esc; then, select **Yes** to save your changes.

Using the Serial ATA HostRAID feature

The instructions in this section are for using the Array Configuration Utility program to access and perform an initial RAID level-1 configuration. If you install a different type of RAID adapter in your server, use the configuration method described in the instructions that come with that adapter to view or change settings for the attached devices.

See the documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD for additional information about using the Array Configuration Utility program to create, configure, and manage arrays.

Configuring the controller: Complete the following steps to use the Array Configuration Utility program to configure a RAID level-1 array on your server.

1. Turn on the server and watch the monitor screen.
2. When the message `Press <CTRL><<A> for Adaptec RAID Configuration Utility` appears, press Ctrl+A.
3. Select **Array Configuration Utility (ACU)**.
4. Select **Create Array**.
5. From the list of ready drives, select the two drives that you want to group into the array.
6. Select **RAID-1** when asked to select the RAID level.
7. (optional), Type an identifier for the array.
8. Select **Quick Int** when asked for the array build method.
9. Follow the instructions on the screen to complete the configuration, and select **Done** to exit.
10. Restart the server.

Viewing the configuration: Complete the following steps to view information about the Serial ATA controller:

1. Start the Array Configuration Utility.
2. From the Array Configuration Utility window, select **Manage Arrays**.
3. Select an array and press Enter.

4. Press Esc to exit the program.

Using the SCSISelect Utility program (for SCSI RAID)

Use the SCSISelect Utility to add RAID levels 0 and 1 functionality to the SCSI controller. This utility is part of the BIOS code in your server.

The integrated SCSI RAID feature (SCSI HostRAID) comes disabled by default. You must enable the SCSI RAID feature and install the device drivers before you can use it. The SCSI RAID configuration utilities, device drivers, and information are available on the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD. If this CD did not come with your server, you can download the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD from the IBM Web site at http://www.ibm.com/pc/support/.

Enabling the SCSI HostRAID feature

Complete the following steps to enable the SCSI RAID feature:

1. Turn on the server and watch the monitor screen.
2. When the message `Press <CTRL><A> for SCSISelect Utility` appears, press Ctrl+A. If you have set a supervisor password, you are prompted to type the password.
3. Use the arrow keys to select the channel for which you want to change settings and press Enter.
4. Select **Configure/View SCSI Controller Setting**; then, select **HostRAID**.
5. Select **Enabled**.
6. Press Esc; then, select **Yes** to save the changes.

Using the SCSI HostRAID feature

The instructions in this section describe how to access the SCSI RAID feature from the SCSISelect Utility program and perform an initial RAID level-1 configuration on your server. If you install a different type of RAID adapter in your server, use the configuration method described in the instructions that come with that adapter to view or change SCSI settings for attached devices.

See the documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD for additional information about how to use the SCSI HostRAID feature.

Configuring the controller: Complete the following steps to use the SCSI HostRAID feature to configure a RAID level-1 array on your server:

1. From the SCSISelect main menu, select **Configure/View HostRAID Settings**.
2. From the list of ready drives, type `C` to create an array.
3. Select **RAID-1** when asked to select the RAID type.
4. From the list of ready drives, select the two drives that you want to group into the array.
5. Select **Create new RAID-1**.
6. Type an identifier for the array.
7. Select **Yes** to create the array.
8. Press Esc to exit the utility.
9. Restart the server.

Viewing the configuration: You can use the SCSISelect Utility program to view information about the SCSI controller. From the list of available arrays, select an array and press Enter. Press Esc to exit the utility.

Using ServeRAID Manager

Use the ServeRAID Manager program to:

- Configure arrays
- View your RAID configuration and associated devices
- Monitor operation of your RAID controllers

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the SCSI controller and perform an initial RAID configuration on your server, you must run ServeRAID Manager in a Startable-CD mode, as described in the instructions in this section. If you install a RAID adapter in your server, use the configuration method described in the instructions that come with the adapter to view or change SCSI settings for attached devices.

See the ServeRAID documentation on the **IBM ServeRAID Support** CD or additional information about RAID technology and instructions for using ServeRAID Manager to configure your SCSI controller. Additional information about ServeRAID Manager is also available from the **Help** menu. For information about a specific object in the ServeRAID Manager tree, select the object and click **Actions → Hints and tips.**

Configuring the controller

By running ServeRAID Manager in Startable CD mode, you can configure the controller before you install your operating system. The information in this section assumes that you are running ServeRAID Manager in Startable CD mode.

To run the ServeRAID Manager program in startable-CD mode, turn on the server; then, insert the *IBM ServeRAID Support* CD into the CD-ROM drive. If the ServeRAID Manager program detects an unconfigured controller and ready drives, the program automatically starts the Configuration wizard.

In the Configuration wizard, you can select *Express configuration* or *Custom configuration*. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the two physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration

Complete the following steps to use Express configuration:

1. In the ServeRAID Manager tree, click the controller that you want to configure.
2. From the toolbar, click **Create**.
3. Click **Express configuration**.
4. Click **Next**. The "Configuration summary" window opens.
5. Review the information that is displayed in the "Configuration summary" window. To change the configuration, click **Modify arrays** or **Modify logical drives**.

   Note: Some operating systems have size limitations for logical drives. Before you save the configuration, verify that the size of the logical drive is appropriate for your operating system.
6. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

7. Exit from the ServeRAID Manager program and remove the CD from the CD-ROM drive.

8. Restart the server.

Using custom configuration

Complete the following steps to use custom configuration:

1. In the ServeRAID Manager tree, click the controller that you want to configure.

2. From the toolbar, click **Create**.

3. Click **Custom configuration**.

4. Click **Next**. The "Create arrays" window opens.

5. Click the appropriate tab in the right pane; then, from the list of ready drives, select the two drives you want to move to the array.

6. Click the icon to add the drives to the array.

7. Complete the following steps if you want to configure a hot-spare drive:

   a. Click the **Spares** tab.

   b. Select the physical drive you want to designate as the hot-spare drive; then, click the icon to add the drive.

8. Click **Next**. The "Configuration summary" window opens.

9. Review the information that is displayed in the "Configuration summary" window. To change the configuration, click **Back**.

10. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

11. Exit from the ServeRAID Manager program, and remove the CD from the CD-ROM drive.

12. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.

To display available actions for an item, click the item in the ServeRAID Manager tree and click **Actions**.

Using the Boot Menu program

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

Complete the following steps to use the Boot Menu program to change the startup sequence of your server:

1. Turn off the server.

2. Restart the server.

3. Press F12.

4. Select the startup device.

The next time the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Enabling the Intel Gigabit Ethernet Utility program

The Intel Gigabit Ethernet Utility program is part of the BIOS code in your computer. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence.

Complete the following steps to enable the Intel Gigabit Ethernet Utility program:

1. Turn on the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears during startup, press the F1.
3. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
4. Select **System Board Ethernet PXE/DHCP** and use the Right Arrow (→) key to set it to **Enabled**.
5. Select **Save Settings** and press Enter.

Using the SCSISelect utility program (some models)

Complete the following steps to start the SCSISelect utility program:

1. Turn on the server.
2. When the `<<< Press <CTRL><A> for SCSISelect Utility! >>>` prompt appears, press Ctrl+A. If you have set an administrator password, you are prompted to type the password.
3. Use the arrow keys to select a choice for which you want to change settings, and press Enter.
4. When the prompt `Would you like to configure the SCSI controller or run the SCSI disk utility?` appears, make your selection and press Enter.
5. Use the arrow keys to select a choice from the menu.
6. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

For information about how to use this utility to perform an initial RAID level-1 configuration on your server, see "Using the SCSISelect Utility program (for SCSI RAID)" on page 50.

Chapter 5. Updating IBM Director

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

Complete the following steps to install the IBM Director updates and any other applicable updates and interim fixes:

1. Check for the latest version of IBM Director:
   a. Go to http://www.ibm.com/pc/us/eserver/xseries/systems_management/dwnl.html.
   b. If a newer version of IBM Director than what comes with the server is shown in the drop-down list, follow the instructions on the Web page to download the latest version.
2. Install the IBM Director program.
3. Download and install any applicable updates or interim fixes for your server:
   a. Go to http://www.ibm.com.
   b. Click **Support & downloads**.
   c. Click **Downloads & drivers**.
   d. In the search field, type `director 8482` and click **Submit**.
   e. Select any applicable update or interim fix that you want to download.
   f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update or interim fix.
   g. Repeat steps 3e and 3f for any additional updates or interim fixes that you want to install.

Chapter 6. Solving problems

This section provides basic troubleshooting information to help you solve some common problems that might occur while you are setting up your server.

If you cannot locate and correct the problem using the information in this chapter, see Appendix A, "Getting help and technical assistance," on page 71, the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD, and the "Server Support" flowchart in the front of this document.

Diagnostic tools overview

The following tools are available to help you identify and resolve hardware-related problems:

- **POST beep codes and error messages**

  The power-on self-test (POST) indicates the detection of a problem.

  – One beep indicates successful completion of POST, with no errors.

  – More than one beep indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem.

    See "POST beep code descriptions" on page 58 and the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM xSeries Documentation CD for more information.

- **ServerGuide problems**

  This chart lists problem symptoms and steps to correct problems that occur when you are using the *ServerGuide Setup and Installation CD*. See the "ServerGuide problems" on page 60 for information.

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See "Troubleshooting charts" on page 61 for more information.

- **System-board error LEDs**

  An LED on the system board might also be lit to help isolate an error indicated by the system error LED on the front of the server. See "System-board LEDs" on page 11 for more information.

Power-on self-test (POST)

When you turn on the server, the power-on self-test (POST) performs a series of tests to check the operation of the server components and some of the installed options.

If POST finishes without detecting any problems, the first window of your operating system or application program opens.

If POST detects a problem, more than one beep might sound, an error message might appear on your screen, or both.

Notes:

1. If you have set a user password, you must type the password and press Enter, when prompted, before the operating system will start.

2. A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages typically will be resolved the next time you run the test.

POST beep code descriptions

POST emits one beep to signal successful completion. If POST detects a problem during startup, other beep codes might occur. Use the following beep code descriptions to help diagnose and solve problems that are detected during startup.

One beep
POST was completed successfully.

Repeating long beeps
A memory error has occurred. Make sure that all DIMMs are correctly installed.

One long beep and two short beeps
A video error has occurred, and the BIOS cannot initialize the monitor screen to display additional information.

No beep
The server successfully completed POST without finding any errors.

Continuous beep
Your startup (boot) microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the server continues through POST with no errors, call for service. If no video appears, the startup processor has failed.

POST error messages

The following table provides an abbreviated list of the error messages that might appear during POST. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information about the POST error messages.

POST message	Failing device or problem found	Suggested action
162	A device configuration has changed.	• Run the Configuration/Setup Utility program; then, exit, saving the configuration settings. • Make sure that optional devices are turned on and installed correctly.

POST message	Failing device or problem found	Suggested action
163	Time of day has not been set.	Set the date and time.
164	The memory configuration has changed.	• Run the Configuration/Setup Utility program; then, exit, saving the configuration settings. • Make sure that DIMMs are seated and installed correctly.
201	The memory configuration has changed.	Make sure that DIMMs are fully seated and installed correctly.
289	A failing DIMM was disabled.	Make sure that DIMMs are supported by your server and that they are installed correctly.
301 and 303	Keyboard and keyboard controller	Make sure that the keyboard cable is connected and that nothing is resting on the keyboard keys.
11*xx*	Serial port error	Make sure that the serial cable is connected correctly.
1162	Serial port configuration error	Run the Configuration/Setup Utility program and make sure that the IRQ and I/O port assignments needed by the serial port are available.
1601	BIOS code update needed	Download and install the latest level of system BIOS code.
1800	PCI adapter hardware interrupt	Run the Configuration/Setup Utility program and make sure that the interrupt resource settings are correct.
2400 and 2462	Video adapter and memory	Call for service.
00180*xxx*	A PCI adapter requested a resource that is not available.	Run the Configuration/Setup Utility program and make sure that the resources needed by the PCI adapter are available.
012980*xx* and 012981*xx*	Data for microprocessor *x*	Download and install the latest level of system BIOS code.
I9990305	POST could not find an operating system.	Install an operating system.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 2. ServerGuide Setup and Installation CD

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the server supports the ServerGuide program and has a startable (bootable) CD-ROM (or DVD-ROM) drive. • If the startup (boot) sequence settings have been altered, ensure that the CD-ROM drive is first in the startup sequence. • If more than one CD-ROM drive is installed, ensure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID program cannot view all installed drives or the operating system cannot be installed.	• Make sure that there are no duplicate SCSI IDs or IRQ assignments. • Make sure that the hard disk drive is connected correctly.
The operating system Installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the operating-system CD is supported on your server. If the operating system is supported, either there is no logical drive defined (SCSI RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Troubleshooting charts

The following tables list problem symptoms and suggested solutions. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more detailed troubleshooting charts. If you cannot find the solution to a problem in these charts, run the diagnostic programs. If you have run the diagnostic programs, or if running the tests does not reveal the problem, call for service.

CD-ROM drive problems

Symptom	Suggested action
The CD-ROM drive is not recognized.	Make sure that: • The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. If the server has a single IDE channel, only the primary channel can be used. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
A CD is not working correctly.	Clean the CD. If the problem remains, call for service.
The CD-ROM drive tray is not working.	Insert the end of a straightened paper clip into the manual tray-release opening. The server must be turned on. If the problem remains, call for service.

Diskette drive problems

Symptom	Suggested action
The diskette drive activity LED stays lit, or the server bypasses the diskette drive.	• If there is a diskette in the drive, make sure that: – The diskette drive cables are correctly and securely connected. – The diskette drive is enabled in the Configuration/Setup utility program. – The diskette is good and not damaged. (Try another diskette if you have one.) – The diskette is inserted correctly in the drive. – The diskette contains the necessary files to start the server. – Your software program is working properly. • To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.). If the problem remains, call for service.

Expansion enclosure problems

Symptom	Suggested action
The SCSI expansion enclosure used to work but does not work now.	Make sure that: • The cables for all external SCSI options are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI devices are turned on. You must turn on external SCSI devices before turning on the server. For more information, see your SCSI expansion enclosure documentation.

General problems

Symptom	Suggested action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	Call for service.

Hark disk drive problems

Symptom	Suggested action
Not all drives are recognized by the hard disk drive diagnostic test (Fixed Disk test).	1. Remove the first drive not recognized and try the hard disk drive diagnostic test again. 2. If the remaining drives are recognized, replace the drive that you removed with a new one. If the problem remains, call for service.
The server stops responding during the hard disk drive diagnostic test.	1. Remove the hard disk drive that was being tested when the server stopped responding and try the diagnostic test again. 2. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.

Intermittent problems

Symptom	Suggested action
A problem occurs only occasionally and is difficult to diagnose.	Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the rear of the server at the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. • The SCSI bus and devices are configured correctly and the last external device in each SCSI chain is terminated correctly. If the problem remains, call for service.

Keyboard, mouse, or pointing-device problems

Symptom	Suggested action
All or some keys on the keyboard do not work.	• Make sure that the keyboard cable is securely connected to the server and that the keyboard and mouse cables are not reversed. • Make sure that the server and the monitor are turned on. • Try using another keyboard. If the problem remains, call for service.
The mouse or pointing device does not work.	• Make sure that the mouse or pointing-device cable is securely connected to the server and that the keyboard and mouse cables are not reversed. • Make sure that the mouse device drivers are installed correctly. • Make sure that the server and the monitor are turned on. • Try using another mouse or pointing device. If the problem remains, call for service.

Memory problems

Symptom	Suggested action
The amount of system memory displayed is less than the amount of physical memory installed.	Make sure that: • The DIMMs are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. Check the POST error log for a error message 289: • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. • If the DIMM was disabled by the user or by POST, run the Configuration/Setup Utility program and enable the DIMM. • If this error remains, replace the DIMM. If the problem remains, call for service.

Microprocessor problems

Symptom	Suggested action
The server emits a continuous tone during POST. (The startup (boot) microprocessor is not working properly.)	The startup (boot) microprocessor is not working correctly. Make sure that the startup microprocessor is seated correctly. If it is, replace the startup microprocessor. If the problem remains, call for service.

Monitor problems

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

Symptom	Suggested action
The screen is blank.	Make sure that: • The server power cord is plugged into the server and a working electrical outlet. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • Make sure that the correct server is selected, if applicable. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is Enabled (its default setting), you must restart the server three times to force the BIOS to reset the configuration settings to the default configuration (memory connector or bank of connectors enabled). If the problem remains, call for service.
Only the cursor appears.	Call for service.
The monitor has screen jitter, or the screen is wavy, unreadable, rolling, or distorted.	If the monitor self-tests show the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Then move the device and the monitor at least 300 mm (12 in.) apart, and turn on the monitor. **Notes:** 1. To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 75 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM marketing representative or authorized reseller. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. If the problem remains, call for service.
No video.	Make sure all cables are secured. If the problem remains, call for service.

Power problems

Symptom	Suggested action
The server does not turn on.	• Make sure that the server power cord is connected to the server and a working electrical outlet. • Make sure that the type of memory that is installed is supported by your server. • If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports. If the problem remains, call for service.
The server does not turn off.	Determine whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: 1. Press Ctrl+Alt+Delete. 2. Turn off the server by using the power-control button. You might need to press and hold the power-control button for 5 seconds to force the server to turn off. If the problem remains or if you are using an ACPI operating system, call for service.

Serial port problems

For more information about the serial port, see the Option Installation Guide on the IBM *xSeries Documentation* CD.

Table 3.

Symptom	Suggested action
The number of serial ports identified by the operating system is less than the number of serial ports that are installed.	Make sure that: • Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled. • The serial port adapter, if you installed one, is seated correctly. If the problem remains, call for service.
A serial device does not work.	Make sure that: • The device is compatible with the server. • The serial port is enabled and is assigned a unique address. • The device is connected to the serial port and the serial port is connected to the serial connector on the system board. If the problem remains, call for service.

Software problems

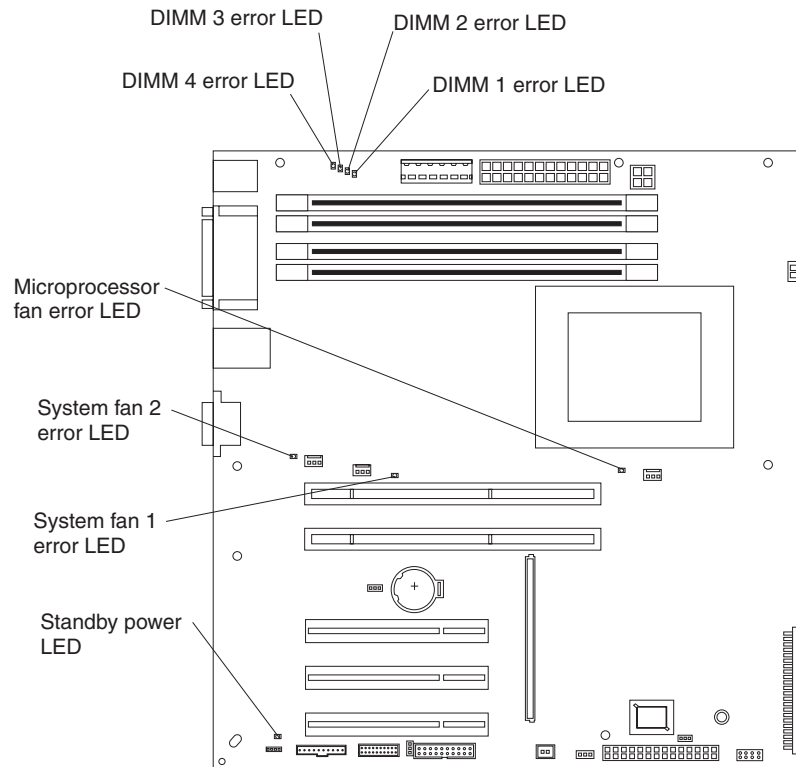| Symptom	Suggested action
You suspect a software problem.	To determine whether the problem is caused by the software, make sure that: • Your server has the minimum memory needed to use the software. For memory requirements, see the information that comes with software. If you have just installed an adapter or memory, the server might have a memory-address conflict. • The software is designed to operate on your server. • Other software works on your server. • The software that you are using works on another server. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem. If the problem remains, contact your place of purchase of the software.

Universal Serial Bus device problems

Symptom	Suggested action
A USB device does not work.	Make sure that: • You are not trying to use a USB device during POST if a standard (non-USB) keyboard is connected to the keyboard connector. If a standard (non-USB) keyboard is connected to the keyboard connector, the USB is disabled, and no USB device will work during POST. • The correct USB device driver is installed. • Your operating system supports USB devices. If the problem remains, call for service.

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.

DIMM 3 error LED   DIMM 2 error LED

DIMM 4 error LED   DIMM 1 error LED

Microprocessor
fan error LED

System fan 2
error LED

System fan 1
error LED

Standby power
LED

Each error LED is lit to indicate a problem with a specific component. After a problem is corrected, its LED will not be lit the next time the server is restarted; if the problem remains, the LED will be lit again. See the *User's Guide* on the IBM *xSeries Documentation* CD for additional information.

Recovering from a POST/BIOS update failure

If power to your server is interrupted while POST/BIOS code is being updated (flash update), your server might not restart (reboot) correctly. If this happens, use the following procedure to recover:

1. Review the safety information beginning on page vii and "Handling static-sensitive devices" on page 14
2. Turn off the computer and all attached devices.
3. Disconnect the power cord.
4. Remove the side cover and support bracket. (See "Removing the side cover" on page 15 and "Removing and installing the support bracket" on page 17.)
5. Locate the boot block recovery jumper (JP1) on the system board, removing any adapters that impede access to the jumper. The following illustration shows the location of the jumper on the system board.

CMOS jumper (JP2)

Boot block jumper (JP1)
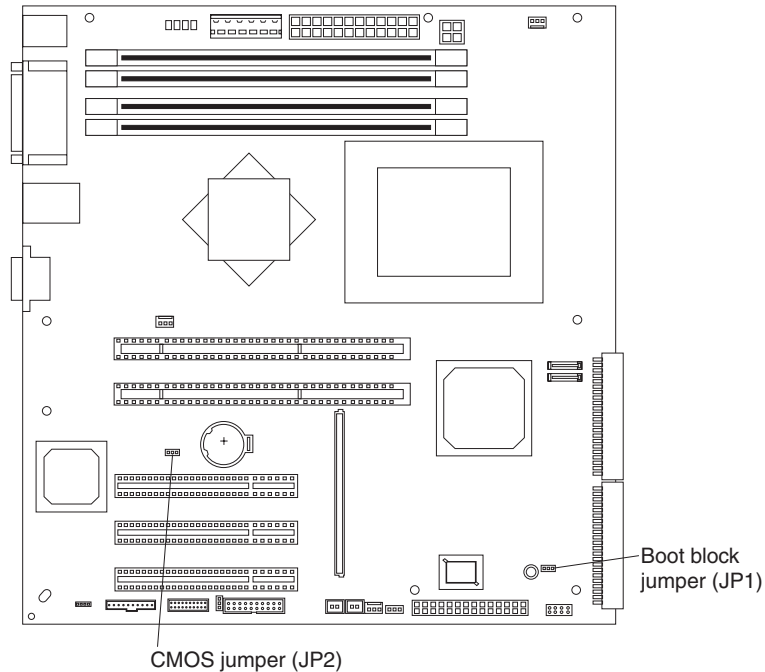
6. Remove the boot block recovery jumper from pins 1 and 2.

7. Replace any adapters that were removed; then, replace the support bracket and replace the side cover. (See "Removing and installing the support bracket" on page 17 and "Replacing the side cover" on page 38.)

8. Connect the server to a power source, keyboard, monitor, and mouse.

9. Insert the POST/BIOS update (flash) diskette into the diskette drive. You can download a file to create this diskette from http://www.ibm.com/pc/support/. For more information, see Appendix A, "Getting help and technical assistance," on page 71.

10. Turn on the computer and the monitor.

11. After the update session is completed, turn off the server and monitor.

12. Remove the diskette from the diskette drive.

13. Disconnect all power cords; then, remove the server cover.

14. Return the boot block recovery jumper to pins 1 and 2.

15. Reinstall the server cover; then, reconnect all external cables and power cords and turn on the peripheral devices.

16. Turn on the server to restart the operating system.

Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords. For more information about lost or forgotten passwords, see the *User's Guide.*

Complete the following steps to set the CMOS recovery jumper and erase a forgotten password:

1. Review the safety information beginning on page vii and "Handling static-sensitive devices" on page 14.

2. Turn off the server and all attached devices.

3. Disconnect the power cord.

4. Remove the side cover and support bracket. (See "Removing the side cover" on page 15 and "Removing and installing the support bracket" on page 17).

5. Locate the CMOS recovery jumper (JP2) on the system board, removing any adapters that impede access to the jumper.

Boot block jumper (JP1)

CMOS jumper (JP2)
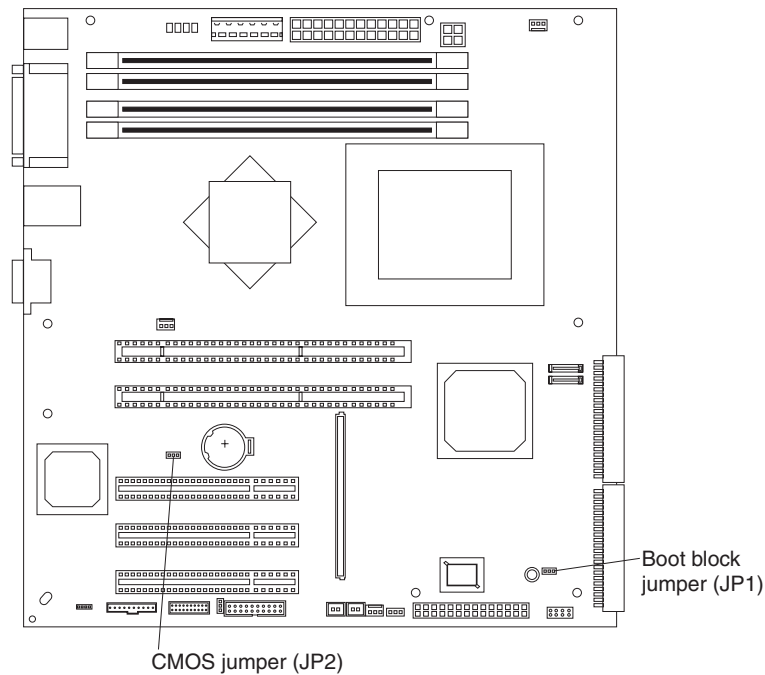
6. Move the CMOS recovery jumper from pins 1 and 2 to pins 2 and 3.

7. Wait 60 seconds; then, return the CMOS recovery jumper to pins 1 and 2.

8. Replace any adapters that were removed; then, replace the support bracket and replace the side cover. (See "Removing and installing the support bracket" on page 17 and "Replacing the side cover" on page 38).

   You can now start the server one time without having to use the user password and start the Configuration/Setup Utility program. At this time, you can either delete the old password or set a new user password. If you do not change or delete the password, the next time you start the server the original user password will be reinstated.

9. Connect the server to a power source, keyboard, monitor, and mouse.

10. Turn on the server. The Configuration/Setup Utility program starts.

11. Follow the instructions to erase the existing password or create a new password.

12. Select **Save Settings** and press Enter.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the IntelliStation *Hardware Maintenance Manual* at the IBM Support Web site.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, README files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/pc/support/ and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at
http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is http://www.ibm.com/eserver/xseries/. The address for IBM IntelliStation information is http://www.ibm.com/pc/intellistation/.

You can find service information for your IBM products, including supported options, at http://www.ibm.com/pc/support/.

Software service and support

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

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

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to http://www.ibm.com/planetwide/ for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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

Appendix B. IBM Statement of Limited Warranty Z125-4753-07 11/2002

Part 1 - General Terms

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. **Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.**

What this Warranty Covers

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications") which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

What this Warranty Does not Cover

This warranty does not cover the following:
- any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;
- failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
- failure caused by a product for which IBM is not responsible; and
- any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

IBM does not warrant uninterrupted or error-free operation of a Machine.

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with "how-to" questions and those regarding Machine set-up and installation, is provided **WITHOUT WARRANTIES OF ANY KIND**.

How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

What IBM Will Do to Correct Problems

When you call for service, you must follow the problem determination and resolution procedures that IBM specifies. A technician will attempt to make an initial diagnosis of your problem and help you resolve it over the telephone.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive and other easily replaceable parts), IBM will ship these parts to you for replacement by you.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone, through your application of Machine Code or software updates, or with a CRU, IBM or your reseller, if approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Exchange of a Machine or Part

When the warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Your Additional Responsibilities

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to:
1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
    a. follow the service request procedures that IBM or your reseller provides;
    b. backup or secure all programs, data, and funds contained in the Machine;
    c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
    d. inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

Limitation of Liability

IBM is responsible for loss of, or damage to, your Machine only while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller are responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM for any reason. You should remove all such information from the Machine prior to its return.

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than
1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST

PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Governing Law

Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Statement of Limited Warranty, without regard to conflict of law principles.

THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR JURISDICTION TO JURISDICTION.

Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in which you acquired the Machine.

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

Governing Law: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

BRAZIL

Governing Law: *The following is added after the first sentence:*
Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

PERU

Limitation of Liability: *The following is added at the end of this section:*

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct ("dolo") or gross negligence ("culpa inexcusable").

NORTH AMERICA

How to Obtain Warranty Service: *The following is added to this Section:*
To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Limitation of Liability: *The following replaces item 1 of this section:*

1.   damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this section:*
Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State or Territory.

CAMBODIA, LAOS, AND VIETNAM

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York, United States of America.

CAMBODIA, INDONESIA, LAOS, AND VIETNAM

Arbitration: *The following is added under this heading:*
Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the SIAC. Other vacancies shall

be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of Hong Kong Special Administrative Region of China.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this section:*
1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence; and
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

JAPAN

Governing Law: *The following sentence is added to this section:*
Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

MALAYSIA

Limitation of Liability: *The word "**SPECIAL**" in item 3 of the fifth paragraph is deleted.*

NEW ZEALAND

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this section:*
Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America (except when local law requires otherwise).

PHILIPPINES

Limitation of Liability: *Item 3 in the fifth paragraph is replaced by the following:*

SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

SINGAPORE

Limitation of Liability: *The words* "**SPECIAL**" *and* "**ECONOMIC**" *in item 3 in the fifth paragraph are deleted.*

<u>**EUROPE, MIDDLE EAST, AFRICA (EMEA)**</u>

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:
The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

Hot to Obtain Warranty Service: If you purchase a Machine in Austria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom or Vatican State, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service. If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase a Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

Add the following paragraph in **Western Europe** *(Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom, Vatican State):*

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

Governing Law:

The phrase "the laws of the country in which you acquired the Machine" is replaced by:

1) "the laws of Austria" **in Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia;** 2)

"the laws of France" **in Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna;** 3) "the laws of Finland" **in Estonia, Latvia, and Lithuania;** 4) "the laws of England" **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe;** and 5) "the laws of South Africa" **in South Africa, Namibia, Lesotho and Swaziland.**

Jurisdiction: *The following exceptions are added to this section:*

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium** and **Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the nullity of the execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

Arbitration: *The following is added under this heading:*

In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova,

Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

How to Obtain Warranty Service: *The following is added to this section:*

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:
    IBM Warranty & Service Quality Dept.
    PO Box 30
    Spango Valley
    Greenock
    Scotland PA16 0AH

AUSTRIA, DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS, PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

FRANCE AND BELGIUM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*
The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The warranty period for Machines is 12 months from the date of delivery. The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this section:*
as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this section:*
In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The minimum warranty period for Machines is twelve months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

HUNGARY

Limitation of Liability: *The following is added at the end of this section:*

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

IRELAND

What this Warranty Covers: *The following is added to this section:*
Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the **Items for Which IBM is Not Liable** below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.

3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

Limitation of Liability: *The following is added to the end of the last paragraph:*

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for:
   a. death or personal injury caused by the negligence of IBM; and
   b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.
2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.
3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds

Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

Warranty Period

The warranty period may vary by country or region and is specified in the table below.

Note: "Region" means either Hong Kong or Macau Special Administrative Region of China.

Machine - IBM @server xSeries 206 Type 8482

Country or region	Warranty period	Type of Warranty Service*
Worldwide	Parts - 1 year, labor - 1 year	1 and 2
*See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.
1. **Customer Replaceable Unit ("CRU") Service**

    IBM will ship CRU parts to you for your replacement. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM's instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.
2. **On-site Service**

IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. **For some Machines, certain repairs may require sending the Machine to an IBM service center.**

3. **Courier or Depot Service***

   You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

* This type of service is called ThinkPad® EasyServ or EasyServ in some countries.

The IBM Machine Warranty World Wide Web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM Limited Warranty for Machines, a Glossary of IBM definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages.**

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers below.

EU Country Telephone List

Phone numbers are subject to change without notice.

Austria -- 43-1-24592-5901	Italy -- 39-02-482-9202
Belgium -- 02-718-4339	Luxembourg -- 352-360385-1
Denmark -- 4520-8200	Netherlands -- 020-514-5770
Finland -- 358-9-4591	Portugal -- 351-21-7915-147
France -- 0238-557-450	Spain -- 34-91-662-4916
Germany -- 07032-15-4920	Sweden -- 46-8-477-4420
Greece -- 30-210-688-1220	United Kingdom -- 01475-555-055
Ireland -- 353-1-815-4000	

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@server	Update Connector
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IBM	XA-32
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Important notes

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 1 000 000 bytes, and GB stands for approximately 1 000 000 000 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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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. For country-specific instructions, refer to the following Web site: http://www.ibm.com/ibm/environment/products/prp.shtml.

Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml or contact your local waste disposal facility.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

In the Netherlands, the following applies.

Electronic emission notices

IBM @server xSeries 206 Type 8482

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

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

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

Responsible party:
    International Business Machines Corporation
    New Orchard Road
    Armonk, NY 10504
    Telephone: 1-919-543-2193

FC Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE

Industry Canada Class B emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards. This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Japanese Voluntary Control Council for Interference (VCCI) statement

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Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Maceo, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya

IBM power cord part number	Used in these countries and regions
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

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