



## xSeries 440 Type 8687

# Installation Guide

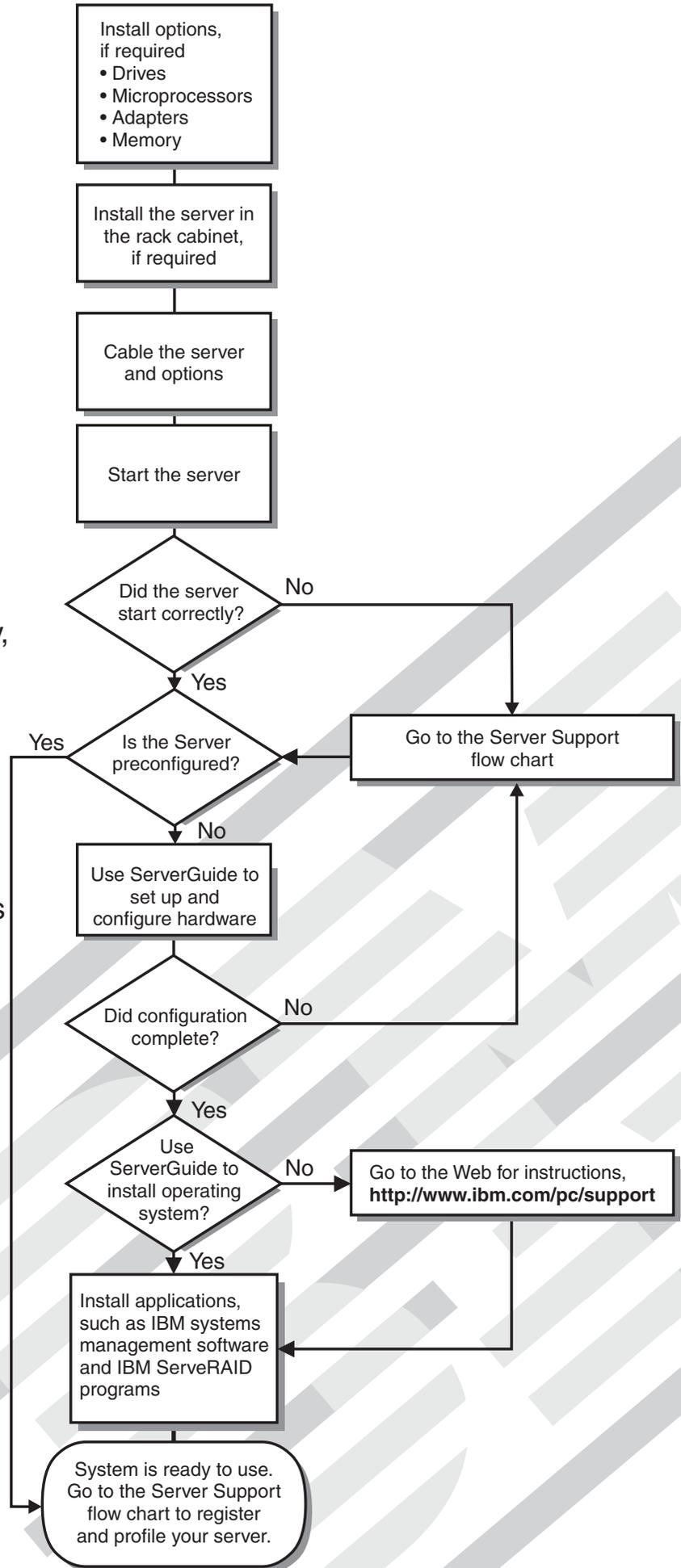
### Welcome...

Thank you for buying an IBM xSeries server. Your server is based on the X-Architecture technology, and it features superior performance, availability, and scalability.

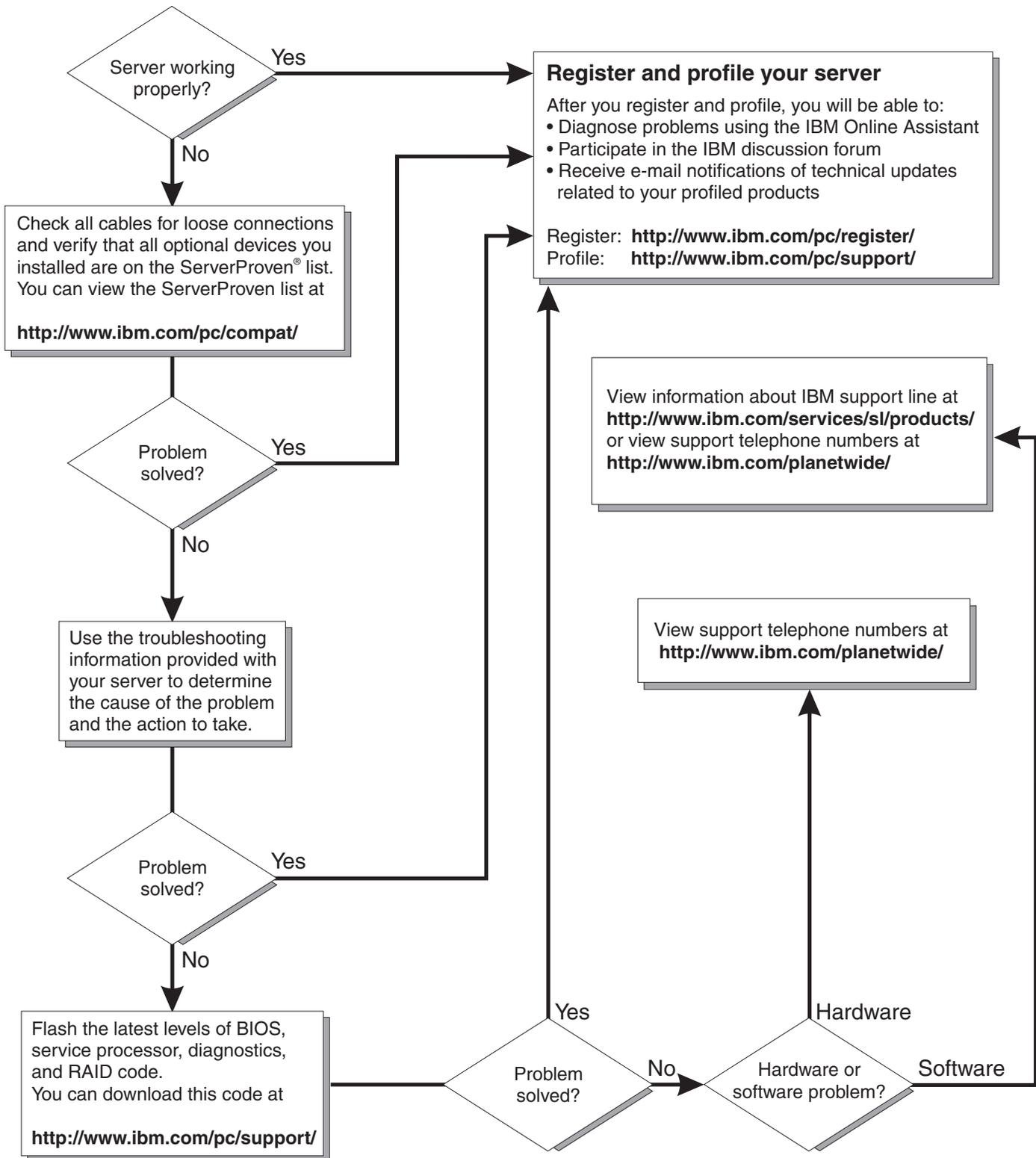
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the publications 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>



# Server Support



xSeries 440



# Installation Guide

**Note:** Before using this information and the product it supports be sure to read the general informatin in Appendix A, "Warranty information" on page 63 and Appendix B, "Notices" on page 75.

**Third Edition (November 2002)**

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# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

**Statement 1:**



**DANGER**

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

**To avoid a shock hazard:**

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

**To Connect:**

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

**To Disconnect:**

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

**Statement 2:**



**CAUTION:**

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

*Do not:*

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

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

**Statement 3:**



**CAUTION:**

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

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

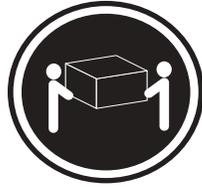


**DANGER**

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

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

**Statement 4:**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



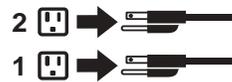
≥ 55 kg (121.2 lb)

**CAUTION:**  
Use safe practices when lifting.

**Statement 5:**



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



**Statement 8:**



**CAUTION:**

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



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



# Chapter 1. Introduction

Thank you for purchasing an IBM® @server xSeries™ 440 server with IBM X-Architecture™ Enterprise technologies<sup>1</sup>.

This *Installation Guide* provides the information that is needed to:

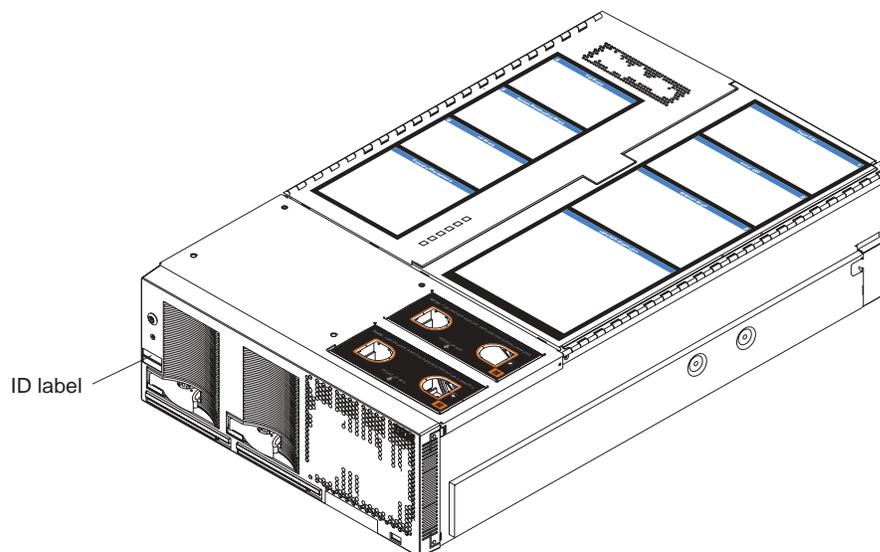
- Set up and cable your server
- Start and configure your server
- Install options
- Install your operating system
- Perform basic troubleshooting of your server

Packaged with the *Installation Guide* is an *IBM xSeries Documentation CD*, and the *Rack Installation Instructions*, which provide detailed information about your server and basic instructions for installing your system into a rack.

Your server comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your xSeries 440 model and other IBM server products at <http://www.ibm.com/eserver/xseries/>.

Record your product information in this table.	
<b>Product name</b>	IBM @server xSeries 440 server _____
<b>Type</b>	8687 _____
<b>Model number</b>	_____
<b>Serial number</b>	_____

The machine type and serial number are located on the ID label located on the left side of the bezel just above the hard disk drives.



1. X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor based sever powerful, scalable, and reliable. For more information about IBM X-Architecture technology, go to <http://www.ibm.com/pc/us/eserver/xarchitecture/enterprise/index.html>.

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## About your documentation CD

Your server comes with a documentation CD, which contains documentation for your server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

## System requirements

To run the documentation CD, your system must have the following minimum hardware and software:

- Microsoft® Windows NT® 4.0 (with Service Pack 3 or later), Windows® 98, Windows 2000.
- 100 MHz Intel Pentium® microprocessor.
- 32 MB RAM.
- Adobe Acrobat Reader 3.0 or later. Adobe Acrobat Reader software is included on the documentation CD, and you can install it when you run the IBM Documentation Browser.

## Starting the IBM Documentation Browser

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

- If Autostart is enabled, insert the documentation CD into your CD-ROM drive. The Documentation Browser will start automatically.
- If Autostart is disabled, insert the documentation 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**.

## Using the IBM Documentation Browser

Use the IBM Documentation Browser to browse the contents of the documentation CD, select from a list of available topics, see brief descriptions of the selected topics, and view selected topics using Adobe Acrobat Reader. The Documentation Browser automatically detects the regional settings in use on your system and presents the information in the language for that region (if available). If a topic is not available in the language for that region, the English version is displayed.

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

Complete the following steps to use the Documentation Browser:

1. Select your product from the **Product** drop-down list.  
The **Topics** list appears. It lists all topics that pertain to the selected product. Topics are in folders or under other topics. A plus sign (+) appears beside each folder or topic that has additional topics under it. Click the plus sign to display the additional topics.
2. Click a topic to select it.  
When you select a topic, a description of the topic contents appears in the **Description** field.

**Note:** To select multiple topics, press and hold down the Ctrl key while selecting your topics.

3. View selected topics.  
Click **View Book**. Adobe Acrobat Reader starts, and the selected topics are displayed.

## Using the search feature

Complete the following steps to use the Documentation Browser search feature:

1. Type a key word in the **Search** field.
2. Click **Search**. The topics containing the search word are listed in order based on the number of occurrences.
3. Click a file to open it.
4. Press Ctrl+F and use the Adobe Acrobat search function to search within the file.

## Features and specifications

The following table provides a summary of the features and specifications for your xSeries 440.

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>Supports the following:           <ul style="list-style-type: none"> <li>Up to 8 Intel Xeon MP microprocessors</li> <li>OR</li> <li>Up to 4 Intel Xeon DP microprocessors</li> </ul> </li> </ul> <p><b>Note:</b> Use the Information in BIOS to determine the type and speed of the microprocessors installed in your server.</p> <ul style="list-style-type: none"> <li>IBM XA-32™ chip set with integrated memory, I/O, system cache, and remote I/O controllers</li> </ul> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>Minimum: 2 GB</li> <li>Maximum: 32 GB</li> <li>Type: 4-way interleaved PC133 MHz, ECC SDRAM, registered DIMMs only</li> <li>Supports 512 MB and 1GB dual inline memory modules (DIMMs)</li> <li>Xcel4™ Server Accelerator Cache (up to 64 MB depending on your configuration)</li> </ul> <p><b>Drives:</b></p> <ul style="list-style-type: none"> <li>Diskette: 1.44 MB</li> <li>CD-ROM: 24X IDE</li> <li>Supports up to two internal Ultra160 SCSI hard disk drives</li> </ul> <p><b>Active™ PCI-X expansion slots:</b></p> <p>Six 64-bit Active PCI-X expansion slots:</p> <ul style="list-style-type: none"> <li>Two 66 MHz PCI-X slots</li> <li>Two 100 MHz PCI-X slots</li> <li>Two 133 MHz PCI-X slots</li> <li>Additional PCI-X slots available in an optional remote I/O expansion enclosure</li> </ul>	<p><b>Cooling:</b></p> <p>Four hot-swap fans</p> <ul style="list-style-type: none"> <li>Two 150 mm x 51 mm redundant fans</li> <li>Two 150 mm x 38 mm fans</li> </ul> <p><b>Power supply:</b></p> <p>Two hot-swap power supplies (550 watts at 110 V ac or 1050 watts at 220 V ac)</p> <p><b>Video:</b></p> <ul style="list-style-type: none"> <li>S3 Savage4 Pro video on system board</li> <li>PCI bus interface</li> <li>Compatible with SVGA</li> <li>8 MB SDRAM video memory at 125 MHz</li> </ul> <p><b>Size (4U):</b></p> <ul style="list-style-type: none"> <li>Height: 17.8 cm (7 inches, 4 U)</li> <li>Depth: 69.85 cm (27.5 inches)</li> <li>Width: 48.3 cm (19 inches)</li> <li>Maximum weight: 50 kg (110 lb) depending on your configuration</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>Broadcom 5700 10/100/1000 Ethernet controller</li> <li>Light Path Diagnostics™ feature</li> <li>Adaptec 7899W Dual Ultra160 SCSI controller</li> <li>Remote Supervisor Adapter (service processor)           <ul style="list-style-type: none"> <li>ASM interconnect (peer-to-peer) port</li> <li>Ethernet port</li> <li>Serial port</li> </ul> </li> <li>IDE controller</li> <li>RXE Management Port</li> <li>Three USB ports</li> <li>Keyboard port</li> <li>SCSI port</li> <li>Mouse port</li> <li>Symmetrical multiprocessor (SMP) Expansion Ports (up to six ports depending on your configuration)</li> <li>Two remote I/O expansion enclosure (RXE) Expansion Ports</li> </ul>	<p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>Sound power, idling: 6.2 bel maximum</li> <li>Sound power, operating: 6.2 bel maximum</li> </ul> <p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>Air temperature:           <ul style="list-style-type: none"> <li>Server on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 914 m (2998.7 ft)</li> <li>Server on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft)</li> <li>Server off: -40° to 60° C (-104° to 140° F). Maximum altitude: 2133 m (6998.0 ft)</li> </ul> </li> <li>Humidity:           <ul style="list-style-type: none"> <li>Server on: 8% to 80%</li> <li>Server off: 5% to 100%</li> </ul> </li> </ul> <p><b>Heat output:</b></p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> <li>Minimum configuration: 855 Btu (250 watts)</li> <li>Maximum configuration: 2726 Btu (800 watts)</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>Sine-wave input (47-53 or 57-63 Hz) required</li> <li>Input voltage low range:           <ul style="list-style-type: none"> <li>Minimum: 100 V ac</li> <li>Maximum: 127 V ac</li> </ul> </li> <li>Input voltage high range:           <ul style="list-style-type: none"> <li>Minimum: 200 V ac</li> <li>Maximum: 240 V ac</li> </ul> </li> <li>Input kilovolt-amperes (kVA) approximately:           <ul style="list-style-type: none"> <li>Minimum: 0.250 kVA</li> <li>Maximum: 0.800 kVA</li> </ul> </li> </ul>
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## Notices and statements used in this book

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

The notice and statement definitions are as follows:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible 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.

---

## Before you begin

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

- Read the safety information beginning on page v and “Handling static-sensitive devices” on page 6. These guidelines will help you work safely with your server or options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Back up all important data before you make changes to disk drives.
- For a list of supported options for the xSeries 440, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

**Note:** Some preconfigured servers have a unique list of supported options. See the software documentation provided with those servers for more information.

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## Working inside the server with power on

Your server supports hot-swap devices and is designed to operate safely while turned on with the cover removed. Follow these guidelines when you work inside a server that is turned on:

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

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## Handling static-sensitive devices

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

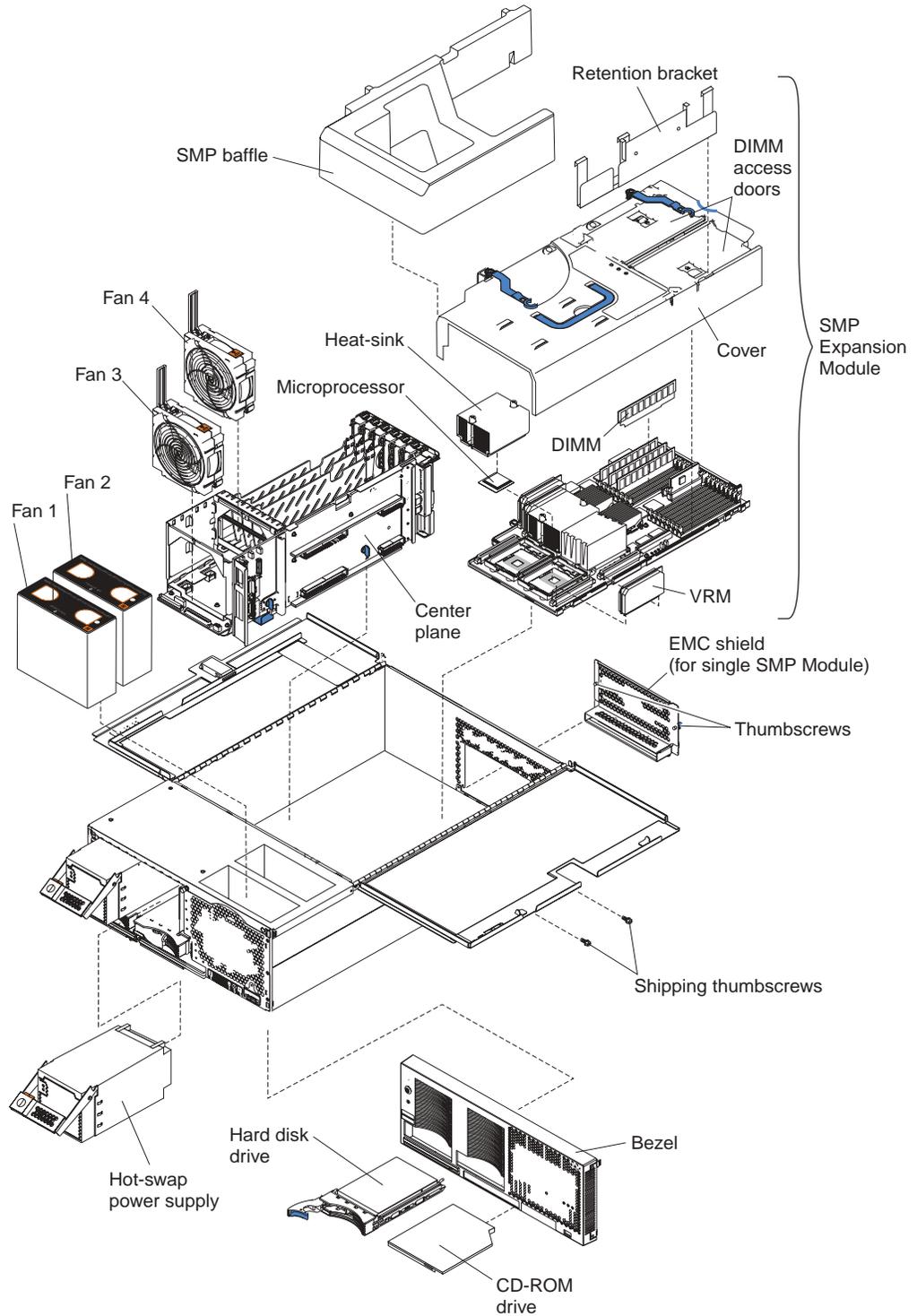
To reduce the possibility of electrostatic discharge, observe the following precautions:

- 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 printed 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 it down. If it is necessary to set down the device, place 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.

# Major components of the xSeries 440 server

The following illustration shows the locations of major components in your server.

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





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## Chapter 2. Installing options

This section provides basic information that is needed to install PCI or PCI-X adapters, Symmetric Multiprocessor (SMP) Expansion Modules, microprocessors, and DIMMs; properly cable your server; and prepare your server for installation into a rack cabinet. For more detailed information, see the *Option Installation Guide* on the *IBM xSeries Documentation CD*.

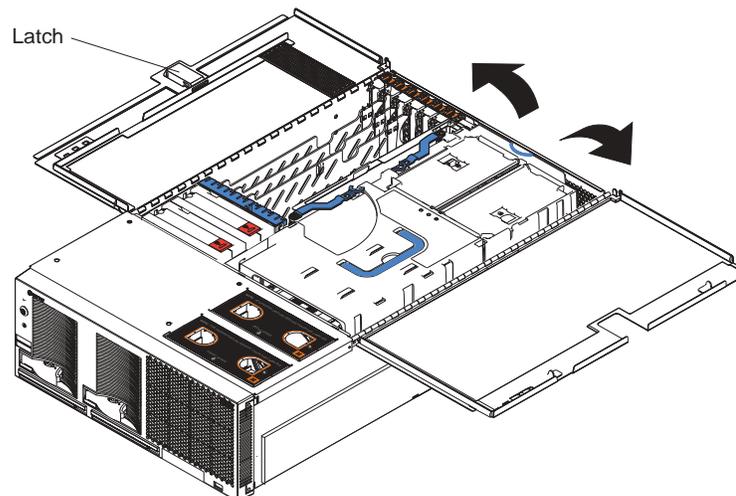
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### Opening the cover

Complete the following steps to open the server cover:

**Note:** Before opening the top cover, you must remove the rack-support wheels and handles from the server. see the *Rack Installation Instructions* for information on how to remove them.

1. Review the information in “Before you begin” on page 5, “Working inside the server with power on” on page 6, and “Handling static-sensitive devices” on page 6.



2. Press the release latch on the left half of the top cover to the left.
3. Using the finger hole in the release latch, open the left half of the cover; then, open the right half of the cover.

**Attention:** For proper cooling and airflow, close the cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the cover open might damage server components.

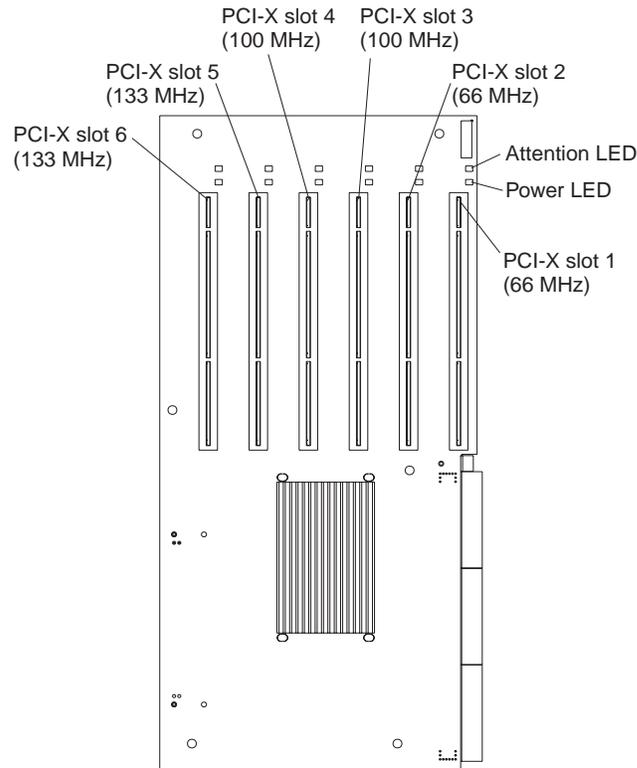
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## PCI and PCI-X adapters

This section provides information about the PCI-X expansion slots on the I/O board, and peripheral component interconnect (PCI) adapters.

The following illustration shows the location and bus speeds of the PCI-X expansion slots on the I/O board.

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



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## PCI and PCI-X adapter considerations

Before you install adapters, review the following:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter.
- If you need to change the switch settings or jumper settings on your adapter, follow the instructions that come with the adapter.
- Video adapters are not supported.
- Some long adapters have extension handles or brackets installed. Before installing the adapter, you must remove the extension handle or bracket.
- Your server uses a rotational interrupt technique to configure PCI-X adapters. You can use this technique to install PCI-X adapters that currently do not support sharing of PCI-X interrupts.
- The xSeries 440 server scans devices and PCI-X slots to assign system resources in the following order: CD-ROM drive; disk drives; integrated SCSI devices; PCI-X slots 1, 2, 6, 5, 3, 4; and the integrated Ethernet controller. If an RXE-100 enclosure is attached to the server, the scan continues in sequence with PCI slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, and 14.

- You can use the Configuration/Setup Utility program to change the sequence and have the server scan one of the first six PCI slots before it scans the integrated devices. You cannot change the scan sequence of the PCI slots in an RXE-100 enclosure.
- You can install both PCI and PCI-X adapters in the same bus. However, if you install a PCI adapter and a PCI-X adapter in the same bus, the PCI-X features of the PCI-X adapter will be disabled and the adapter will function as a PCI adapter.
- You can install PCI or PCI-X adapters of speeds faster than what is labeled for a particular PCI-X bus. For example, if you install two 133 MHz adapters into slots that are labeled as 100 MHz slots, the adapters will operate at 100MHz.
- If you install a 33 MHz and a 66 MHz adapter in the same bus, the bus speed will match that of the slowest adapter.
- If a single 133 MHz adapter is installed in PCI-X Bus B (slot 3 and 4), and the other slot in PCI-X Bus B is empty, the adapter will operate at 133 MHz.
- Your server supports six hot-plug 64-bit adapters in the expansion slots located on the PCI-X board.
 

**Note:** You can add up to 12 additional PCI-X slots to your server by connecting your server to a remote I/O expansion enclosure. For more information about the expansion enclosure and how to connect your server to it, see the documentation that comes with your expansion enclosure.
- Your server supports 3.3 V adapters; it does not support 5.0 V adapters.

## Installing adapters

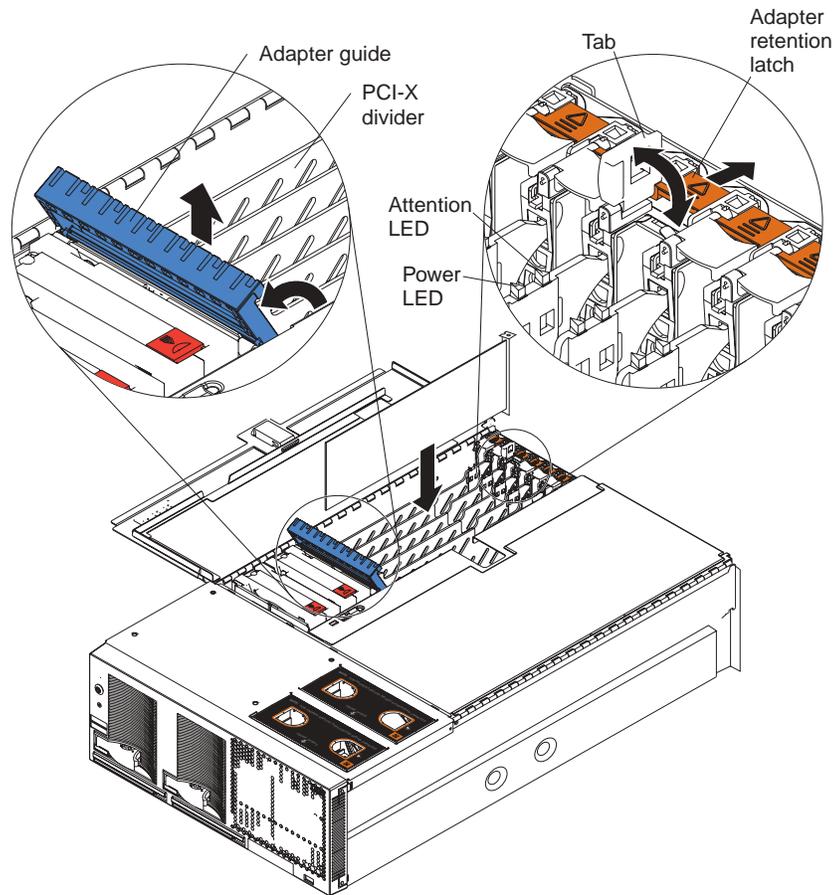
The Active PCI-X slots in your server must be disabled by the operating system before you insert or remove a PCI or PCI-X adapter.

**Note:** Before hot-swapping any of the PCI-X adapters, read the information in “Working inside the server with power on” on page 6.

Complete the following steps to install an adapter:

1. Review the information in “Safety” on page v, “Before you begin” on page 5, “Working inside the server with power on” on page 6, and “Handling static-sensitive devices” on page 6.
2. Open the top cover.

**Note:** Inside your server there are six PCI-X slots: two 66 MHz, two 100 MHz, and two 133 MHz. Before attempting to install a new adapter, be sure that there is an available slot for it. If you need additional PCI-X slots, you can purchase a remote I/O expansion enclosure either from your IBM marketing representative or authorized reseller.



3. See the documentation that comes with your adapter for any cabling instructions.  
**Note:** Route adapter cables before you install the adapter.
4. Set any jumpers or switches as described by the adapter manufacturer.
5. Install the adapter:
  - a. Open the blue adapter guide by lifting the front edge, as shown in the illustration.
  - b. Carefully grasp the adapter by its top edge or upper corners, and align it with the connector on the I/O board.
  - c. Press the adapter *firmly* into the adapter connector.  
**Attention:** When you install an adapter, be sure the adapter is correctly seated in the connector. Improperly seated adapters might cause damage to the I/O board or to the adapter.
  - d. Push down on the blue adapter guide to keep the adapter steady.
  - e. Close the tab; then, push down on the blue adapter retention latch until it clicks into place, securing the adapter.
6. Connect the internal cables to the adapter.
7. If you have other options to install or remove, do so now.
8. Go to “Completing the installation” on page 31.

## Cabling a ServeRAID adapter

Some xSeries 440 models come with an optional IBM ServeRAID™ adapter installed to control the internal hot-swap hard disk drives. If you are installing an optional IBM

ServeRAID adapter, see the ServeRAID documentation and the cabling information in this section to install the ServeRAID adapter.

Servers that do not come with an IBM ServeRAID adapter installed come with two SCSI cables:

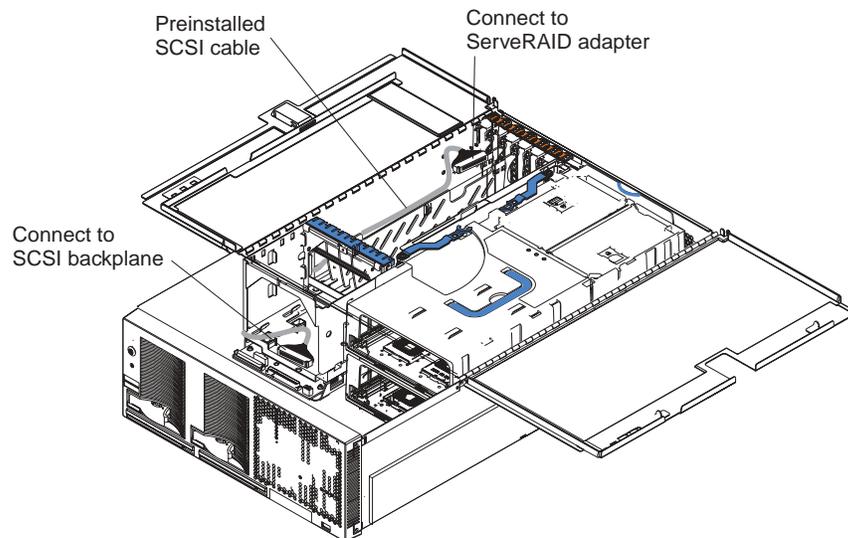
- One end of the first SCSI cable is attached to the connector on the SCSI backplane, and the other end is attached to the connector for the integrated SCSI controller behind fans 3 and 4.
- The second SCSI cable is preinstalled along the inside of the server and both ends are loose inside the server. When you install a ServeRAID adapter, you will connect this cable to the adapter and to the SCSI backplane.

The following procedure describes the internal cabling needed to install a ServeRAID adapter.

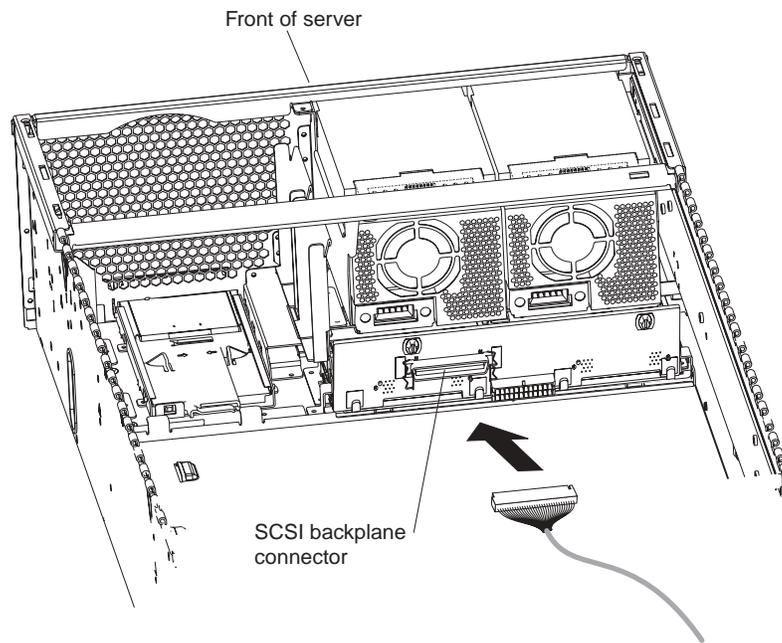
**Important:** When installing multiple ServeRAID adapters in a server that has the PCI-X slot enabled for high scan (boot) priority, ensure that the ServeRAID adapter controlling the startup (boot) drive is installed in a PCI slot that is scanned before the PCI slots that contain the other ServeRAID adapters. See “PCI and PCI-X adapter considerations” on page 10.

Complete the following steps to cable the ServeRAID adapter.

1. Review the information in “Safety” on page v, “Before you begin” on page 5, and “Handling static-sensitive devices” on page 6.
2. Turn off the server and disconnect all power cords and external cables; then, open the server cover (see “Opening the cover” on page 9).
3. Remove fans 3 and 4, which are located just behind the PCI-X slots (see the illustration on page 5 for the location of the fans).
4. Disconnect the short SCSI cable from the SCSI backplane and the integrated SCSI controller; then, store this short cable in a safe place for future use.
5. Install the ServeRAID adapter in a PCI-X slot (see “Installing adapters” on page 11).



6. Locate the preinstalled SCSI cable; then, attach a connector on the cable to the ServeRAID adapter.
7. Locate the connector on the opposite end of the SCSI cable and connect it to the SCSI backplane connector.



8. Reinstall fans 3 and 4.
9. If you have other options to install or remove, do so now.
10. Go to “Completing the installation” on page 31.

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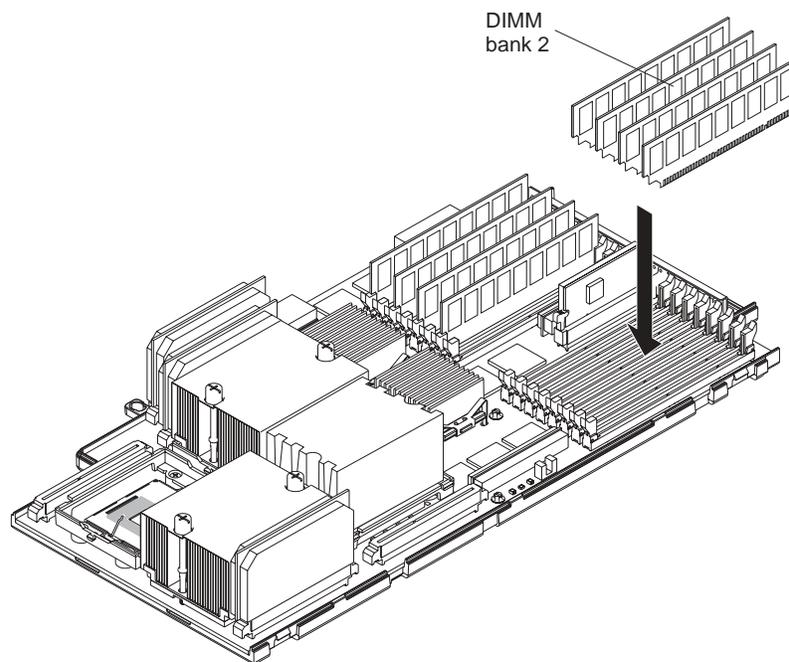
## SMP Expansion Module

The SMP Expansion Module contains the XceL4 system cache, DIMMs, microprocessors, and voltage regulator modules (VRMs) needed to run your server. In this section, you will find the information needed to remove and install the SMP Expansion Module, microprocessors, VRMs, and DIMMs.

SMP Expansion Module considerations:

- Use two hands to install or remove an SMP Expansion Module. Do not allow the expansion module to come in contact with the center planar while lifting it out or putting into the server.
- For your server to operate properly, there must be a minimum of one SMP Expansion Module installed.
- An SMP Expansion Module must contain at least one microprocessor and four DIMMs.
- If there is only one SMP Expansion Module installed in the server, an SMP baffle must be installed in place of the upper SMP Expansion Modules to ensure proper cooling of the server.
- When the minimum number of microprocessors are installed in the SMP Expansion Module, a microprocessor baffle must be installed in microprocessor socket 4 to ensure proper cooling within the server.
- Before removing or installing SMP Expansion Modules, you must remove the retention bracket or brackets and electromagnetic compatibility (EMC) shield from the rear of the server.
- You must run the Configuration/Setup Utility program whenever you remove or replace an SMP Expansion Module or one of its associated options.

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



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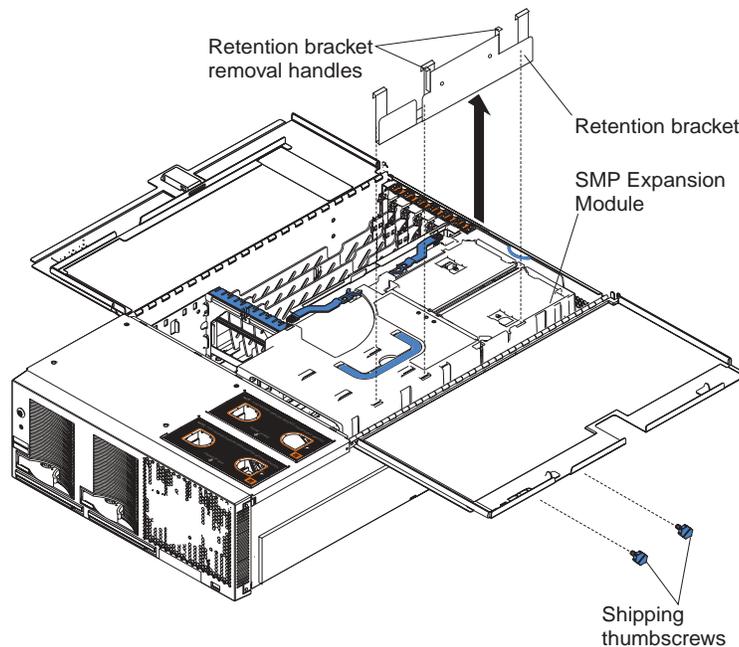
## Removing an SMP Expansion Module and cover

While installing options, you might need to remove one or both of the SMP Expansion Modules. This section describes how to properly remove an SMP Expansion Module from the server and how to remove the cover from the module.

Complete the following steps to remove an SMP Expansion Module from the server:

1. Review the safety information beginning on page v, “Before you begin” on page 5, and “Handling static-sensitive devices” on page 6.
2. If necessary, turn off the server and peripheral devices, and disconnect the external cables and power cords.
3. Remove the retention bracket or brackets from the server.

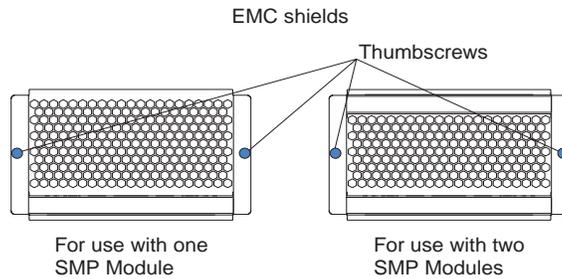
- a. Remove the shipping thumbscrews from the right side of the server.  
**Note:** There are two shipping thumbscrews per retention bracket.



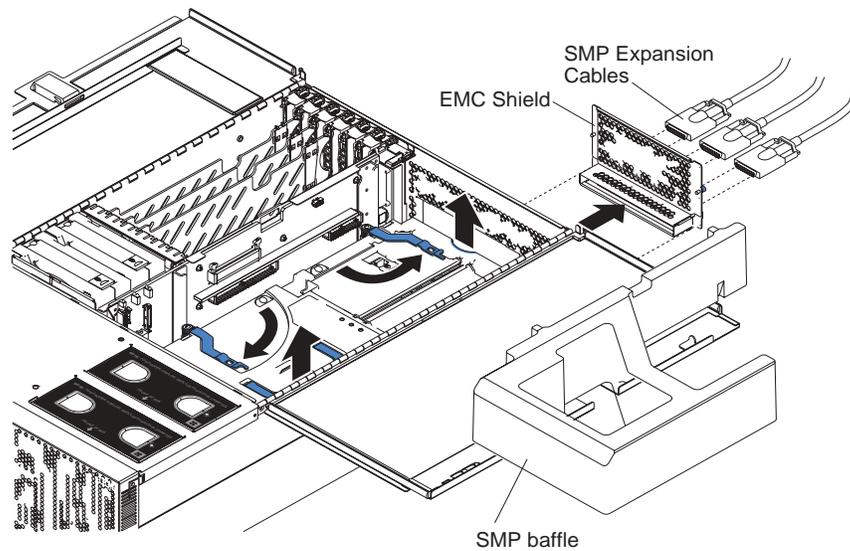
- b. Open the cover.
- c. Grasp the retention bracket by the right edge and lift it up and out of the server. Store the retention bracket or brackets in a safe place for use later.

**Note:** If there is one SMP Expansion Module installed, you will need to remove the SMP baffle from the server; then, remove the retention bracket from the lower SMP Expansion Module.

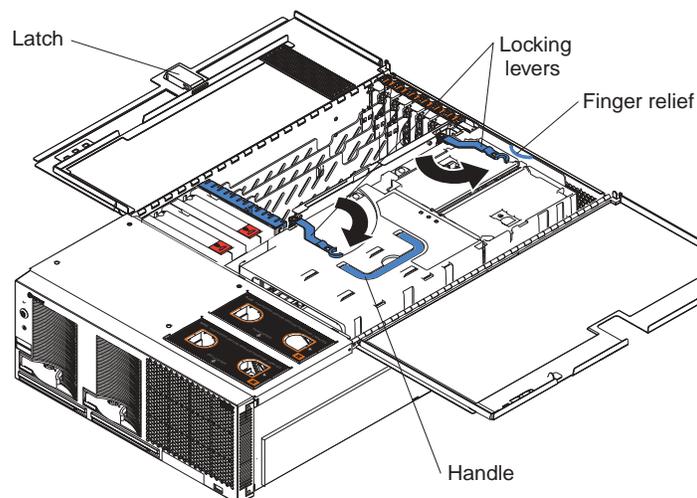
4. Remove the EMC shield from the rear of the server.
  - a. If there are two SMP Expansion Modules installed in the server you must disconnect all the SMP Expansion cables that are connected to the SMP Expansion Modules.
  - b. Remove the blue thumbscrews holding the EMC shield to the server.



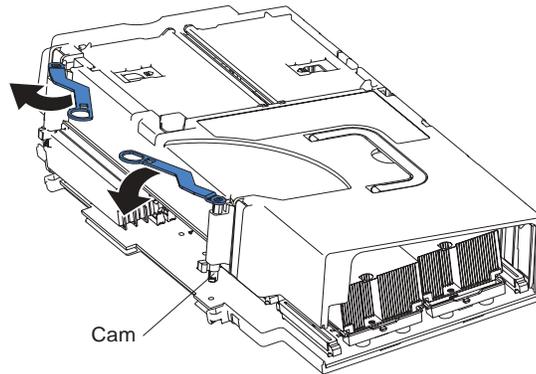
- c. Remove the EMC shield from the rear of the server.



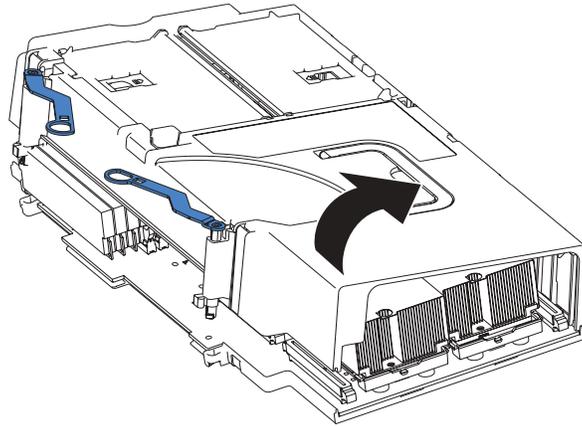
5. Grasp each of the locking levers on the top of the SMP Expansion Modules, and lift them up slightly.
6. Working from the right side of the server, rotate the two locking levers toward you until they are fully extended, as shown.



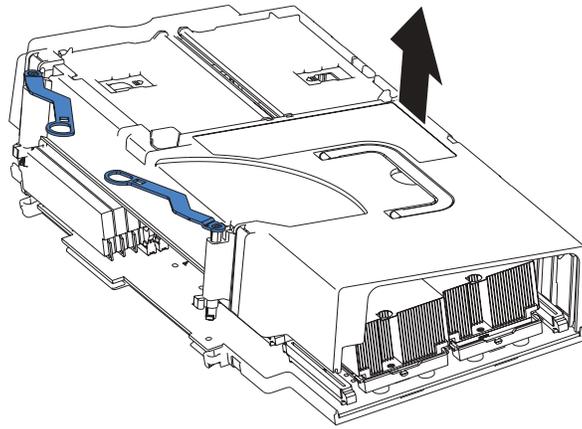
7. Being careful not to damage the components on the center plane, use the handle and the finger relief on the SMP Expansion Module cover to lift the SMP Expansion Module out of the server.
8. Remove the SMP Expansion Module cover:
  - a. Place the SMP Expansion Module on a flat, level surface.
  - b. Rotate the two locking levers until they are fully extended beyond the edge of the SMP Expansion Module cover. Do not force the locking levers past the position shown in the illustration.



- c. Using the locking levers, lift the front edge of the cover off the SMP Expansion Module.



- d. Lift the cover off the SMP Expansion Module.



## Installing and replacing a microprocessor

This section describes how to install and remove microprocessors and VRMs. Before performing any of the procedures in this section, read “Safety” on page v, “Handling static-sensitive devices” on page 6, and Before you begin.

Before you begin:

- Read the documentation that comes with the microprocessor to determine if you need to update the server basic input/output system (BIOS) code. For the most current level of BIOS code for the server, go to <http://www.ibm.com/pc/support/> on the World Wide Web.
- Obtain an SMP-capable operating system (optional). For a list of supported operating systems, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

**Attention:** To avoid damage and ensure proper server operation after you install a replacement or an additional microprocessor, use a microprocessor that has the same cache size and type, clock speed, and internal and external clock frequencies as the microprocessors already installed in the individual SMP Expansion Module. For a list of microprocessors supported by your server, see the ServerProven® list at <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

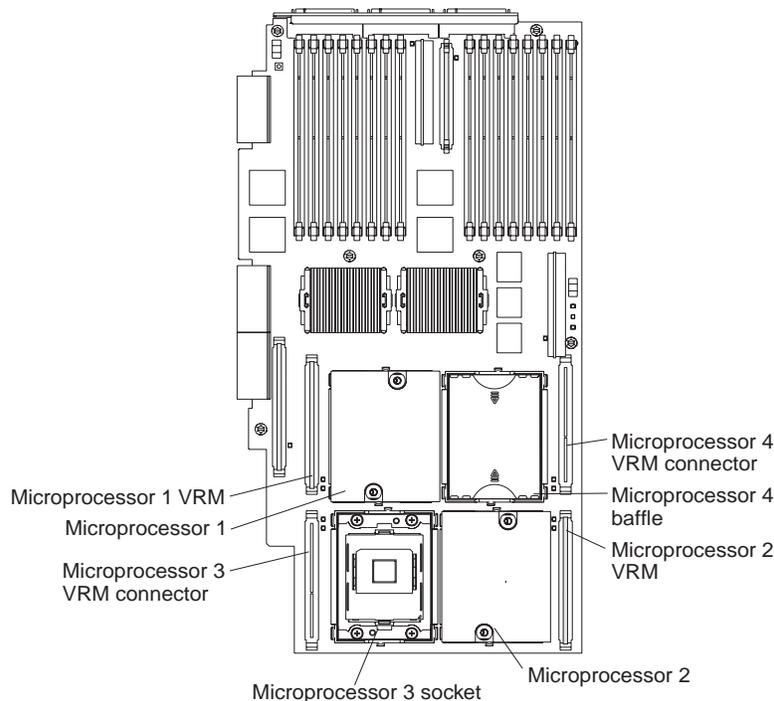
### Notes:

1. To order additional microprocessor or SMP Expansion Module options, contact your IBM marketing representative or authorized reseller.
2. The microprocessor in socket 1 of the bottom SMP Expansion Module is the startup (boot) microprocessor.
3. If you are adding additional Intel Xeon MP microprocessors to an SMP Expansion Module, populate the empty microprocessor sockets in numeric order, starting with socket 1. If you install the microprocessors in the wrong order, the server will not power on.
4. If you are adding additional Intel Xeon MP microprocessors to an SMP Expansion Module, always install the heat sink that comes with the microprocessor.
5. If you are adding additional Intel Xeon DP microprocessors to your server, you must have a second populated SMP Expansion Module with two Intel Xeon DP microprocessors installed. Server models that come with Intel Xeon DP microprocessors support a maximum of two microprocessors per SMP Expansion Module, and are installed in microprocessor sockets 1 and 4.

The following illustration shows the location of the startup microprocessor and its VRM on the system board. It also shows the microprocessor baffles and the VRM slots for the other microprocessor sockets.

**Notes:**

1. The illustrations in this document might differ slightly from your hardware.
2. Intel Xeon DP microprocessors are supported in microprocessor sockets 1 and 4 only. Intel Xeon MP microprocessors are supported in microprocessor sockets 1, 2, 3, and 4.



Complete the following steps to install a microprocessor:

1. Review the safety information beginning on page v, “Before you begin” on page 5, and “Handling static-sensitive devices” on page 6.
2. Turn off the server and peripheral devices, disconnect the power cords, and disconnect all external cables from the SMP Expansion Module; then, open the cover (see “Opening the cover” on page 9 for details).
3. Remove the SMP Expansion Module in which you plan to install the microprocessor; then, remove the module cover and determine the socket where the microprocessor is to be installed. For details, see “Removing an SMP Expansion Module and cover” on page 16.

**Important:** Before continuing, you should determine which type of microprocessors are installed in your server. The easiest way to do this is by the locations of the installed microprocessors in the SMP Expansion Module. If the microprocessors are installed only in sockets 1 and 4, your server came with Intel Xeon DP microprocessors. If the microprocessors are installed in any other sockets, such as 1 and 2 or 1, 2, and 3, then your server came with Intel Xeon MP microprocessors.

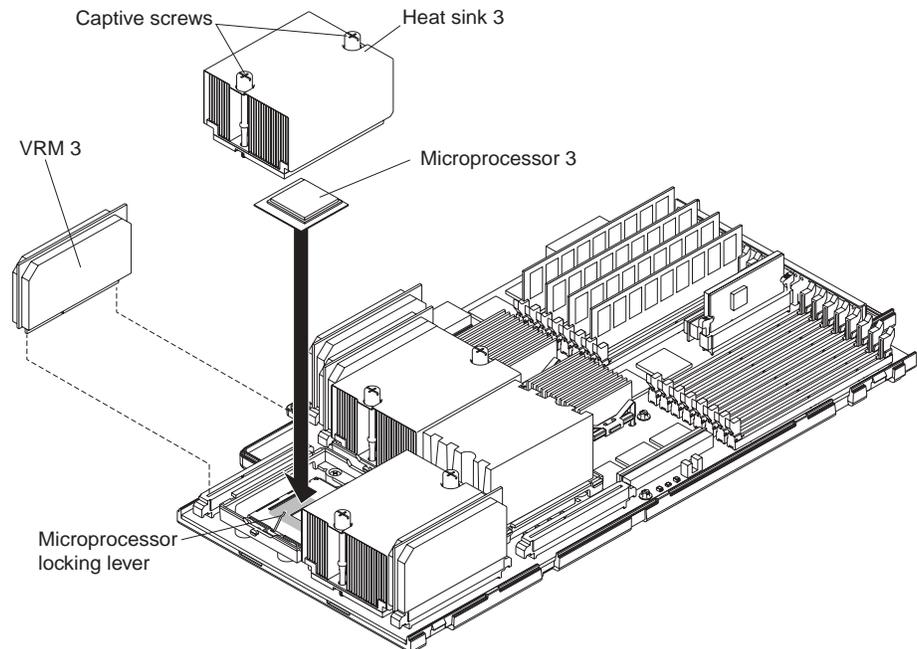
**Note:** If your server contains only one SMP Expansion Module, remove the SMP baffle above it to gain access to the module. If your server contains two

SMP Expansion Modules, remove the top module to gain access to the bottom or lower SMP Expansion Module.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 6.

4. If you are installing a new microprocessor, go to step 5; otherwise, continue:
  - a. Verify that you have selected the correct microprocessor to be replaced. The LED next to the failing microprocessor will be on.

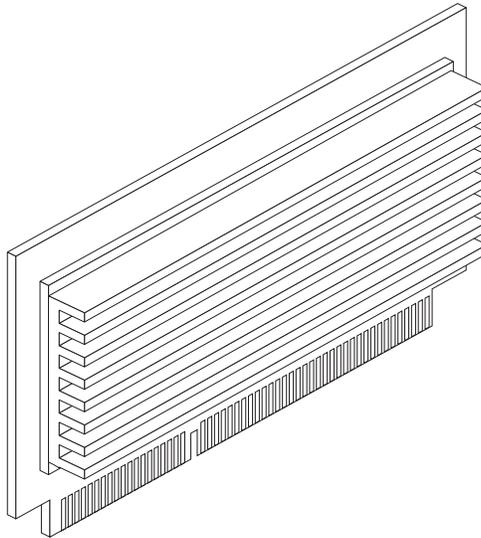
**Attention:** Before attempting to remove the heat sink from the microprocessor, note that the heat-conducting grease between the heat sink and the microprocessor might have formed a strong bond. Do not force the components apart; doing so can damage the microprocessor pins. If the heat sink does not separate from the microprocessor easily, loosen one heat sink captive mounting screw first. This allows one corner of the heat sink to be lifted off of the microprocessor; then, you can loosen the other captive mounting screw and remove the heat sink.



- b. Using a screwdriver, loosen the two captive mounting screws on the heat sink, alternating between screws until they release from the SMP board; then, remove the heat sink.
  - c. Lift the microprocessor locking lever to the open position and remove the microprocessor.
5. Install the VRM in the slot adjacent to the microprocessor socket.

**Attention:** If you are installing an additional microprocessor, note that the new microprocessor comes in a kit with a VRM. Some microprocessor options contain a VRM with a clip to secure the VRM in the slot. This clip is not needed for installations in your server and can be discarded. When installing a new microprocessor, you must install the VRM that came in the kit.

- a. If you are replacing a failed VRM:
    - 1) Verify that you have selected the correct VRM to be replaced. The LED next to the failing VRM will be on.
    - 2) Grasp the VRM at both upper corners and lift it out of the slot.



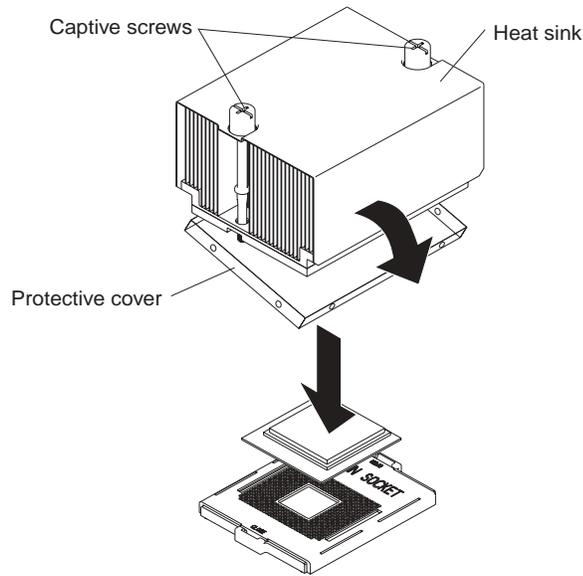
- b. Holding the new VRM by the upper corners, plug it *firmly* into the slot.
6. If necessary, remove the microprocessor baffle from the microprocessor socket. Keep the microprocessor baffle for possible future use.
7. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
8. Install the microprocessor:

**Important:** When installing Intel Xeon DP microprocessors, you must install them in the following order: socket 1 then socket 4. When installing Intel Xeon MP microprocessors, you must install them in the following order: sockets 1, 2, 3, and then 4.

  - a. Ensure that the microprocessor locking lever is in the open position to permit plugging in the microprocessor.
  - b. Remove the protective tape from the microprocessor socket.
  - c. Align the triangle icon on the microprocessor with the triangle icon on the socket and press the microprocessor gently into the socket.

**Attention:** Make sure that the microprocessor is aligned correctly before you proceed. To avoid bending the pins on the microprocessor, do not use excessive force when pressing it into the socket.
  - d. Close the locking lever to secure the microprocessor.
9. If you have installed an additional microprocessor:
  - a. Remove the heat sink from its package and detach the protective cover from the bottom of the heat sink.

**Attention:** Do not disturb or contaminate the heat-conducting grease on the bottom of the new heat sink. Doing so damages its heat-conducting capability and exposes the new microprocessor to overheating.



- b. Align the heat sink over the microprocessor; then, carefully set it down on top of the microprocessor.
  - c. Using a screwdriver, secure the heat sink to the microprocessor socket on the SMP board using the two captive mounting screws. Press firmly on the screws and tighten them, alternating between them. Do not overtighten the screws.
10. Close the SMP Expansion Module top cover; then, install the module in the server. For details, see “Reinstalling an SMP Expansion Module and cover” on page 28.
  11. If you have other options to install or remove, do so now.
  12. Close the cover on the server; then, reinstall the server in the rack cabinet and connect all external cables. For details, see “Completing the installation” on page 31.
  13. Turn on the server.

**Important:** If your server will not start after replacing or installing a microprocessor, you might have installed a microprocessor of a different type or the VRM is not installed properly. Verify that you have installed the proper microprocessor and that the VRM is properly installed.

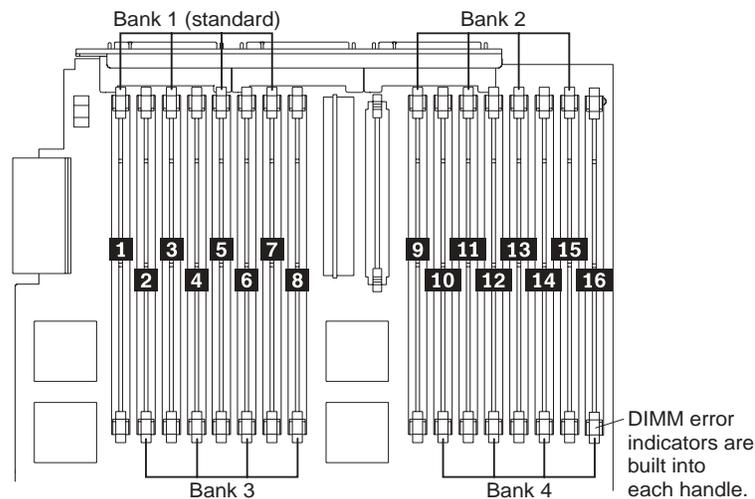
**Note:** When you install or remove microprocessors, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program. See the *User’s Guide* on the *Documentation CD*.

## DIMMs

This section describes how to install and remove DIMMs. Before performing any of the procedures in this section, read “Safety” on page v, “Handling static-sensitive devices” on page 6, and the following DIMM considerations.

DIMM considerations:

- IBM periodically makes updates available to provide enhancements to the standard features of your server. Currently, your xSeries 440 supports the Memory Mirroring and Memory ProteXion features of the Active Memory technology. However in the future, IBM might also support the hot-swap feature of the Active Memory technology. Be sure to check the IBM support Web site occasionally to ensure that you have the most current levels of system software installed.
- Your server comes with a minimum of four 512 MB DIMMs installed in slots 1, 3, 5, and 7 in the SMP Expansion Module. When installing additional DIMM modules, you must install four DIMMs at a time and in the order described in this section, using the instructions in the "Installing DIMMS" procedure on page 26 to maintain performance. See the ServerProven list at <http://www.ibm.com/pc/compat> for a list of memory modules for use with your server.
- When installing or removing DIMMs, it must be done in banks of four and in the following order:
  - Bank 1 = DIMM connectors 1, 3, 5, 7
  - Bank 2 = DIMM connectors 9, 11, 13, 15
  - Bank 3 = DIMM connectors 2, 4, 6, 8
  - Bank 4 = DIMM connectors 10, 12, 14, 16



- Each DIMM in an individual bank must be of the same size and clock speed to ensure the server will operate properly.

- The installing or removing of DIMMs changes the configuration information in the server. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings**. See the *User's Guide* on the *IBM xSeries Documentation CD* for additional information.
- You can configure your server to use memory mirroring and memory scrubbing. For detailed information on configuring your server and using these features, see the *User's Guide* on the *IBM xSeries Documentation CD*.

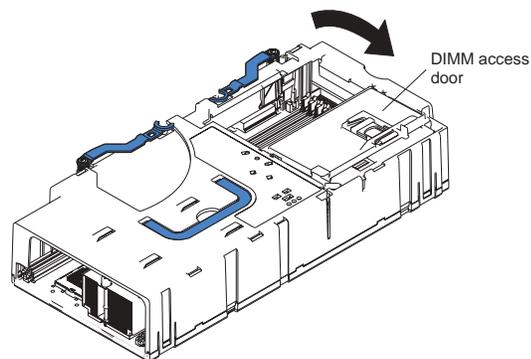
## Installing DIMMs

Complete the following steps to install a DIMM in your server.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 6.

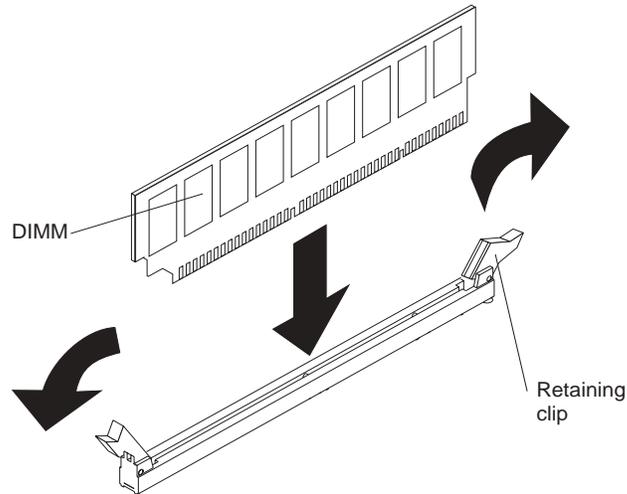
1. Review the safety information beginning on page v, “Before you begin” on page 5, and “Handling static-sensitive devices” on page 6.
2. Turn off the server and peripheral devices, and disconnect all external cables and power cords. Then, open the server cover (see “Opening the cover” on page 9 for details).
3. If necessary, remove the top SMP Expansion Module from the server. See “Removing an SMP Expansion Module and cover” on page 16 for instructions.
4. Open the DIMM access door on the SMP Expansion Module cover that covers the memory bank in which you will be installing the new DIMMs.

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



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

6. Install the DIMM:



- a. Open the retaining clip on each end of the DIMM connector. Turn the DIMM so that the pins align correctly with the connector.  
**Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
  - b. Insert the DIMM into the connector by aligning the DIMM edges with the slots at each end of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. Be sure that the retaining clips snap into the locked position when the DIMM is firmly seated in the connector.
  - c. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
7. Close the DIMM access door or reinstall the SMP Expansion Module cover (see “Reinstalling an SMP Expansion Module and cover” on page 28).
  8. If you have other options to install or remove, do so now.
  9. Close the server cover. See “Completing the installation” on page 31.
- Note:** The installing or removing of DIMMs changes the configuration information in the server. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility program” on page 46 for more information.

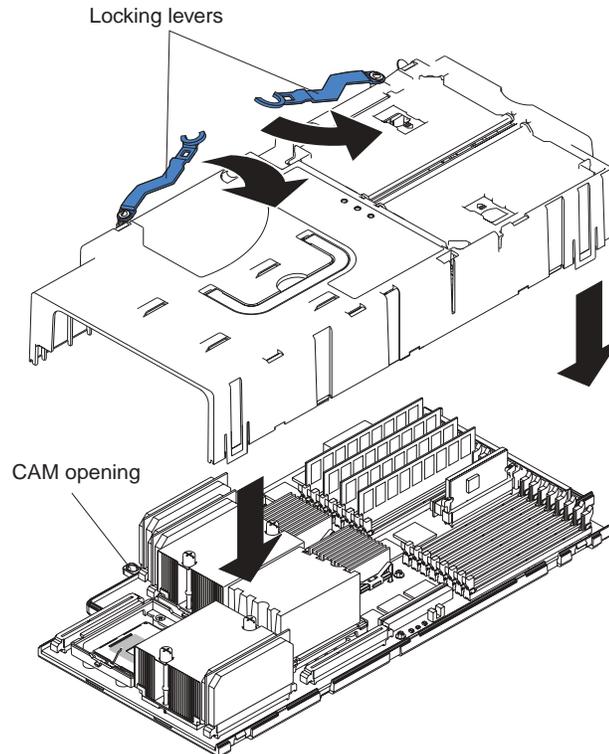
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## Reinstalling an SMP Expansion Module and cover

After installing options in the SMP Expansion Module, you will need to reinstall the SMP Expansion Module cover and reinstall the SMP Expansion Module in the server.

Complete the following steps to reinstall the SMP Expansion Module cover:

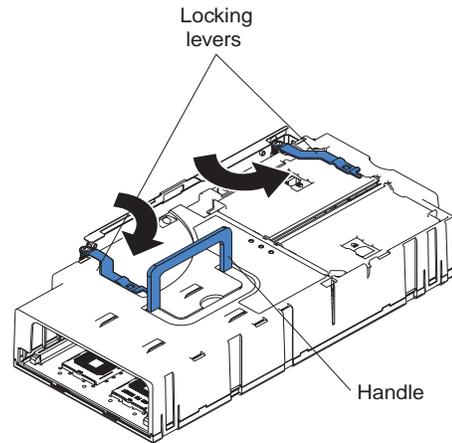
1. Install the cover on the SMP Expansion Module:
  - a. Set the cover on top of the expansion module.
  - b. Extend the locking levers as shown in the illustration; then, let the cam on the front of the cover fall into the cam opening on the SMP Expansion Module circuit board.



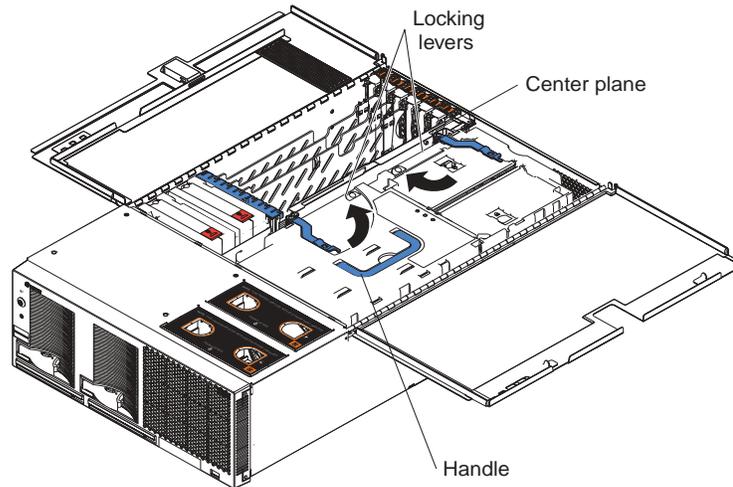
- c. Release the locking levers and align the rear of the cover with the rear edge of the circuit board.
    - d. Press down on the cover until it snaps into place.

- e. Lift slightly on the locking levers and rotate them back until they stop.

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

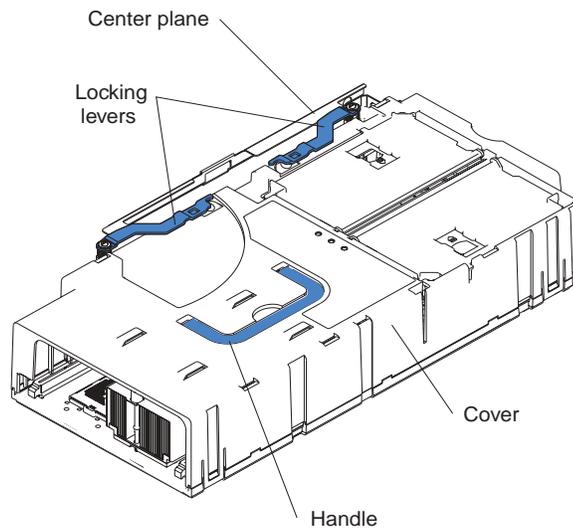


- 2. Install the SMP Expansion Module into the server.



- a. Lift the SMP Expansion Module by its handle and use the finger relief to hold the SMP Expansion Module steady.
- b. Being careful not to damage the components on the center plane, place the SMP Expansion Module into the server.
- c. Release the handle and slide the SMP Expansion Module toward the center plane until it stops.

- d. Rotate the SMP Expansion Module locking levers forward until the SMP Expansion Module is securely fastened in place. See the following illustration.



- e. Install the retention bracket.

**Notes:**

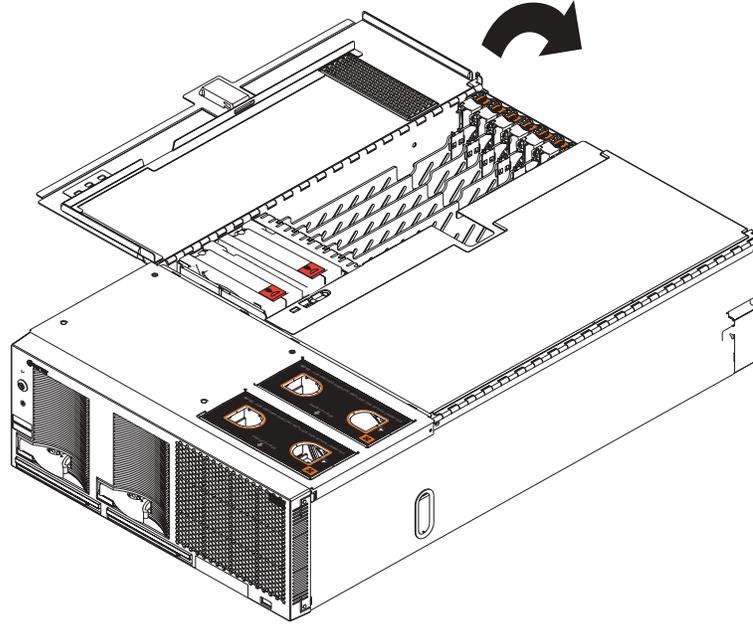
- 1) If there are two SMP Expansion Modules installed in your server, you must install the retention bracket for each of the SMP Expansion Modules. Be sure to install the bottom retention bracket first, then repeat steps 2a through 2e for the top SMP Expansion Module.
- 2) If the server is going to shipped or moved over a long distance, you must reinstall the shipping thumbscrews.

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## Completing the installation

Complete the following steps to finish the installation:

1. Put the right side of the cover in place first, and then put the left side in place. Press down to latch the two halves of the cover in place.



2. Install the server in the rack cabinet. See the *Rack Installation Instructions* that came with your server for detailed information on how to install the server in a rack cabinet.
3. Connect the external cables and power cords; then, turn on the peripheral devices and the server. See “Working with cables” on page 32.

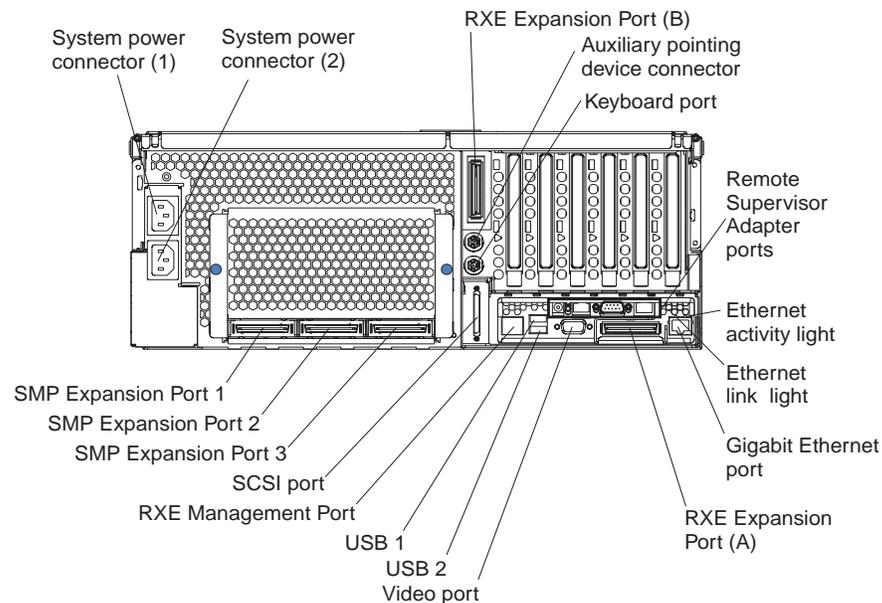
## Working with cables

This section describes how to connect cables to the SMP Expansion Port, system power connectors, RXE Expansion Port, SCSI port, USB port, video port, auxiliary pointing device connector, keyboard port, Ethernet port, and RXE Management port. When instructed, see the appropriate documentation for more details.

For details about the locations and functions of all of the ports, indicators, and connectors see “Server controls and indicators” on page 37.

### Notes:

1. See the following illustration to locate the connectors on the back of your server.
2. If your server model came with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation provided with your server for additional cabling instructions.
3. The illustrations in this document might differ slightly from your hardware.



To effectively manage the cables on this server, keep groups of cables secured together, and do not run cables across the back of the server.

### Notes:

1. Use cable ties to bundle similar cables together.
2. Use hook-and-loop fasteners to secure the cable bundles to the vertical rails of the rack cabinet.
3. When possible, separate data and power cables.

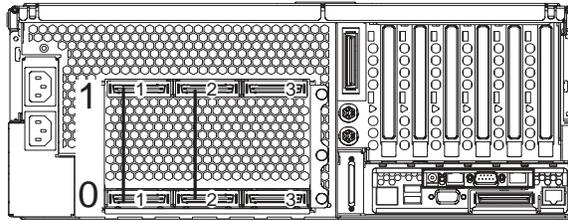
**Attention:** Do not secure cables too tightly. Overtightening can cause internal damage to the cables.

## SMP expansion port cabling

Each server has up to six SMP Expansion Ports located on the back, depending on your configuration. Three ports are located on each SMP Expansion Module in the server.

Complete the following steps to cable two SMP Expansion Modules in a single server together for up to 8-way operation:

**Note:** In the illustration the SMP Expansion Modules are numbered from bottom to top, 0 and 1. Notice that the SMP Expansion Ports are numbered left to right, 1 through 3.



1. Using the two 25.4 cm (10 in.) long SMP Expansion cables, connect the two SMP Expansion Modules together.

**Note:** If your server comes with two SMP Expansion Modules, the SMP Expansion cables are included with the server. If you purchased a second SMP Expansion Module separately, the cables are included with the option.

- a. Connect one end of the first cable to port 1 of SMP Expansion Module 0; then, connect the opposite end of the cable to port 1 of SMP Expansion Module 1.
- b. Connect one end of the second SMP Expansion cable to port 2 of SMP Expansion Module 0; then, connect the opposite end of the cable to port 2 of SMP Expansion Module 1.

**Notes:**

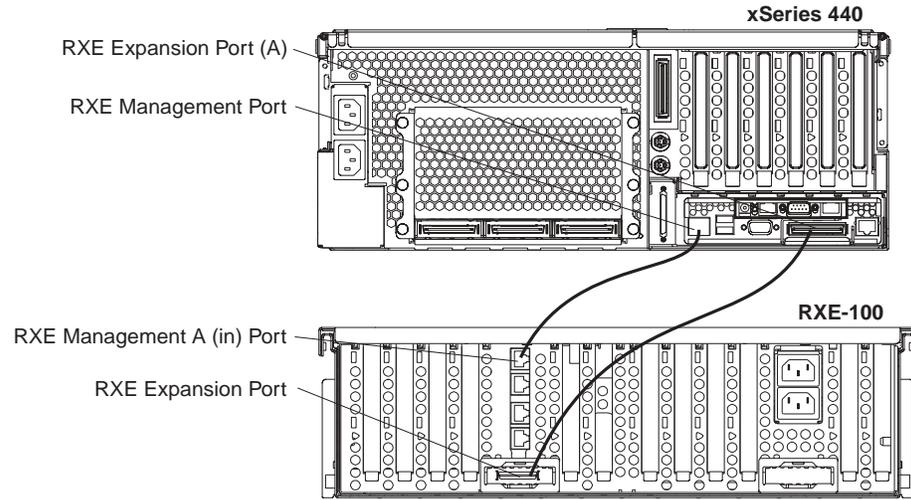
1. When multiple cables are connected between the SMP Expansion Module ports, SMP data is interleaved between the cables for better performance.
2. The SMP Expansion cables are not redundant.
3. If either of the two cables is removed or fails, the server will either turn off or restart, depending on your configuration.
4. The server will start and operate with one cable attached between the two SMP Expansion Modules.

## RXE Expansion Port cabling

Your server has two RXE Expansion Ports located on the rear of the server. Use these ports to connect the server to a remote I/O enclosure and to expand the number of PCI-X slots that are available for use by the server. For detailed information about cabling the RXE Expansion Ports, see the documentation that comes with the remote I/O enclosure.

Complete the following steps to cable your server to a remote I/O enclosure:

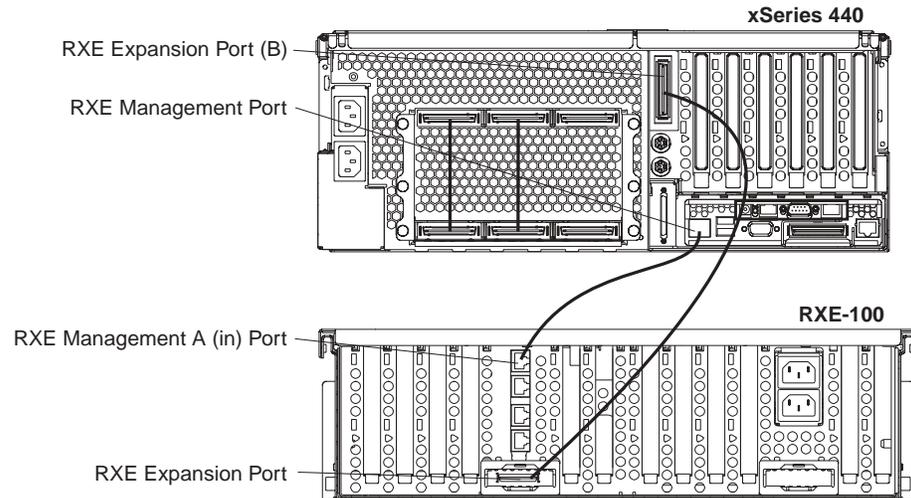
**Cabling an SMP Expansion Module:** If your server has one SMP Expansion Module installed, complete the following steps.



**Note:** For information about cabling the RXE Management Ports see, “RXE Management Port cabling” on page 35.

1. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port (A) on the server.
2. Connect the opposite end of the cable to an RXE Expansion Port on the remote I/O enclosure.

**Cabling two SMP Expansion Modules:** If your server has two SMP Expansion Modules installed complete the following steps.



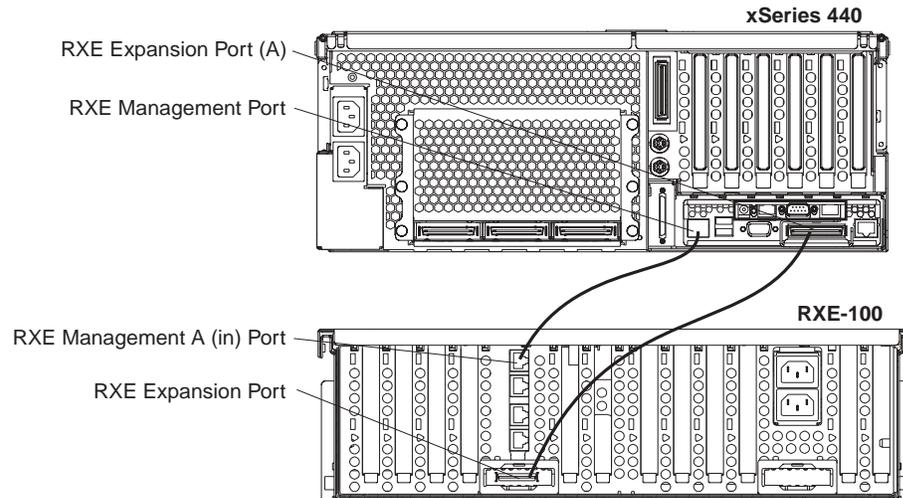
1. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port (B) on the server.
2. Connect the opposite end of the cable to an RXE Expansion Port on the remote I/O enclosure.

**Note:** When two SMP Expansion Modules are installed, both of the RXE Expansion ports are active.

## RXE Management Port cabling

Your server has one RXE Management Port located on the back of the server. Use this port to connect the server to the management port of an optional remote I/O enclosure. This port is used to manage the PCI-X slots in a remote I/O enclosure, including slot assignments and managing access.

Complete the following steps to cable the server RXE Management Port to a remote I/O enclosure RXE Management Port:



1. Using an RXE Management cable, connect one end of the cable to the RXE Management Port on the server.
2. Connect the opposite end of the cable to the RXE Management A (in) Port on the remote I/O enclosure.

### Notes:

- a. The RXE Management cabling is the same for a server with two SMP Expansion Modules.
- b. For details about cabling the server to the remote I/O enclosure and how the server and remote I/O enclosure work together, see the documentation that comes with the enclosure.

## Power cabling

Your server uses two power cords that can be connected to a primary power unit inside the rack cabinet, such as a properly grounded power distribution unit or uninterruptible power supply, or to an external source, such as a properly grounded electrical outlet.

Attach the power supply power cords as follows:

1. Connect a power supply cord to one of the system power connectors on the rear of the server.
2. Plug the other end of the power supply cord into a properly grounded electrical outlet or a primary power unit inside the rack cabinet.

**Note:** Plugging the power-supply cords into an electrical outlet might cause the server to start automatically. This is an acceptable action.

3. See “Turning on the server” on page 41 for detailed information about turning on the server.

## SCSI cabling

Your server has one SCSI port located on the back of the server. Use this port to connect the server to an optional SCSI device such as the IBM FASTT series of extended enclosures. For detailed information about this option and how to connect it to your server, see the documentation that comes with the option.

## USB cabling

Your server has three USB ports, one on the front and two located on the back of the server. Use these ports to connect the server to an optional USB device. For detailed information about this USB option and how to connect it to your server, see the documentation that comes with the option.

## Video cabling

Your server has one video port located on the back of the server. Use this port to connect the server to a monitor or optional console switch. For detailed information about this option and how to connect it to your server, see the documentation that comes with the option.

## Auxiliary pointing device cabling

Your server has one auxiliary pointing device port located on the back of the server. Use this port to connect the server to a pointing device or optional console switch. For detailed information about this option and how to connect it to your server, see the documentation that comes with the option.

## Keyboard cabling

Your server has one keyboard port located on the back of the server. Use this port to connect the server to a keyboard or optional console switch. You can also connect a USB keyboard to the server using one of the USB ports. After installing a USB keyboard, you might need to use the Configuration/Setup utility to Enable keyboardless operation and prevent the POST error message 301 from being displayed during startup. For detailed information about this option and how to connect it to your server, see the documentation that comes with the option.

## Gigabit Ethernet cabling

Your server has one Ethernet port located on the back of the server. Use this port to connect the server to a LAN.

**Note:** A second Ethernet port is located on the Remote Supervisor Adapter. This port is used for specific supervisory functions and should not be confused with the Gigabit Ethernet port located next to the USB ports.

## Remote Supervisor Adapter cabling

Your server comes with a Remote Supervisor Adapter. For information about cabling the Remote Supervisor Adapter connectors, see the *User's Guide* on the *IBM Documentation CD*.

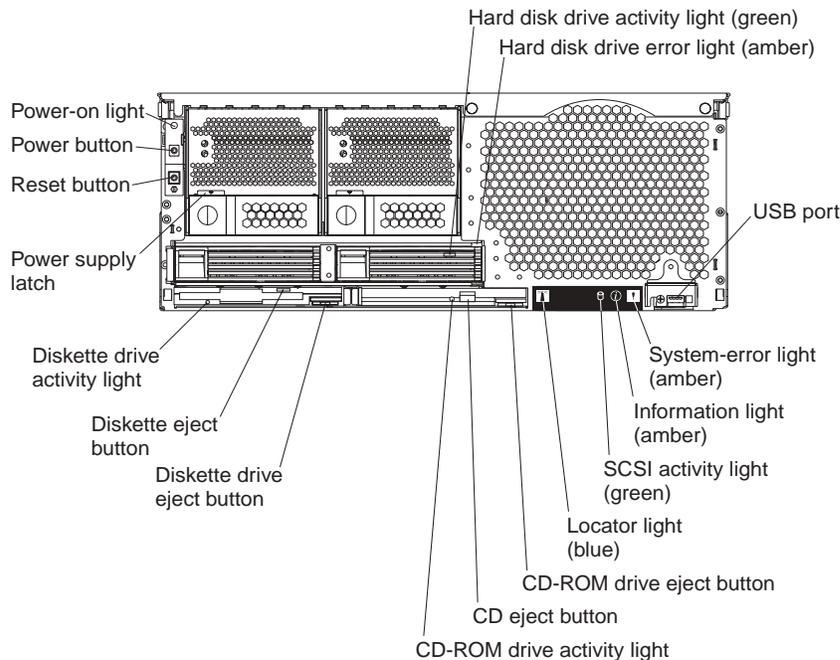
## Chapter 3. Server power, controls, and options

This chapter describes the controls and indicators, and provides the information needed to turn on and turn off the server.

### Server controls and indicators

The following section identifies the controls and indicators on the front and rear of your server.

#### Front view



**Power-on light:** This green light turns on and stays on when you turn on your server, and it blinks when the server is in Standby mode.

**Hard disk drive activity light:** When this green light is on, it indicates that the hard disk drive is in use.

**Hard disk drive error light:** When this amber light is on, it indicates that there is a problem with the hard disk drive.

**USB port:** This is an automatically configured port that you can use to connect one or more USB devices to the front of the server, using Plug and Play technology.

**System-error light:** When this amber light is on, it indicates a system error has occurred.

**Information light:** When this amber light is on, it indicates information about a system error has been placed in the System Error log.

**SCSI activity light:** When this green light is on, it indicates that there is activity on the SCSI bus.

**Locator light:** This blue light is used to help you locate other devices connected to the server.

**CD-ROM drive eject button:** Push this button to release a CD-ROM drive from the server.

**CD eject button:** Push this button to release a CD from the drive.

**CD-ROM drive activity light:** When this light is on, it indicates that the CD-ROM drive is in use.

**Diskette drive eject button:** Push this button to release a diskette drive from the server.

**Diskette eject button:** Push this button to release a diskette from the drive.

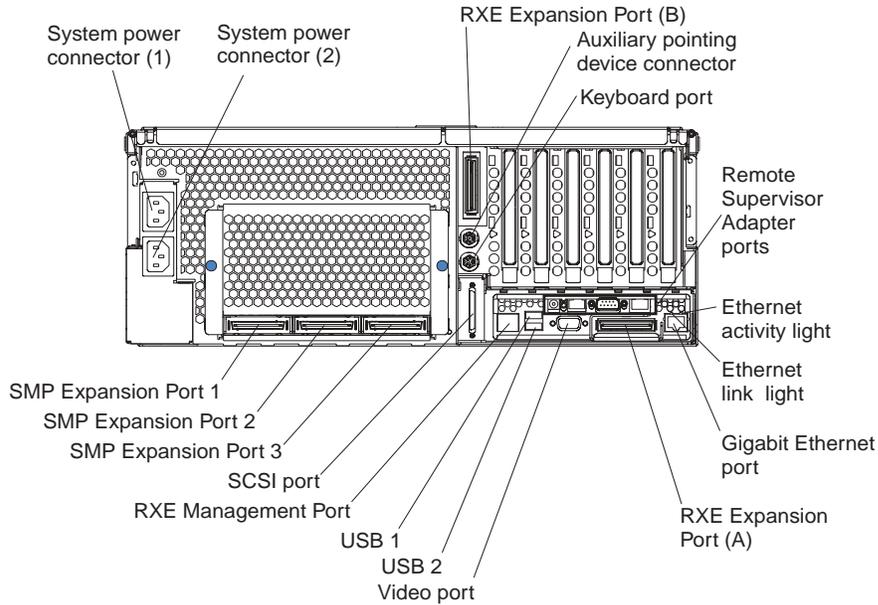
**Diskette drive activity light:** When this light is on, it indicates that the diskette drive is in use.

**Power supply latch:** This latch is used to secure the power-supply in place.

**Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might need to use a pen or the end of a straightened paper clip to press the button.

**Power button:** Press this button to manually turn the server on or off.

## Rear view



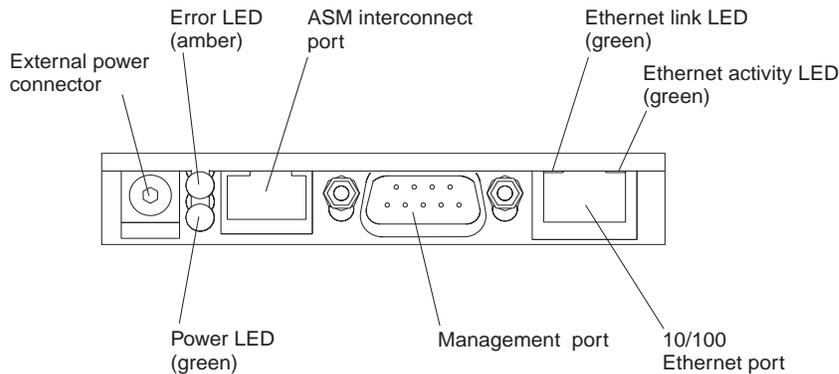
**System power connectors (1 and 2):** The system power cords are connected to these two connectors to provide power to the system.

**RXE Expansion Port (B):** Use this port to connect the server to a remote I/O enclosure when two SMP Expansion Modules are installed.

**Auxiliary pointing device connector:** Signal cables for a mouse, trackball, or other pointing device are connected to the auxiliary pointing device connector.

**Keyboard port:** Signal cables for a keyboard are connected to the keyboard port.

**Remote Supervisor Adapter ports and indicators:** This group of ports and indicators located on the back of the server are used for system management information and control.



- **External power connector** - This connector is not supported on this server.
- **Error LED** - This amber light goes on when a system management error has occurred.
- **ASM interconnect port** - Signal cables for managing expansion module resources are connected to this port.

- **Ethernet link light:** This green light, located on the right of the Ethernet port, goes on when there is an active link connection on the Ethernet controller for the Ethernet port.
- **Ethernet activity light:** This green light, located on the left of the Ethernet port, goes on when there is activity on the Ethernet LAN connected to the Ethernet port.
- **10/100 Ethernet port** - Ethernet Signal cables are connected to the Ethernet port.
- **Management port** - Signal cables for modems or other serial devices are connected to this port.
- **Power LED** - This green light goes on and stays on when you plug in your server.

**Ethernet activity light:** This green light, located on the left of the Gigabit Ethernet port, blinks when there is activity on the Ethernet LAN.

**Ethernet link light:** This green light, located on the right of the Gigabit Ethernet port, goes on when there is an active link connection on the Gigabit Ethernet controller for Ethernet port 1.

**Gigabit Ethernet port:** Gigabit Ethernet Signal cables are connected to the Gigabit Ethernet port. This port supports 10/100/1000 speed connections.

**RXE Expansion Port (A):** Use this port to connect the server to a remote I/O enclosure, when only one SMP Expansion Module is installed.

**Video port:** The signal cable for a monitor connects to the video port.

**USB 2:** This is an automatically configured port that you can use to connect one or more USB devices to the server, using Plug and Play technology.

**USB 1:** This is an automatically configured port that you can use to connect one or more USB devices to the server, using Plug and Play technology.

**RXE Management Port:** Use this port to connect a management cable from the server to a remote I/O enclosure.

**SCSI port:** This port is used to connect external SCSI devices to the server.

**SMP Expansion port 3:** This port is reserved for future use.

**SMP Expansion port 2:** This port is used to interconnect two SMP Expansion Modules together.

**SMP Expansion port 1:** This port is used to interconnect two SMP Expansion Modules together.

---

## Turning on the server

You can turn on the server in any of the following ways:

- If the power cords are connected to a power source, you can press the power-control button on the front of the server.

**Notes:**

1. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your server.
  2. After you plug the power cords of your server into the electrical outlets, wait approximately 20 seconds before pressing the power-control button. During this time, the system-management adapter is initializing; therefore, the power-control button does not respond.
- If the server is turned on and a power failure occurs, the server will restart automatically when power is restored.
  - If ac power is present and the server is in Standby mode, the server can be turned on from the Remote Supervisor Adapter user interface.
  - When you plug in your server for the first time, the Wake on LAN<sup>®</sup> feature can turn on the server. If your server was previously turned on, it must be properly placed in Standby mode for the Wake on LAN feature to turn on the server.

Complete the following steps to manually turn on the server:

1. Review the information in “Safety” on page v.
2. Turn on all external devices, such as the monitor.
3. Plug the server power cords into the power source.

**Note:** Do not attempt to turn on any server that is cabled to another at this point. Pressing the power-control button on any server that is cabled to another will turn both servers on.

4. Press the power-control button on the front of the server.

**Note:** While the server is powering up, the power-on LED on the front of the server is lit.

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## Turning off the server

Complete the following steps to manually turn off the server:

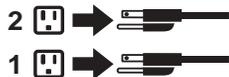
1. Review the information in “Safety” on page v.
2. See your operating system documentation for the proper procedure to shut down the operating system.

### 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.



3. Press the power-control button on the front of the server. This will put the server in Standby mode.

**Note:** You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server and to force it into Standby mode. You can use this feature if the operating system stops functioning.

4. Disconnect the server from the power source.

**Note:** After disconnecting all the power cords, wait approximately 15 seconds for your system to stop running. Watch for the power-on LED on the front of the server to stop flashing.

---

## Standby mode

Standby mode refers to the condition in which the server is connected to an ac power source but the server operating system is not running and all core logic is shut down except for the service processor. In Standby mode, the server can respond to service processor requests, such as a remote request to turn on the server. When the server is in Standby mode, the power-on LED on the front of the server flashes (when the server is running, the power-on LED stays on and does not flash).

You can put the server in Standby mode in any of the following ways:

- You can press the power-control button on the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.
- The server can be placed in Standby mode from the Remote Supervisor Adapter user interface.

Complete the following steps to put the server into Standby mode:

1. See the operating system documentation for the proper procedure to shut down the operating system.

**Note:** Each operating system is different. Read all the documentation about shutting down the operating system before continuing.

2. Press the power-control button on the front of the server.

**Notes:**

- a. After you place the server in Standby mode, wait at least 5 seconds before you turn on the server again.
- b. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the operating system and to force it into Standby mode. You can use this feature if the operating system stops functioning.



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## Chapter 4. Configuring your server

The following configuration programs are provided with your server:

- **Configuration/Setup Utility**

This program is part of the basic input/output system (BIOS) code that comes with your server. You can use this program to configure the serial connector assignment, change the drive startup sequence, set the date and time, and set passwords. See “Using the Configuration/Setup Utility program” on page 46 for more information.

- **SCSISelect Utility**

With the SCSISelect Utility program, you can configure the devices that are attached to the SCSI controller. Use this program to change default values and to resolve configuration conflicts. See “Using the SCSISelect utility program” on page 47 for more information.

- **IBM ServerGuide Setup and Installation CD**

The *ServerGuide™ Setup and Installation CD* includes software setup and installation tools that are specifically designed for IBM xSeries 440 servers. If you did not purchase a preconfigured server, you can use this CD during the initial installation of your server to configure the server hardware and to simplify your operating system installation. See the *User's Guide on the IBM xSeries Documentation CD* for more detailed information.

**Note:** If your server model comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation provided with your server for configuration information.

- **Remote Supervisor Adapter configuration process**

Configuration activities are also required for the Remote Supervisor Adapter. See “Using the Remote Supervisor Adapter” on page 48 for a description of the Remote Supervisor Adapter features. For information about cabling, configuring, and using the Remote Supervisor Adapter to manage the server remotely, see “Using the Remote Supervisor Adapter” on page 48 and the *Remote Supervisor Adapter User's Guide on the IBM xSeries Documentation CD*.

- **ServeRAID configuration program**

This program comes with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If the server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure the disk-array subsystem *before* you install the operating system. If your server model came with an operating system installed, your disk-array subsystem is already configured. For more information about using the ServeRAID configuration program, see the ServeRAID information on the *IBM xSeries Documentation CD*.

**Note:** If your server model comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation provided with your server for configuration information.

---

## Using the Configuration/Setup Utility program

Configuration/Setup is a menu-driven utility that is part of the BIOS code that comes with your server. You can use it to:

- Configure system devices and ports
- Change the drive startup sequence
- 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.
3. Follow the instructions that appear on the screen.

For more information about using the Configuration/Setup Utility program, see the section on the Configuration/Setup Utility program in the *User's Guide* on the IBM *xSeries Documentation CD*.

---

## Using the SCSISelect utility program

SCSISelect is a built-in, menu-driven configuration utility program that you can use to:

- View the default SCSI IDs
- Locate and correct configuration conflicts

The following sections provide instructions for starting the SCSISelect Utility program.

**Note:** If your server has a redundant array of independent disks (RAID) adapter installed, use the configuration method that is supplied with the RAID adapter to view or change SCSI settings for devices attached to the adapter.

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.
3. When the Would you like to configure the host adapter or run the SCSI disk utility? question appears, make your selection and press Enter.
4. Use the arrow keys to select a choice from the menu.
  - Press Esc to exit the SCSISelect Utility program.
  - Press the F5 key to switch between color and monochrome modes (if your monitor permits).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

For more information about using the SCSISelect utility program, see the section on the SCSISelect utility program in the *User's Guide* on the *IBM Documentation CD*.

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## Using the ServerGuide 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 helps you install your operating system. For information about the supported operating-system versions, see the label on the CD.

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

1. Insert the *Setup and Installation CD*, and restart the server.
  - Note:** If the ServerGuide CD does not start, see "ServerGuide startup problems" on page 51.
2. Follow the instructions on the screen to:
  - a. Select your language.
  - b. Select your country and keyboard layout.
  - c. View the Overview to learn about ServerGuide features.
  - d. View the README file to review installation tips about your NOS and adapter.
  - e. Start the setup and hardware configuration programs.
  - f. Start the NOS installation. You will need your copy of the NOS CD.

**Note:** For information on the supported NOS versions, see the *Setup and Installation CD* label.

---

## Using the Remote Supervisor Adapter

The Remote Supervisor Adapter is one of the products in the Advanced System Management (ASM) family. It provides around-the-clock remote access and system management of your server and supports the following:

- Remote management regardless of the status of the server
- Remote control of hardware and operating systems
- Web-based management with standard Web browsers (no other software is required)
- Text-based user interface terminal access

The Remote Supervisor Adapter provides the following specific features:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis<sup>®</sup> (PFA)
- Configurable automatic notification and alerts
- Remote access through Ethernet, point-to-point protocol (PPP) connection, serial port, and ASM interconnect peer-to-peer network
- Simple Network Management Protocol (SNMP)
- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Remote firmware update and access to critical server settings
- Microsoft Windows NT and Windows 2000 blue screen capture
- Independent power, which enables around-the-clock access to the server even when the server power is off
- E-mail alerts
- Event logs that are time-stamped, saved by a battery power unit, and can be attached to e-mail alerts
- Redirection of the server graphical or text console
- Access to vital product data (VPD)
- Alphanumeric or numeric pager alerts

For information about cabling, configuring, and using the Remote Supervisor Adapter to manage the server remotely, see the *User's Guide* and the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation CD*.

---

## Using the ServeRAID configuration programs

**Note:** If your server model came with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation provided with your server for configuration information.

A ServeRAID adapter enables you to use multiple physical SCSI hard-disk drives as logical drives, operating as a disk array. To enable you to configure the ServeRAID controller, the adapter comes with a CD containing the ServeRAID Manager program and the ServeRAID Mini-Configuration program. For details about using these programs, see the documentation that comes with the ServeRAID adapter.

---

## Chapter 5. Solving problems

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

If you cannot locate and correct the problem using the information in this section, see the *Troubleshooting Guide* on the IBM *xSeries Documentation CD* for more information.

---

### Diagnostic tools overview

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

- **POST beep codes**

The power-on self-test beep codes indicate the detection of a problem.

- One beep indicates successful completion of POST.
- 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 50 and the *Troubleshooting Guide* on the IBM *xSeries Documentation CD* for more information.

- **Troubleshooting charts**

These charts list problem symptoms and steps to correct the problems. See the “Troubleshooting charts” on page 52 for more information.

- **Diagnostic programs and error messages**

The system diagnostic programs are provided in ROM. These programs test the major components of your server.

**Notes:**

1. The diagnostic programs and error messages are specific to each server. When running diagnostics and reading error messages of two merged servers, be sure that you know which server gave the error before attempting any repairs or change any settings.
2. See the *Troubleshooting Guide* on the IBM *xSeries Documentation CD* for more information.

- **Light Path Diagnostics feature**

Use the Light Path Diagnostics feature to identify system errors quickly.

---

## POST beep code descriptions

### **One beep**

Indicates successful completion of POST.

### **Repeating long beeps**

Indicates that a memory error has occurred. Ensure that all DIMMs are correctly installed.

### **One long beep and two short beeps**

Indicates that a video error has occurred and the BIOS code cannot initialize the video screen to display any additional information.

---

## ServerGuide startup problems

Look for the symptom in the left column of the chart. Probable solutions to the problem are in the right column.

**Note:** If your server model came with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation provided with your server for configuration information.

Setup	Suggested action
<i>Setup and Installation</i> CD will not start.	<ul style="list-style-type: none"><li>• Ensure that the system is a supported server with a startable (bootable) CD-ROM drive.</li><li>• If the startup (boot) sequence settings have been altered, be sure the CD-ROM is first in the boot sequence.</li></ul>
ServeRAID program cannot view all installed drives - or - cannot install NOS.	If you installed an optional ServeRAID adapter: <ul style="list-style-type: none"><li>• Ensure that there are no duplicate SCSI IDs or IRQ assignments.</li><li>• Ensure that the hard disk drive is connected properly.</li></ul>
The <i>Operating System Installation</i> program continuously loops.	Free up more space on the hard disk drive.
ServerGuide will not start <i>your</i> NOS CD.	Ensure that the NOS CD you have is supported by ServerGuide. See the <i>Setup and Installation</i> CD label for a list of NOS versions supported.
Cannot install NOS - option is grayed out.	Either there is no logical drive defined (ServeRAID systems) or the ServerGuide system partition is not present. Run the ServerGuide setup and configuration program and ensure that setup is complete

## Troubleshooting charts

You can use the troubleshooting charts in this section to find solutions to problems that have definite symptoms.

**Attention:** If diagnostic error messages appear that are not listed in the following tables, make sure that your system has the latest level of BIOS code installed.

See the *Troubleshooting Guide* on the *IBM xSeries Documentation CD* for more detailed information about testing the system. If you have run the diagnostic test programs or if running the tests does not reveal the problem, call for service.

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column. If you have just added new software or a new option and your system is not working, do the following before using the troubleshooting charts:

- Remove the software or device that you just added.
- Run the diagnostic tests to determine if your system is running correctly.
- Reinstall the new software or new device.

Device	Suggested action
<b>CD-ROM drive</b>	Verify that:
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> <li>1. The primary IDE channel is enabled in the Configuration/Setup Utility program.</li> <li>2. All cables and jumpers are installed correctly.</li> <li>3. The correct device driver is installed for the CD-ROM drive.</li> </ol>
<b>Diskette drive</b>	If there is a diskette in the drive, verify that:
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	<ol style="list-style-type: none"> <li>1. The diskette drive is enabled in the Configuration/Setup Utility program.</li> <li>2. The diskette is good and not damaged. (Try another diskette if you have one.)</li> <li>3. The diskette contains the necessary files to start the system.</li> <li>4. Your software program is working properly.</li> </ol> <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.</p>
<b>Other devices</b>	Call for service.
Problems such as broken cover locks or indicator lights not working.	
<b>Intermittent problems</b>	Verify that:
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> <li>1. All cables and cords are connected securely to the rear of the system and attached options.</li> <li>2. When the system is turned on, air is flowing from the rear of the system at the fan grille. If there is no air flow, the fan is not working. This causes the system to overheat and shut down.</li> <li>3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.</li> </ol> <p>If the items above are correct, call for service.</p>
<b>Keyboard, mouse, or pointing-device</b>	<ol style="list-style-type: none"> <li>1. Make sure that the keyboard cable is properly connected to the system.</li> <li>2. Make sure that the system and the monitor are turned on.</li> <li>3. Try using another keyboard.</li> </ol>
All or some keys on the keyboard do not work.	If the problem remains, call for service.

<b>Device</b>	<b>Suggested action</b>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> <li>1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly.</li> <li>2. Try using another mouse or pointing device.</li> </ol> <p>If the problem remains, call for service.</p>
<b>USB Keyboard, mouse, or pointing-device</b> All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> <li>1. Make sure that the keyboard USB cable is properly connected to the system.</li> <li>2. Make sure that the system and the monitor are turned on.</li> <li>3. Ensure that the USB mouse and keyboard support are enabled in BIOS.</li> <li>4. Try using another keyboard.</li> </ol> <p>If the problem remains, call for service.</p>
The USB mouse or USB pointing device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that the mouse or pointing-device USB cable is properly connected to the system.</li> <li>2. Make sure that the system and the monitor are turned on.</li> <li>3. Ensure that the USB mouse and keyboard support are enabled in BIOS.</li> <li>4. Try using another mouse or pointing-device.</li> </ol> <p>If the problem remains, call for service.</p>
<b>Memory</b>	Verify that:
The amount of memory displayed is less than the amount of memory installed.	<ol style="list-style-type: none"> <li>1. The memory modules are seated properly.</li> <li>2. You have installed the correct type of memory.</li> <li>3. If you changed the memory, you must update the memory configuration with the Configuration/Setup Utility program.</li> <li>4. All banks of memory on the DIMMs are enabled. The system might have automatically disabled a DIMM bank if it detected a problem, or a DIMM bank could have been manually disabled.</li> </ol> <p>If the items above are correct and the screen remains blank, call for service.</p>
<b>Monitor</b>	Verify that:
The monitor works when you turn on the system, but goes blank when you start some application programs.	<ol style="list-style-type: none"> <li>1. The primary monitor cable is connected to the video port.</li> <li>2. You installed the necessary device drivers for the applications.</li> </ol> <p>Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions.</p> <p>If you still cannot find the problem, call for service.</p>
The screen is blank.	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The system power cord is plugged into the server and a working electrical outlet.</li> <li>2. The monitor cables are connected properly.</li> <li>3. The monitor is turned on and the brightness and contrast controls are adjusted correctly.</li> </ol> <p>If the items above are correct and the screen remains blank, call for service.</p>
Only the cursor appears.	Call for service.

Device	Suggested action
Wavy, unreadable, rolling, distorted screen, or screen jitter.	<p>If the monitor self-tests show the monitor is working properly, 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. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>Non-IBM monitor cables might cause unpredictable problems.</li> <li>An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM reseller or IBM marketing representative.</li> </ol> <p>If the problem remains, call for service.</p>
Wrong characters appear on the screen.	<p>If the wrong language is displayed, update the BIOS code with the correct language.</p> <p>If the problem remains, call for service.</p>
<b>Option</b>	Verify that:
An IBM option that was just installed does not work.	<ol style="list-style-type: none"> <li>The option is designed for the server. See the "Server Support" flowchart on the inside of the front cover for information about obtaining ServerProven compatibility information from the World Wide Web.</li> <li>You followed the installation instructions that came with the option.</li> <li>The option is installed correctly.</li> <li>You have not loosened any other installed options or cables.</li> <li>You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.</li> </ol> <p>If the problem remains, call for service.</p>
An IBM option that used to work does not work now.	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> <li>The cables for all external SCSI options are connected correctly.</li> <li>The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>All external SCSI options are turned on. You must turn on external SCSI options before turning on the server.</li> </ol> <p>If the problem remains, call for service.</p>
<b>Power</b>	Verify that:
The system does not power on.	<ol style="list-style-type: none"> <li>The power cables are properly connected to the server.</li> <li>The electrical outlet functions properly.</li> <li>The type of memory installed is correct.</li> <li>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.</li> <li>The LEDs on the power supply are on.</li> </ol> <p>If the problem remains, call for service.</p>

Device	Suggested action
<b>Serial port</b>	Verify that:
The number of serial ports identified by the operating system is less than the number of serial ports installed.	<ol style="list-style-type: none"> <li>1. Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports are disabled.</li> <li>2. The serial-port adapter, if you installed one, is seated properly.</li> </ol> <p>If the problem remains, call for service.</p>
A serial device does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The device is compatible with the server.</li> <li>2. The serial port is enabled and is assigned a unique address.</li> </ol> <p>If the problem remains, call for service.</p>
<b>Software</b>	To determine if problems are caused by the software, verify that:
Suspected software problem.	<ol style="list-style-type: none"> <li>1. Your system has the minimum memory requirements needed to use the software. For memory requirements, see the information that comes with the software. <ul style="list-style-type: none"> <li><b>Note:</b> If you have just installed an adapter or memory, you might have a memory address conflict.</li> </ul> </li> <li>2. The software is designed to operate on your system.</li> <li>3. Other software works on your system.</li> <li>4. The software that you are trying to use works on another system.</li> </ol> <p>If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase.</p>
<b>Universal Serial Bus (USB) ports</b>	Verify that:
A USB device does not work.	<ol style="list-style-type: none"> <li>1. You are not trying to use a USB device during POST, if you have a standard (non-USB) keyboard attached to the keyboard port. <ul style="list-style-type: none"> <li><b>Note:</b> If a standard (non-USB) keyboard is attached to the keyboard port, then the USB is disabled and the USB device might not work during POST.</li> </ul> </li> <li>2. The correct USB device driver is installed.</li> <li>3. Your operating system supports USB devices.</li> </ol> <p>If the problem remains, call for service.</p>

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## Light Path Diagnostics feature overview

If the System Error light on the operator information panel on the front of the server is on, one or more LEDs inside the server might be on. Use the Light Path Diagnostics panel to identify the type of error that occurred.

For LED locations, see the illustration on page 56.

You can use the Light Path Diagnostics feature in your server to quickly identify the type of system error that occurred in that server. The Light Path Diagnostics panel is located on the system board, just behind PCI adapter slot 1. When you press the Light Path Diagnostics button, the LED on the top-right corner of the panel will illuminate. This shows that the diagnostic circuitry is working correctly.

Your server is designed so that any LEDs that have illuminated, can be illuminated again without ac power after you open the cover. This feature helps you isolate a

problem if an error causes the server to shut down. See “Light Path Diagnostics table” on page 58.

**Important:** You have up to 12 hours to use the Light Path Diagnostic LEDs after ac power has been removed from the server. After 12 hours, you must power-on the server again to be able to use the Light Path Diagnostic LEDs to help locate system errors.

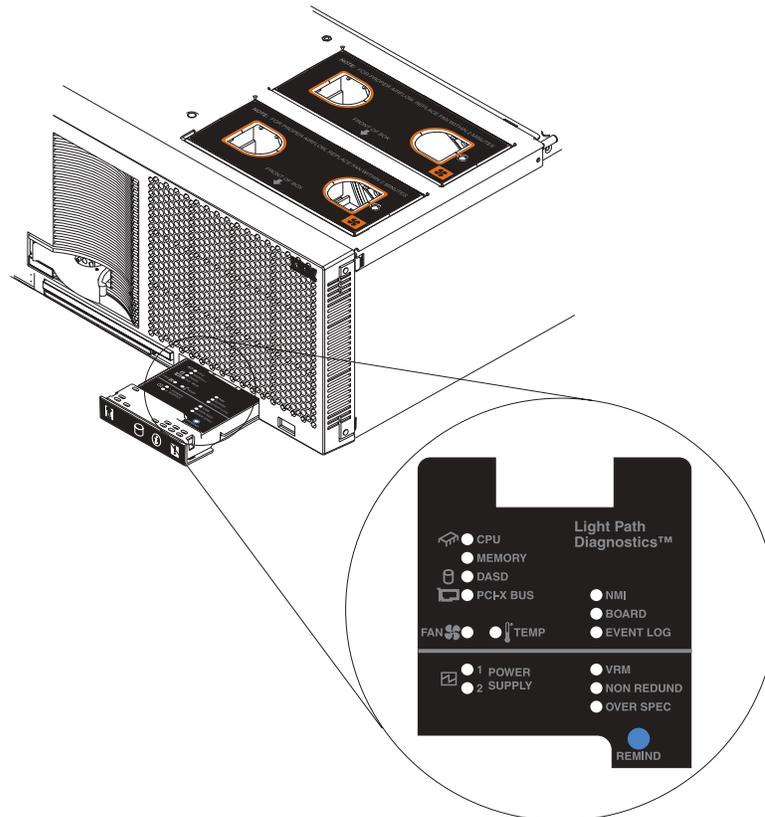
To view the LEDs when the server cover has been opened:

1. Turn off the server and all peripheral devices; then, disconnect all external cables from the server.
2. Slide the server out of the rack cabinet.
3. Open the top cover.
4. Press and hold the Light Path Diagnostics (blue) button on the diagnostics panel. The LEDs will be illuminated while the button is pressed.

**Note:** You can illuminate the LEDs for a maximum of two minutes. After that time, the circuit that powers the LEDs is exhausted.

5. Close the cover on the server; then, slide the server into the rack cabinet and connect all external cables. For more information, see “Completing the installation” on page 31 for instructions.

The following illustration shows the LEDs on the diagnostics panel on the system board. See “Light Path Diagnostics table” on page 58 for information on identifying problems using these LEDs.



## Identifying problems using the Light Path Diagnostics feature

This section provides the information needed to identify problems that might arise during installation using the Light Path Diagnostic feature.

**The diagnostic panel:** The diagnostics panel should be the first place you look for help in identifying problems. If a system error occurs, the system error light on the front of this panel is lit. Press the front of the panel to open it and look for any lit LEDs. These lit LEDs can help you identify the possible cause of the error. Make a note of any LEDs that are lit, then close the panel.

**LEDs on the top of the server:** Another location you can use to find an error is on the top of the server. After viewing the diagnostic panel, pull the server out and view the top cover. In the center of the top cover is a set of 6 LEDs and the system service labels. The numbers next to the LEDs correspond to the numbers located on the system service label. Note the lit LED, and see the numbered block on the system service label that corresponds to the lit LED. Then, follow the instructions, if any, in the numbered block.

**LEDs on the SMP Expansion Modules and system boards:** To locate the actual component that caused the error, you must locate the lit LED next to that component.

For example:

A system error has occurred and you have noted that the CPU LED is lit on the diagnostic panel. Referring to the LEDs on the top cover, you see that LED number 2 is lit. You then locate the panel on the system service label with the number 2 on it. In this case, the instructions in the panel tell you to remove the lower SMP Expansion Module. This tells you that the problem occurred with one of the microprocessors in the lower SMP Expansion Module. Follow the instructions to remove the lower SMP Expansion Module; then, remove the cover from the SMP Expansion Module. Located near the edge connectors on the circuit board is the light-path capacitor switch. Press and hold the switch until you locate the lit LED next to the defective microprocessor. Follow the instructions in the *Option Installation Guide* on the IBM xSeries Documentation CD to remove and replace the microprocessor.

## Light Path Diagnostics table

The system-error LED on the operator information panel is lit when certain system errors occur. If the system-error LED on your server is lit, use the following table to help determine the cause of the error and the action you should take.

Lit LED on diagnostics panel	Cause	Action
None	An error has occurred and cannot be isolated, or the ASM processor has failed.	An error has occurred that is not represented by a Light Path Diagnostics LED. Check the system error log for more information about the error.
PS	Power supply has failed.	Have the system serviced.
TEMP	The system temperature has exceeded a threshold level.	<ol style="list-style-type: none"> <li>1. Check to see if a fan has failed. If it has, replace the fan.</li> <li>2. Make sure the room temperature is not too hot. (See "Features and specifications" on page 4 for temperature information.)</li> </ol> <p>If the problem remains, have the system serviced.</p>
FAN	A fan has failed or is operating too slowly. <b>Note:</b> A failing fan can also cause the TEMP LED to be on.	Check the LEDs on the fans and replace the indicated fan.
SP	The service processor has failed.	<p>Remove ac power from the server and then restart the server.</p> <p>If the problem remains, have the system serviced.</p>
MEM	A memory error occurred.	<ol style="list-style-type: none"> <li>1. Check the DIMM failure LEDs on the system board.</li> <li>2. Replace the DIMM indicated by the lit DIMM failure LED.</li> </ol>
CPU	One of the microprocessors has failed.	<ol style="list-style-type: none"> <li>1. Check the microprocessor failure LEDs on the system board.</li> <li>2. If a microprocessor failure LED is on, make sure the microprocessor is installed correctly. (See the <i>Option Installation Guide</i> on the <i>IBM xSeries Documentation CD</i> for installation instructions).</li> </ol> <p>If the problem remains, have the system serviced.</p>
VRM	One of the VRMs on one of the SMP Expansion Module boards has failed.	<p>Remove ac power from the server and then restart the server.</p> <p>If the problem remains, have the system serviced.</p>

Lit LED on diagnostics panel	Cause	Action
PCI	An error occurred on a PCI bus.	<ol style="list-style-type: none"> <li>1. Check the error log for additional information.</li> <li>2. If you cannot isolate the failing adapter from the information in the error log, try to determine the failing adapter by removing one adapter at a time from the failing PCI-X bus and restarting the server after each adapter is removed.</li> </ol> <p>If the problem remains, have the system serviced.</p>



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## Chapter 6. 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.

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### 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.
- 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.
- Use an IBM discussion forum on the IBM Web site to ask questions.

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.

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### 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.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

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### 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/>. If you click **Profile** from the support page, you can

create a customized support page. The support page has many sources of information and ways for you to solve problems, including:

- Diagnosing problems, using the IBM Online Assistant
- Downloading the latest device drivers and updates for your products
- Viewing Frequently Asked Questions (FAQ)
- Viewing hints and tips to help you solve problems
- Participating in IBM discussion forums
- Setting up e-mail notification of technical updates about your products

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## 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.

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## 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.

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 A. Warranty information

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### Warranty information

This section contains information about your warranty period and the service and support that are provided by your warranty.

### Warranty period

The warranty period varies by machine type and country or region.

Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country or region where service is performed.

**Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician.**

A warranty period of 3 years on parts and 1 year on labor means that IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor it provides in performance of the repair or replacement.

The IBM Machine Warranties Web site at [http://www.ibm.com/servers/support/machine\\_warranties/](http://www.ibm.com/servers/support/machine_warranties/) contains a worldwide overview of the IBM Statement of Limited Warranty for IBM Machines, a glossary of terms used in the Statement of Limited Warranty, Frequently Asked Questions (FAQ), and links to Product Support Web pages. The IBM Statement of Limited Warranty is available from this Web site in 29 languages in Portable Document Format (PDF).

**Machine** - IBM @server xSeries 440

Country or region	Warranty period	Service delivery method
All	1 year	On-site

**Problem determination:** Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician. The service specialist will run diagnostic tests on the hardware and check the software.

**Running diagnostics:** The IBM service specialist will help you determine whether your equipment is functioning as specified. It might be necessary to isolate the failing xSeries, Netfinity®, or IntelliStation system; IBM component; or both from any active production environment to run diagnostics and perform defect-isolation programs. You are responsible for making the system, IBM component, or both available for running diagnostics and defect-isolation programs.

**Checking software:** The IBM service specialist will help you ensure that the correct BIOS code, firmware, device drivers, and other supporting IBM software are installed and correctly configured. It might be necessary to manually gather information about the relevant software levels or run IBM-approved utility programs to gather this

information. It might be necessary to isolate the failing system from any active production environment to gather this information. You are responsible, with assistance from the service specialist, for gathering this information. The IBM Statement of Limited Warranty does not include on-site assistance with this activity.

**Warranty service and support:** With the original purchase of an IBM xSeries or IntelliStation system, you have access to extensive service and support. During the IBM Machine warranty period, you may call IBM or your reseller for problem-determination assistance under the terms of the IBM Statement of Limited Warranty.

The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.
- **Customer replaceable units (CRUs)** - Some parts of IBM xSeries and IntelliStation systems are designated as customer replaceable units. IBM ships CRUs to you for replacement by you. CRUs include keyboards, monitors, memory, diskette drives, hard disk drives, and mice (this list is not inclusive of all CRUs).

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of BIOS code, firmware, or device drivers that are designated as customer installable.

See the IBM Statement of Limited Warranty for a full explanation of IBM warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

Please have the following information ready when you call:

- The machine type and model of your IBM hardware product (if available)
- Serial numbers of your IBM hardware products
- A description of the problem
- The exact wording of any error messages
- Hardware and software configuration information

**International Warranty Service:** If you travel with your xSeries or IntelliStation system or relocate it to a country or region where your system is sold and serviced by IBM or IBM resellers authorized to perform warranty service, International Warranty Service (IWS) is available during the warranty period. Eligible IBM systems are identified by their four-digit machine types.

You can obtain IWS through the service delivery method (such as depot, carry-in, or on-site) provided in the servicing country or region. Service methods and procedures vary by country or region, and some service or parts might not be available in all

countries and regions. Service centers in certain countries or regions might not be able to service all models of a particular machine type. In addition, some countries or regions might have fees and restrictions that apply at the time of service.

To determine whether your system is eligible for IWS, go to <http://www.ibm.com/pc/support/> and click **Warranty lookup**.

**Purchasing additional services:** During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region.

For more information about these services, contact your IBM marketing representative.

## IBM Statement of Limited Warranty Z125-4753-06 8/2000

**Part 1 - General Terms:** This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. 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, from IBM or your reseller. 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. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

**The IBM Warranty for Machines:** IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications"). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded.

**Extent of Warranty:** The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

**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. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.**

**Items Not Covered by Warranty:** 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, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

**Warranty Service:** To obtain warranty service for a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine

based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called "CRUs"), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

When 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. 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.

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 problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
  - b. secure all programs, data, and funds contained in a Machine;
  - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
  - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine 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 is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

**Limitation of Liability:** 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.

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 LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION 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 Agreement, without regard to conflict of law principles.

## **Part 2 - Country-unique Terms: AMERICAS**

### **BRAZIL**

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

Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

### **NORTH AMERICA**

**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**

**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**

**The IBM Warranty for Machines:** *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.

*The following is added to this Section:*

Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. 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 before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. 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.

The English language version of this Agreement prevails over any other language version.

## **HONG KONG AND MACAU**

**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.

## **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;
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, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

## **JAPAN**

**Governing Law:** *The following sentence is added to this Section:*

Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

## **NEW ZEALAND**

**The IBM Warranty for Machines:** *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 this Section:*

Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

## **EUROPE, MIDDLE EAST, AFRICA (EMEA)**

***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.

**Warranty Service:** If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, 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 an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, 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 an IBM 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 authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

**Governing Law:** The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) 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, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

***THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:***

**AUSTRIA AND GERMANY**

**The IBM Warranty for Machines:** *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 six 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.

**Extent of Warranty:** *The second paragraph does not apply.*

**Warranty Service:** *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.

*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).*

## **IRELAND**

**Extent of Warranty:** *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 items one and two of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and
2. the amount of any other actual direct damages, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

*Applicability of suppliers and resellers (unchanged).*

*The following paragraph is added at the end of this Section:*

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

## **ITALY**

**Limitation of Liability:** *The following replaces the second sentence in the first paragraph:*

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than:

1. *(unchanged)*
2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

*Applicability of suppliers and resellers (unchanged).*

*The following replaces the third paragraph of this Section:*

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: *(items 1 and 2 unchanged)* 3) indirect damages, even if IBM or your reseller is informed of their possibility.

## **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 items 1 and 2 of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

*The following item is added to this paragraph:*

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

*Applicability of suppliers and resellers (unchanged).*

*The following is added to the end of this Section:*

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.



---

## Appendix B. Notices

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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.

Maximum memory may require replacement of the standard memory with an optional memory module.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

---

## Electronic emission notices

### Federal Communications Commission (FCC) statement

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

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

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

### Industry Canada Class A emission compliance statement

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

#### Avis de conformité à la réglementation d'Industrie Canada

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

## Australia and New Zealand Class A statement

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

## United Kingdom telecommunications safety requirement

### Notice to Customers

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

## 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 A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

## Taiwanese Class A warning statement

警告使用者：  
這是甲類的資訊產品，在  
居住的環境中使用時，可  
能會造成射頻干擾，在這  
種情況下，使用者會被要  
求採取某些適當的對策。

## Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づきクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

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

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

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Part Number: 59P6785

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