

xSeries 250

Installation Guide

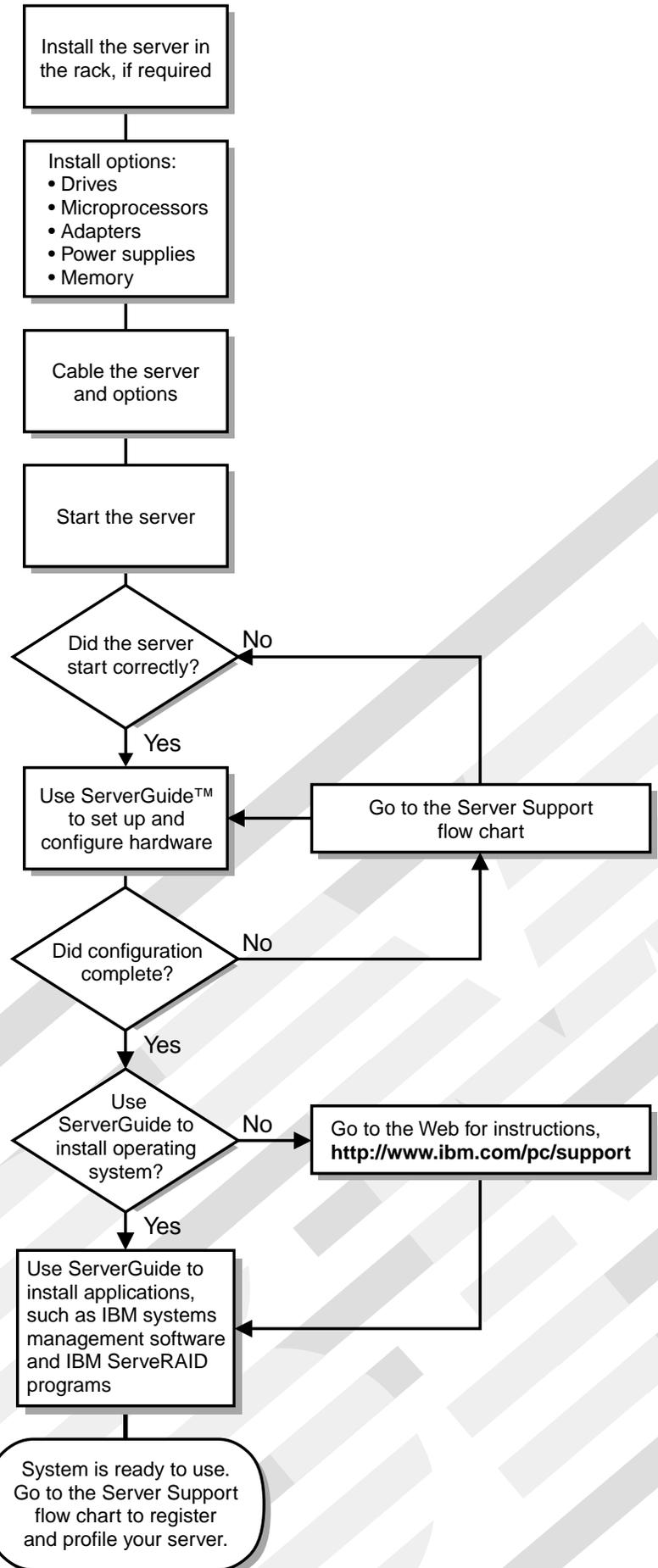
Welcome...

Thank you for buying an IBM xSeries server.

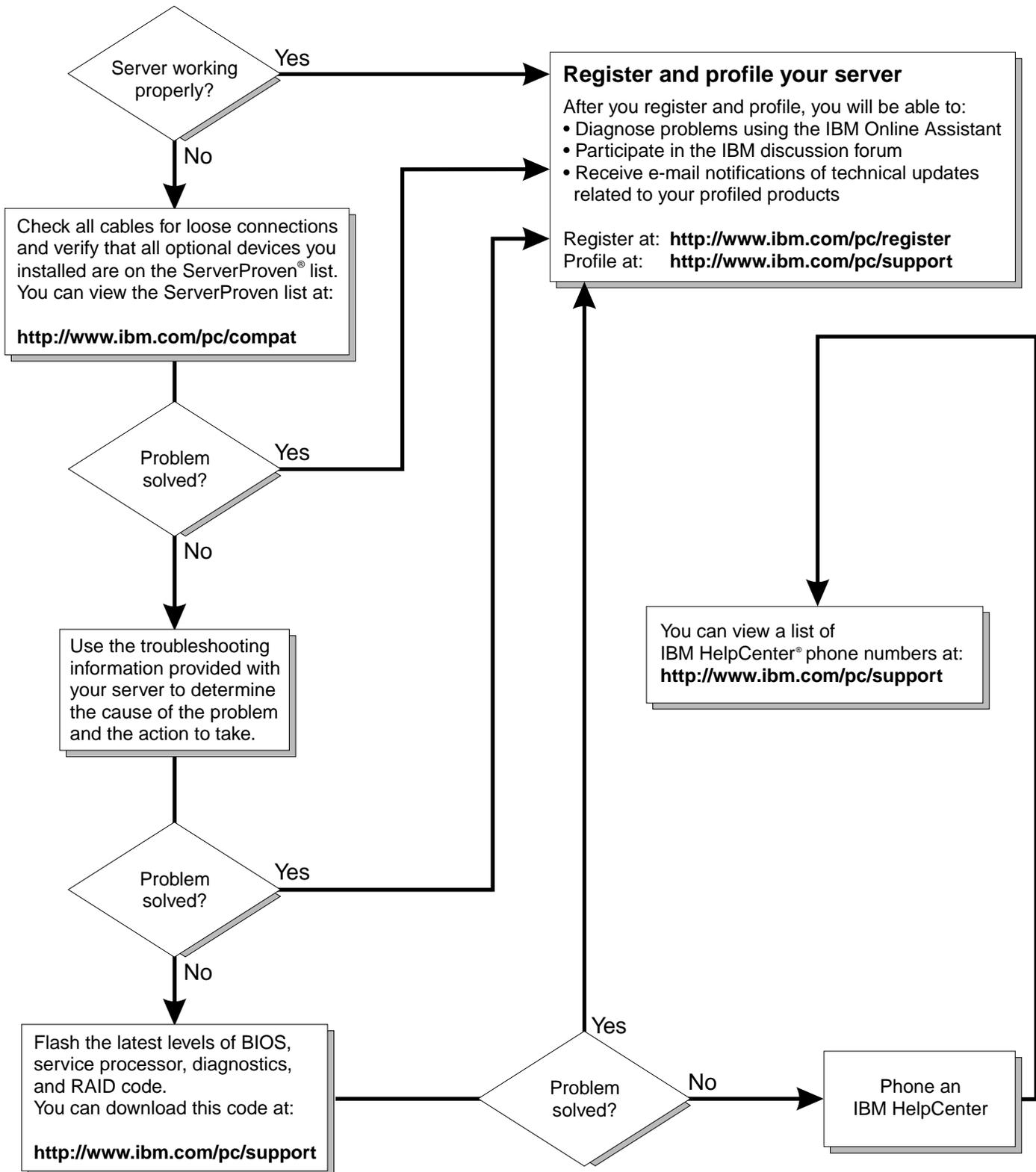
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the *User's Reference* 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



IBM® xSeries 250



Installation Guide

NOTE

Before using this information and the product it supports, be sure to read the general information in “Appendix A. Product warranties and notices,” on page 55.

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Contents

Safety	v	Chapter 4. Configuring your server	45
		Using the ServerGuide CDs	45
Chapter 1. Introduction	1	Chapter 5. Solving problems	47
Features and specifications	2	POST beep code descriptions	47
Notices used in this book	3	POST error messages	48
Major components of the xSeries 250 server	4	ServerGuide startup problems	50
		Troubleshooting chart	51
Chapter 2. Installing options	7	Appendix A. Product warranties and notices	55
Before you begin	7	Warranty Statement	55
System reliability considerations	7	Warranty Period	55
Working inside the server with the power on	8	IBM Statement of Limited Warranty	55
Handling static-sensitive devices	8	Part 1 - General Terms	55
Removing the server top cover and bezel	9	Part 2 - Country-unique Terms	57
Removing the top cover	9	Notices	63
Removing the media-bay bezel	10	Edition notice	63
Installing adapters	11	Processing date data	64
Installing a hot-plug PCI adapter (slots 3 through 6)	12	Trademarks	64
Installing a non-hot-plug PCI adapter (slots 1 and 2)	14	Important notes	64
Cabling example for the ServerRAID adapter	16	Electronic emission notices	65
Installing memory options	22	Federal Communications Commission (FCC) Statement	65
Using the LVD SCSI backplane	24	Industry Canada Class A emission compliance statement	65
Installing a SCSI repeater card	25	Australia and New Zealand Class A statement	65
Installing a drive in a hot-swap bay	31	United Kingdom telecommunications safety requirement	66
Installing a microprocessor	33	European Union EMC Directive conformance statement	66
Installing a hot-swap power supply	34	Taiwan electrical emission statement	66
Completing the installation	36	Japanese Voluntary Control Council for Interference (VCCI) statement	66
Installing the media-bay bezel	36	Power cords	67
Installing the top cover	37		
Reconfiguring the server	37		
Cabling the server	38		
		Index	69
Chapter 3. Server power, controls, and indicators	39		
Turning on the server	39		
Turning off the server	40		
Server controls and indicators	41		
Information LED panel	43		

Safety

Before installing this product, read the Safety Information book.

Antes de instalar este produto, leia o Manual de Informações sobre Segurança.

安裝本产品前请先阅读《安全信息》手册。

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs hæftet med sikkerhedsforskrifter, før du installerer dette produkt.

Lue Safety Information -kirjanen, ennen kuin asennat tämän tuotteen.

Avant de procéder à l'installation de ce produit, lisez le manuel Safety Information.

Vor Beginn der Installation die Broschüre mit Sicherheitshinweisen lesen.

Πριν εγκαταστήσετε αυτό το προϊόν, διαβάστε το εγχειρίδιο Safety Information.

Przed zainstalowaniem tego produktu należy przeczytać broszurę Informacje Dotyczące Bezpieczeństwa.

Prima di installare questo prodotto, leggere l'opuscolo contenente le informazioni sulla sicurezza.

本製品を導入する前に、安全情報資料を御読みください。

이 제품을 설치하기 전에, 안전 정보 책자를 읽어보십시오.

Пред да го инсталирате овој производ прочитајте ја книгата со безбедносни информации.

Lees voordat u dit product installeert eerst het boekje met veiligheidsvoorschriften.

Les heftet om sikkerhetsinformasjon (Safety Information) før du installerer dette produktet.

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

Antes de instalar este produto, leia o folheto Informações sobre Segurança.

Перед установкой продукта прочтите брошюру по технике безопасности (Safety Information).

Pred inštaláciou tohto produktu si pre ítajte Informa nú brožúrku o bezpe nosti.

Preden namestite ta izdelek, preberite knjižico Varnostne informacije.

Antes de instalar este producto, lea la Información de Seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

在安裝本產品之前，也請先閱讀「安全性資訊」小冊子。

Installálás el tt olvassa el a Biztonsági el írások kézikönyvét !

Statement 1



<p>Danger</p> <p>Electrical current from power, telephone, and communication cables is hazardous.</p> <p>To avoid a shock hazard:</p> <ul style="list-style-type: none">• 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.

<p>To connect:</p> <ol style="list-style-type: none">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.	<p>To disconnect:</p> <ol style="list-style-type: none">1. Turn everything OFF.2. First, remove power cords from outlet.3. Remove signal cables from connectors.4. Remove all cables from devices.
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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:

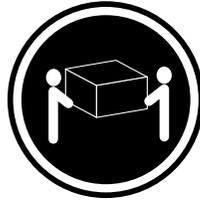
- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation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

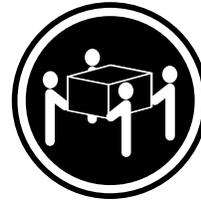
Statement 4



≥18 kg (39.7 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

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.



Chapter 1. Introduction

Thank you for purchasing an IBM® eServer xSeries 250 server. This *Installation Guide* provides the information that you need to:

- Set up and cable your server
- Start and configure your server
- Install your network operating system (NOS)

Packaged with this *Installation Guide* are software CDs that help you configure hardware, install device drivers, and install the network operating system (NOS).

Also included is an *IBM xSeries Documentation* CD that provides detailed information about this server.

Your server comes with a three-year limited warranty and IBM Server Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your server model and other IBM server products at the following World Wide Web address:

<http://www.ibm.com/pc/us/eserver/xseries>

Refer to the *Rack Installation Instructions* for complete details on rack installation instructions.

Record your product information in this table.	
Product name	_____
Machine type	_____
Model number	_____
Serial number	_____

Features and specifications

The following table provides a summary of the features and specifications for your xSeries 250 server.

<p>Microprocessor:</p> <ul style="list-style-type: none"> Intel® Pentium® III Xeon™ 32 KB of level-1 cache 1 MB of level-2 cache (minimum) Expandable to four microprocessors <p>Memory:</p> <ul style="list-style-type: none"> Maximum: 16 GB Type: ECC, SDRAM, Registered DIMMs Slots: 4-way interleaved, 16 slots <p>Drives standard:</p> <ul style="list-style-type: none"> Diskette: 1.44 MB CD-ROM: IDE <p>Expansion bays:</p> <ul style="list-style-type: none"> Hot-swap: 10 slim-high Non-hot-swap: Two 5.25-inch <p>LVD SCSI Backplane:</p> <ul style="list-style-type: none"> Ultra160 capable Two SCSI channels, each with five connectors, in a split configuration Supports a maximum of 10 slim-high hard disk drives <p>PCI expansion slots:</p> <ul style="list-style-type: none"> Four 33 MHz 64-bit hot-plug Two 66 MHz 64-bit non-hot-plug <p>Hot-swap power supplies:</p> <p>250 Watt (115-230 V ac)</p> <ul style="list-style-type: none"> Minimum: Two Maximum: Four Three for redundancy <p>Redundant cooling:</p> <ul style="list-style-type: none"> Four hot-swap fan assemblies 	<p>Video:</p> <ul style="list-style-type: none"> S3 video controller Compatible with SVGA and VGA 4 MB video memory <p>Size:</p> <ul style="list-style-type: none"> Height: 356 mm (14 in.) Depth: 650 mm (25.6 in.) Width: 440 mm (17.3 in.) Weight: 34.4 kg (76 lb.) to 61 kg (134 lb.) depending upon configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> Advanced System Management processor Dual Ultra2 (LVD) SCSI controller, one external port, one internal port One 10BASE-T/100BASE-TX AMD Ethernet controller Two serial ports One parallel port Two Universal Serial Bus ports Keyboard port Mouse port Video port One management port Two Advanced System Management Interconnect ports <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> Sound power, idle: 6.3 bel maximum Sound power, operating: 6.3 bel maximum Sound pressure, idle: 49 dBa maximum Sound pressure, operating: 49 dBa maximum 	<p>Environment:</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Server on: 10° to 35° C (50° to 95° F). Altitude: 0 to 914 m (3000 ft.) Server on: 10° to 32° C (50° to 89.6° F). Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.) Server off: 10° to 43° C (50° to 110° F). Maximum altitude: 2133 m (7000 ft.) Humidity: <ul style="list-style-type: none"> Server on: 8% to 80% Server off: 8% to 80% <p>Heat output:</p> <p>Approximate heat output in British Thermal Units (BTU) per hour</p> <ul style="list-style-type: none"> Minimum configuration: 1023.9 BTU Maximum configuration: 2764.6 BTU <p>Electrical input:</p> <ul style="list-style-type: none"> Sine-wave input (50-60 Hz) required Input voltage low range: <ul style="list-style-type: none"> Minimum: 90 V ac Maximum: 137 V ac Input voltage high range: <ul style="list-style-type: none"> Minimum: 180 V ac Maximum: 265 V ac Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> Minimum: 0.08 kVA Maximum: 0.52 kVA
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Table 1. Features and specifications.

Notices used in this book

The caution and danger notices also appear in the multilingual *Safety Information* book provided on the *IBM xSeries Documentation* CD that comes with your xSeries product. Each notice is numbered for easy reference to the corresponding notices in the safety book.

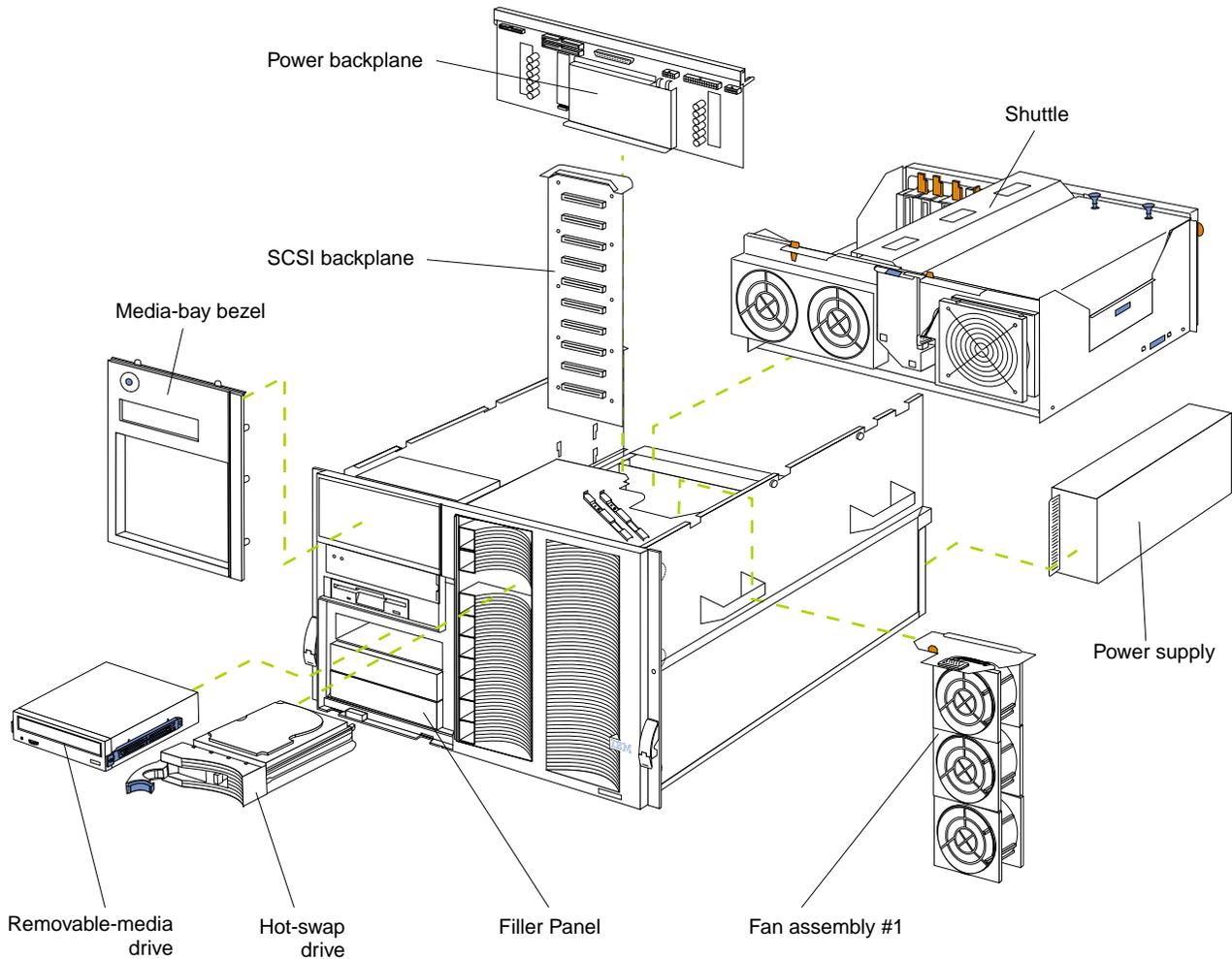
The following types of notices are used in this book:

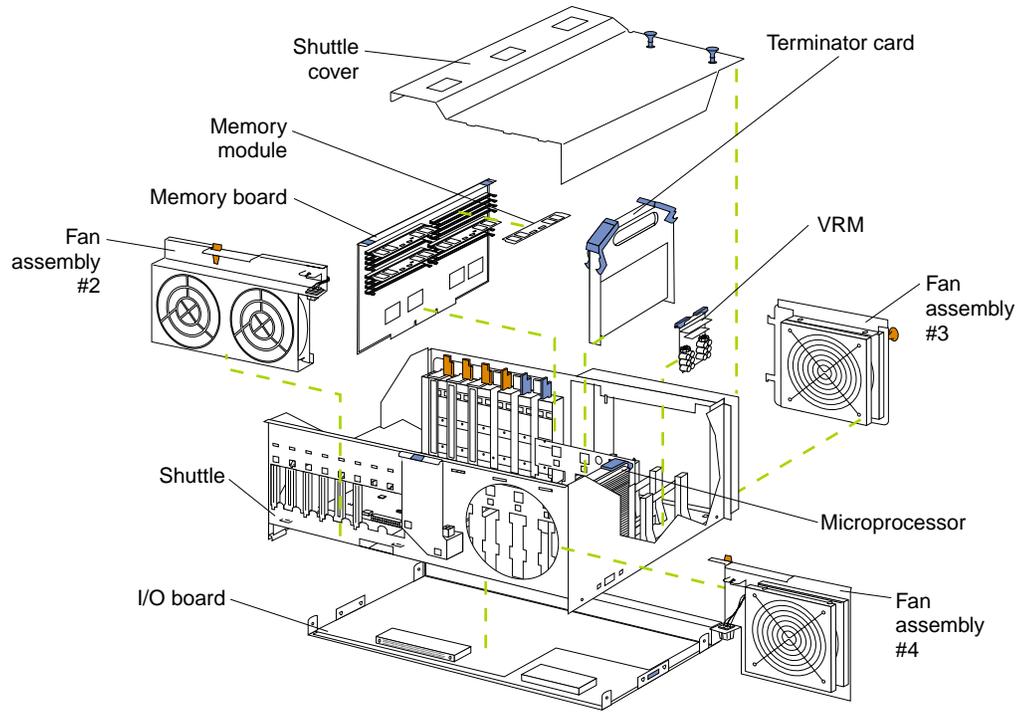
- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These notices indicate situations that can be potentially hazardous to you. A caution notice is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Major components of the xSeries 250 server

The orange color on components and labels in your server identifies hot-swap or hot-plug components. This means that you can install or remove the components while the system is running, provided that your system is configured to support this function. For complete information about installing or removing a hot-swap or hot-plug component, see the information provided in the procedures in this document.

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





Chapter 2. Installing options

This chapter provides the basic information needed to install hardware options in your server. This section is for all users, but is written with the experienced user in mind. If you need more detailed installation information, see the *User's Reference* on the *IBM xSeries Documentation CD*.

Before you begin

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

- Become familiar with the safety and handling guidelines specified under “Handling static-sensitive devices” on page 8, and read the safety statements in “Safety” on page v. These guidelines will help you work safely while working with your server or options.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, hot-swap fans, Active peripheral component interconnect (PCI) (hot-plug) adapters, or hot-plug USB devices.
- The orange color on components and labels in your server identifies hot-swap or hot-plug components. This means that you can install or remove the component while the system is running, provided that your system is configured to support this function.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- 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 250, refer to <http://www.ibm.com/pc/us/compat> on the World Wide Web.

System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.
- Each of the power supply bays has either a power supply or a filler panel installed.
- There are at least 50 mm (2 inches) of ventilated space at the sides of the server and 100 mm (4 inches) at the rear of the server.
- The top cover is in place during normal operation.
- The top cover is removed for no longer than 30 minutes while the server is operating.
- A removed hot-swap drive is replaced within two minutes of removal.
- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced within 48 hours.

Working inside the server with the power on

Your server supports hot-plug, hot-add, and 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, necklaces, rings, 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.
- Avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the server.

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 package until you are ready to install them.

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

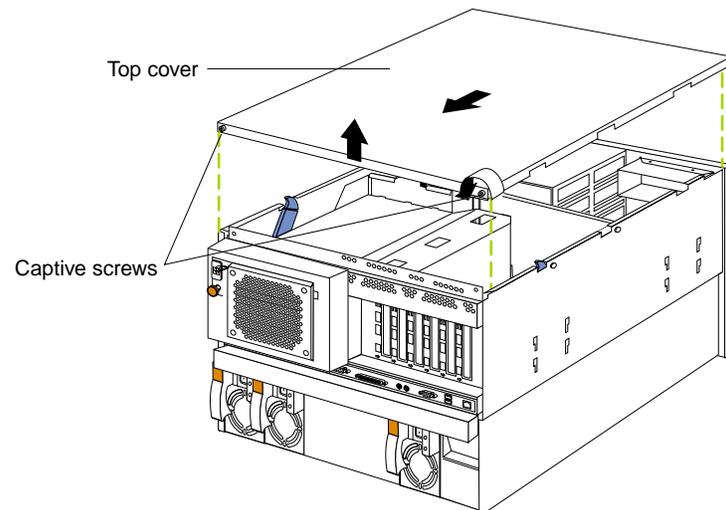
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the system unit for at least two seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is an adapter, place it component side up.) Do not place the device on your system unit cover or on a metal table.
- Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

Removing the server top cover and bezel

Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.

Removing the top cover

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

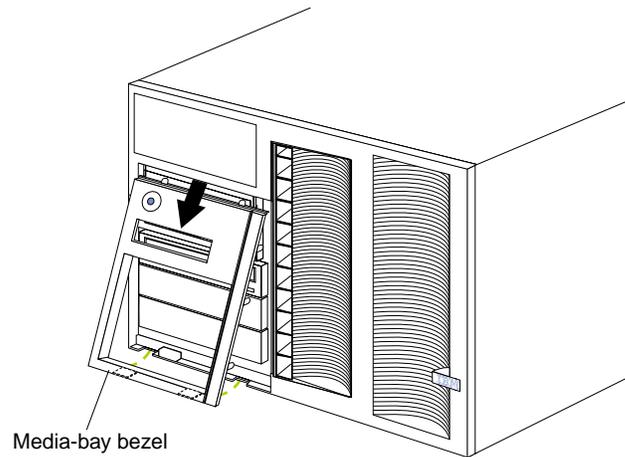


To remove the server top cover:

1. Loosen the two screws on the back edge of the top cover.
2. Slide the top cover slightly toward the rear of the server. Lift the cover off the server and set the cover aside.

Attention: For proper cooling and airflow, replace the top cover after installing or removing an option. Operating the server for extended periods of time (over 30 minutes) with the top cover removed might damage server components.

Removing the media-bay bezel



To remove the media-bay bezel:

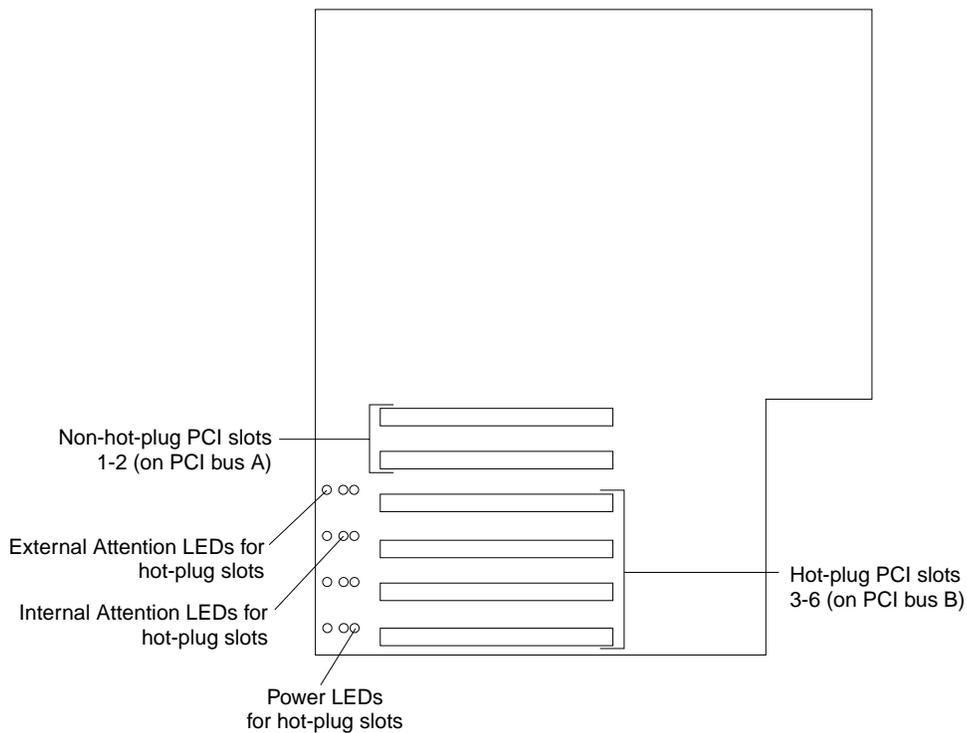
1. Release the two tabs at the bottom edge of the media-bay bezel and pull the bottom of the bezel slightly away from the server.
2. Pull the media-bay bezel down to release the two tabs at the top edge of the bezel. Store the bezel in a safe place.

Installing adapters

This section describes how to install hot-plug and non-hot-plug PCI adapters. Before you continue with the adapter-installation procedure, review the following:

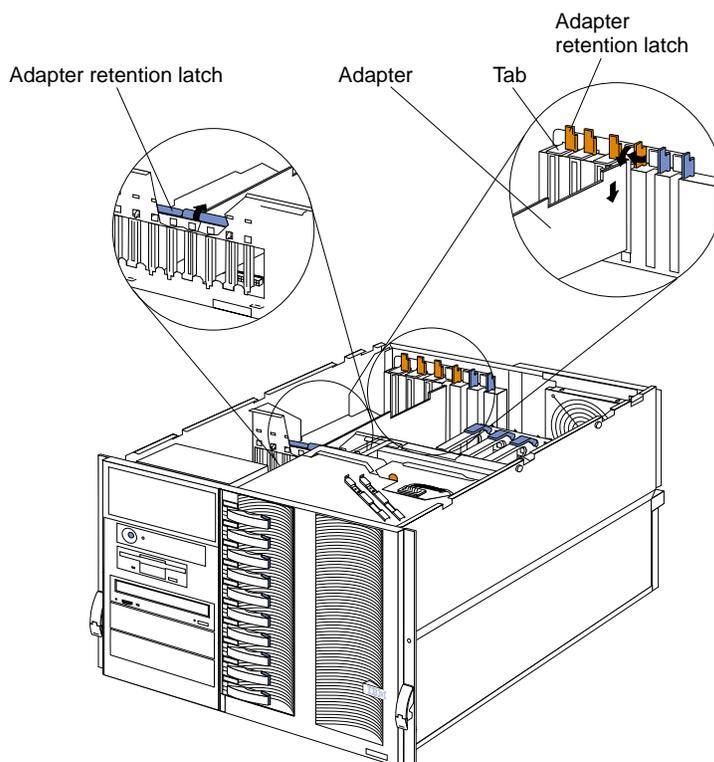
- Slots 1 and 2 support 3.3 V and universal non-hot-plug PCI adapters only.
 - Slots 3 through 6 support 5.0V and universal PCI adapters.
- Note:** Universal PCI adapters support both 3.3V and 5.0V operation.
- The system scans PCI slots 1 through 6 to assign system resources; then, the system starts (boots) the PCI devices in the following order: processor and I/O board devices, slots 1 and 2, and then slots 3 through 6.
 - You can install hot-plug PCI adapters in PCI slots 3 through 6. You can also install non-hot-plug PCI adapters in these slots.

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



Installing a hot-plug PCI adapter (slots 3 through 6)

Refer to the following illustration to install a hot-plug PCI adapter.



To install a hot-plug PCI adapter:

Attention:

- Do not remove a hot-plug adapter before performing the operating-system-defined procedure for disabling the hot-plug PCI slot that contains the adapter. Failure to do so might cause your system to lock up. Refer to your operating system documentation.
 - 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 8.
1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
 2. Remove the top cover (see “Removing the server top cover and bezel” on page 9).
 3. Determine which expansion slot you will use for the adapter.
Note: You can install hot-plug PCI adapters in PCI slots 3 through 6 only.
 4. Disable the selected PCI slot from your operating system. (Refer to the documentation that comes with your operating system for information about disabling a hot-plug PCI slot.) Disabling the PCI slot turns off the power light for that PCI slot.

Attention: Make sure that the power light for the hot-plug PCI slot is off before you continue with the next step.

5. Remove the expansion-slot cover:
 - a. Rotate the adapter retention latch counterclockwise.
 - b. Lift the tab covering the top of the expansion-slot cover and then remove the expansion-slot cover from the server. Store it in a safe place for future use.
 - c. Press on the rear adapter retention latch (near the hard disk drives) as indicated by the arrow on the latch and lift it to the open position.

Attention: You must install expansion-slot covers on all empty slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.
6. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.
7. Remove the adapter from the static-protective package.

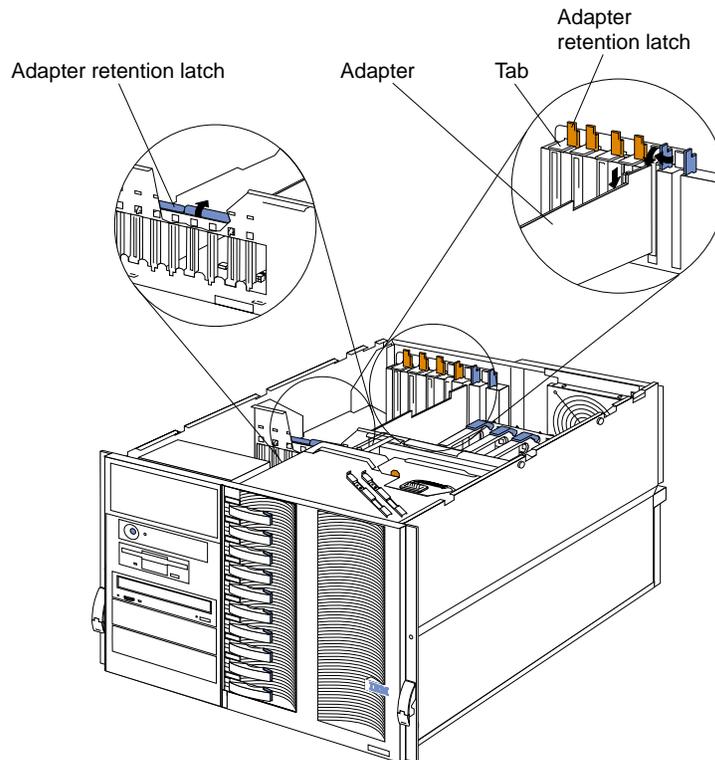
Attention: Avoid touching the components and gold-edge connectors on the adapter. If you need to put down the adapter, place the adapter, component-side up, on a flat, static-protective surface.
8. Install the adapter:
 - a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the processor board.
 - b. Press the adapter *firmly* into the expansion slot.

Attention: When you install an adapter in the server, be sure that it is completely and correctly seated in the expansion slot. Incomplete insertion might cause damage to the processor board or the adapter.
 - c. Lower the tab over the top corner of the adapter. Rotate the adapter retention latch clockwise until it snaps into place.
 - d. Lower the rear adapter retention latch (near the hard disk drives) over the top of the adapter and press on the indentation on the latch until the latch snaps into place.
9. Connect any needed cables to the adapter.
10. Enable the PCI slot from your operating system. (Refer to the documentation that comes with your operating system for information about enabling a hot-plug PCI slot.) Make sure that the power light for the hot-plug PCI slot comes on.
11. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 36.

Installing a non-hot-plug PCI adapter (slots 1 and 2)

The following illustration shows how to install a non-hot-plug PCI adapter.

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



To install a non-hot-plug PCI adapter:

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 8.

1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
2. Turn off the server; then, disconnect the power cords.
3. Remove the top cover (see “Removing the server top cover and bezel” on page 9).
4. Determine which expansion slot you will use for the adapter.

Note: PCI slots 1 and 2 support non-hot-plug PCI adapters only.

5. Remove the expansion-slot cover:
 - a. Rotate the adapter retention latch counterclockwise.
 - b. Lift the tab covering the top of the expansion-slot cover and then remove the expansion-slot cover from the server. Store it in a safe place for future use.
 - c. Press on the rear adapter retention latch (near the hard disk drives) as indicated by the arrow on the latch and lift it to the open position.

Attention: You must install expansion-slot covers on all empty slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

6. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.
7. Remove the adapter from the static-protective package.
Attention: Avoid touching the components and gold-edge connectors on the adapter. If you need to put down the adapter, place the adapter, component-side up, on a flat, static-protective surface.
8. Install the adapter:
 - a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the processor board.
 - b. Press the adapter *firmly* into the expansion slot.
Attention: When you install an adapter in the server, be sure that it is completely and correctly seated in the expansion slot. Incomplete insertion might cause damage to the processor board or the adapter.
 - c. Lower the tab over the top corner of the adapter. Rotate the adapter retention latch clockwise until it snaps into place.
 - d. Lower the rear adapter retention latch (near the hard disk drives) over the top of the adapter and press on the indentation on the latch until the latch snaps into place.
9. Connect any needed cables to the adapter and reconnect the power cords that you disconnected in step 2 on page 14.
10. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 36.

Cabling example for the ServeRAID adapter

You can install an optional IBM ServeRAID™ adapter in your server to control the internal hot-swap hard-disk drives; that is, to enable you to configure the internal hot-swap hard disk drives into disk arrays. Refer to your ServeRAID adapter option documentation for additional information on:

- Installing a ServeRAID adapter in your server
- Connecting the SCSI cable to a ServeRAID adapter
- ServeRAID adapters and controllers

Select the PCI slot where you want to install the ServeRAID adapter. Before you install the ServeRAID adapter, verify that it is compatible with the PCI slot that you selected. Some ServeRAID adapters are not compatible with PCI slots 1 and 2. See “Installing adapters” on page 11 for additional information on PCI slots.

The following procedure describes the cable routing that is necessary when you install a ServeRAID adapter. You can also cable a ServeRAID adapter to external hard disk drives.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. Refer to the documentation that comes with your adapter for any cabling instructions.
3. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled "HDD".

To cable the ServeRAID adapter:

1. Determine the number of SCSI channels that you want to use on the ServeRAID adapter. If you are connecting to more than two SCSI channels, you might need to purchase additional SCSI cables. Consult your IBM marketing representative or reseller for additional information on the number and types of cables that your server configuration requires.

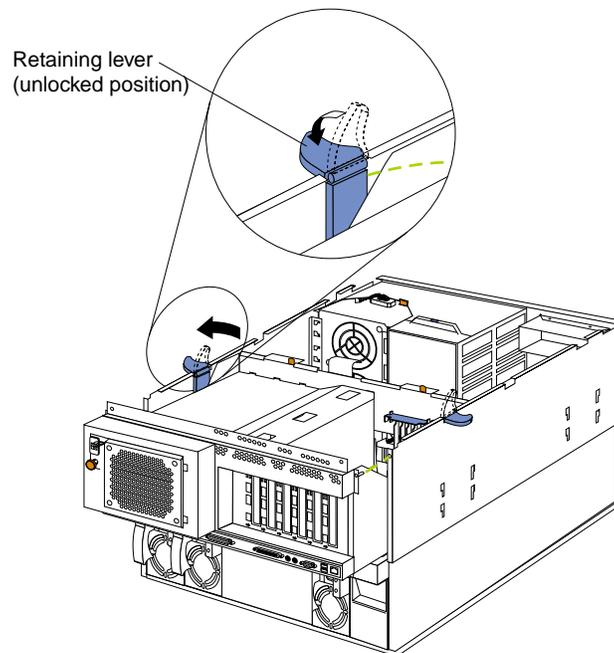
As shipped, your server comes with two SCSI cables attached to the SCSI backplane (see “Using the LVD SCSI backplane” on page 24 for details):

- One end of the first SCSI cable is attached to the SCSI channel A connector on the SCSI backplane, and the other end is attached to the power backplane.
- One end of the second SCSI cable is attached to the SCSI channel B connector on the SCSI backplane. The other end of this cable is folded and restrained with a clamp.

If you want to connect all of the hot-swap hard disk drives to one channel, you must install an optional SCSI repeater card as described in “Installing a SCSI repeater card” on page 25.

2. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
3. Turn off the server; then, disconnect the power cords.
4. Remove the top cover (see “Removing the server top cover and bezel” on page 9).
5. If you have not yet installed the ServeRAID adapter, install it now. Depending on your server configuration, see the beginning of this section for instructions on installing a hot-plug or non-hot-plug adapter; then, return here. Otherwise, continue with the next step.

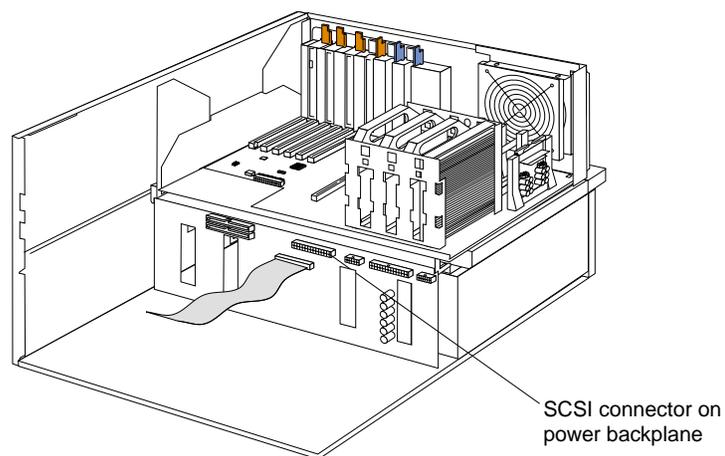
6. Disconnect the shuttle:



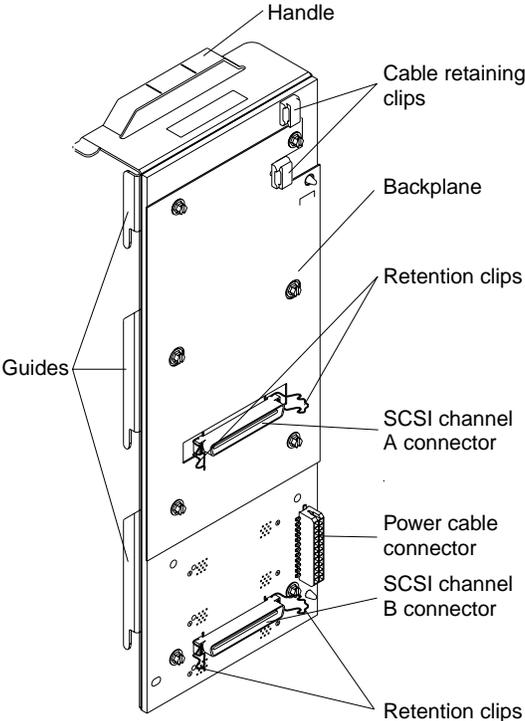
- a. Disengage the retaining levers by pressing inward.
- b. Move the retaining levers back to the unlocked position.
- c. Slide the shuttle toward the rear of the server until it stops.

Note: It is not necessary to remove the shuttle from the server.

7. Disconnect the SCSI cable from the SCSI connector on the power backplane.



8. Route one end of the SCSI cable through the cable retaining clips on the SCSI backplane.

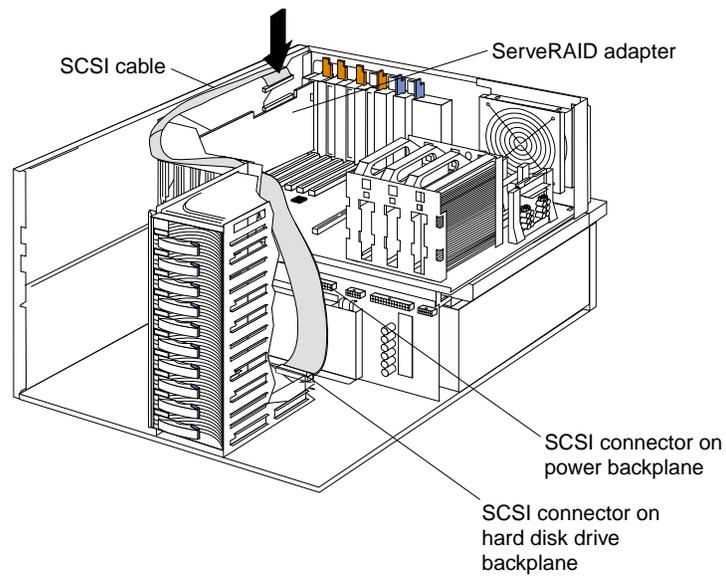


9. Attach one end of the SCSI cable to the selected internal SCSI channel connector on the ServeRAID adapter. Make sure that the other end of the SCSI cable is attached to the appropriate channel connector on the SCSI backplane.

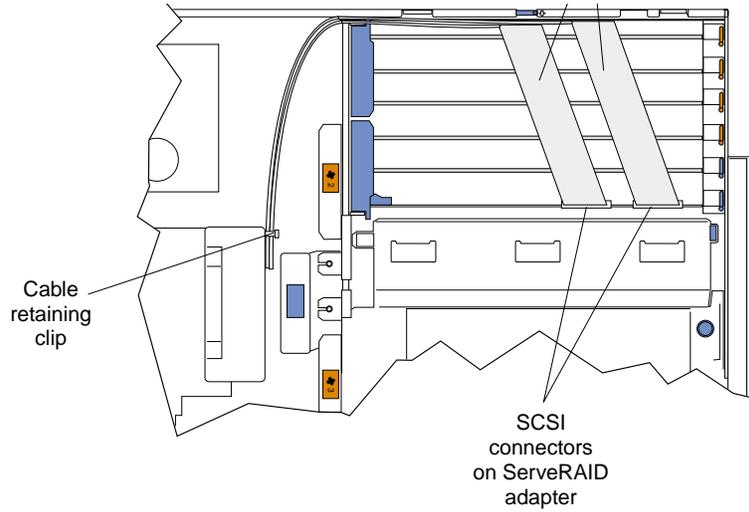
Attention: When you route the SCSI cable, do the following:

- Do not block the ventilated space in front of the fan assembly.
- Do not place the SCSI cable fold on top of the fan assembly.
- Do not route the SCSI cable over the memory board assembly.

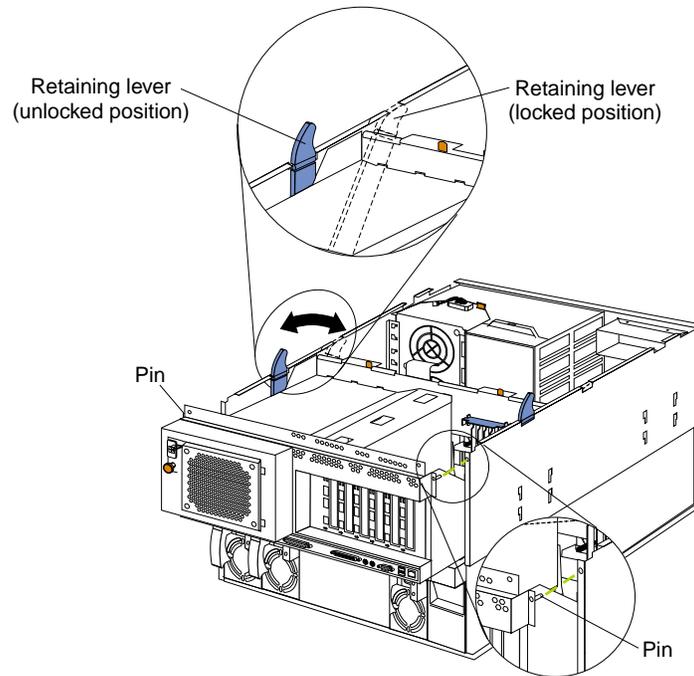
The following illustration shows how to route one SCSI cable to the ServeRAID adapter.



10. If you are connecting to two SCSI channels, repeat step 8 on page 18 and step 9 on page 19 for the second channel on the SCSI backplane. The following illustration shows how to route two SCSI cables to the ServeRAID adapter.



11. Connect the shuttle.



- a. Align the two shuttle pins with the holes on each side of the rear of the chassis, and disengage the retaining levers from the notches on the chassis.
 - b. Move the retaining levers toward the front of the server and secure the retaining levers in the horizontal (locked) position.
12. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 36.

Installing memory options

Before you install memory, review the following:

- All the DIMMs installed in each set must be the same size and speed, but all the sets do not have to contain DIMMs of the same size and speed.
- The memory board contains 16 DIMM connectors and supports 4-way memory interleaving.
- Install only 3.3 V, 168-pin, 8-byte, registered DIMMs. Only 100 MHz, 72-bit, registered, synchronous, error correcting code (ECC), SDRAM configuration DIMM memory is supported for the 128 MB, 256 MB, 512 MB and 1 GB (when available) DIMMs.

Note: If you install 64 MB DIMMs, they will not support the Chipkill memory function.

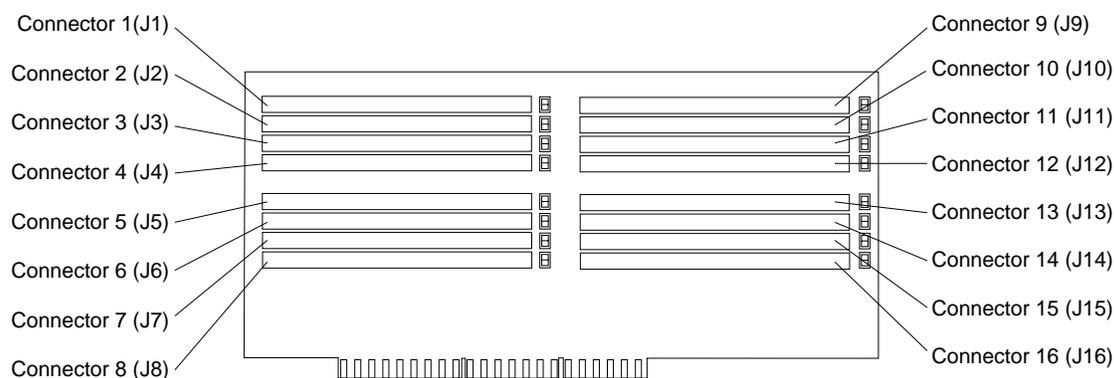
- If you install 4 GB of memory, some of the memory is reserved for system resources. The amount reserved for system resources depends on the configuration of the server.
- If you install 16 GB of memory, the Configuration/Setup Utility will display the memory that is usable by the network operating system. This amount of memory might differ from the amount of memory that you have installed.
- Installing or removing DIMMs changes the configuration information in the server. Therefore, after installing or removing a DIMM, you must save the new configuration information using the Configuration/Setup Utility program. See the *User's Reference* on the *IBM xSeries Documentation CD* for more information.
- Install the DIMMs in the order provided in Table 2.

Set of 4 DIMMs	install DIMMs in these connectors:
First set (shipped as standard)	J1, J5, J9, J13
2nd set	J2, J6, J10, J14
3rd set	J3, J7, J11, J15
4th set	J4, J8, J12, J16

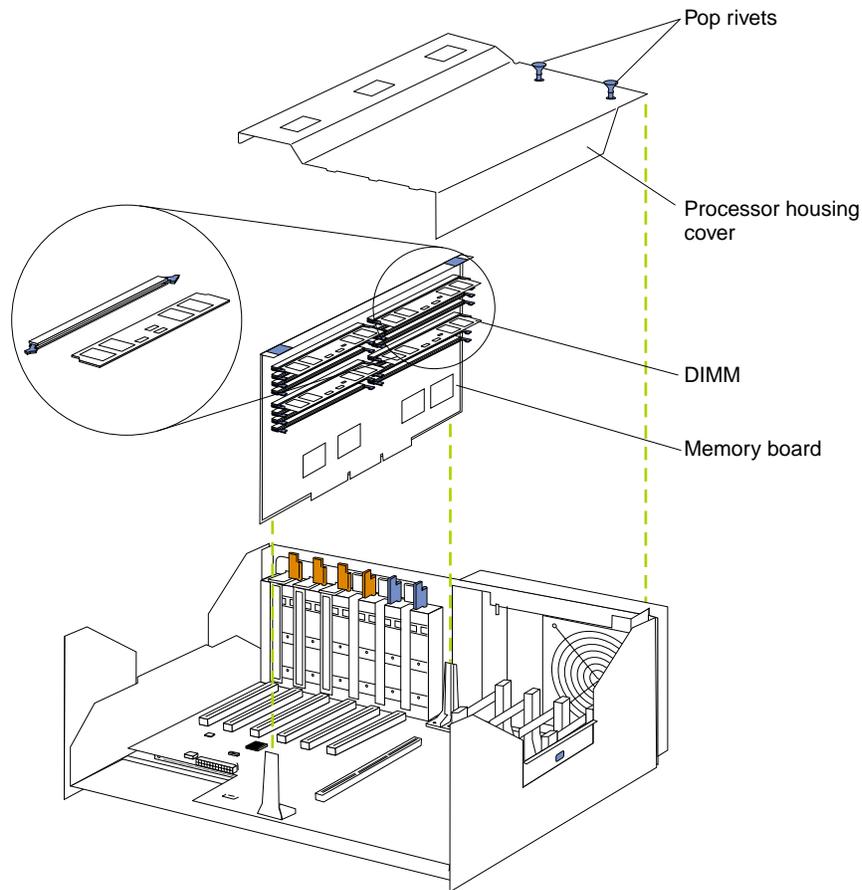
Table 2. DIMM installation order.

The following illustration shows the location of the DIMM connectors.

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



Refer to the following illustration when installing memory.



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 8.

To install a memory module:

1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
2. Turn off the server and remove the power cords.
3. Remove the top cover.
4. Remove the processor housing cover and remove the memory board assembly from the server.
5. Select the connectors in which to install the DIMMs.
6. Install the DIMMs in the connectors.
7. Replace the memory board assembly in the server and replace the processor housing cover.
8. Install the top cover.
9. Connect all cables and power cords.

Using the LVD SCSI backplane

Your server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives. The hot-swap drives are attached to a hot-swap hard disk drive *backplane*. The backplane is a printed circuit board behind the drive bays. For more information on drive bays, refer to the *User's Reference* on the *IBM xSeries Documentation* CD. For details on drive installation, see "Installing a drive in a hot-swap bay" on page 31.

As shipped, the LVD SCSI hot-swap hard disk drive backplane supports a split, dual-channel configuration. You can install a maximum of 10 slim-high, hot-swap hard disk drives. You can attach five drives to each half of the backplane. These drives must be low voltage differential (LVD) hard disk drives that operate at 160 MB per second or lower.

You can configure the channels on the SCSI backplane in one of two ways:

- You can configure each SCSI channel (bus) independently. This is the standard backplane configuration. In this configuration:
 - The hard disk drives in the upper half of the backplane are attached to channel A through a SCSI cable that comes attached to the SCSI backplane.
 - The hard disk drives in the lower half of the backplane are attached to channel B through a second optional SCSI cable. One end of this second SCSI cable comes attached to the SCSI channel B connector on the backplane. The other end of this cable is folded and restrained with a clamp.

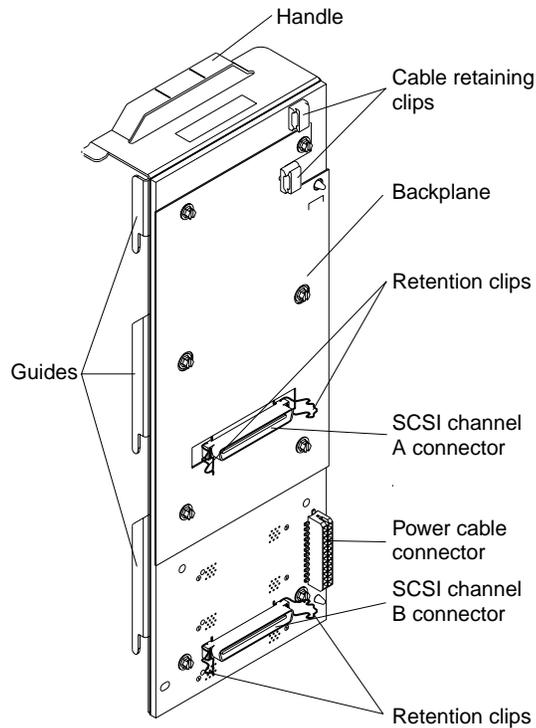
When you are installing hot-swap hard disk drives in the standard backplane configuration, attach the first five to channel A; then, attach the remainder to channel B. Refer to the illustration in this section for the SCSI channel connector locations.

- You can choose to configure the SCSI backplane as a single 10-drive SCSI channel. To do this, you must install an optional SCSI repeater card as described in "Installing a SCSI repeater card" on page 25.

Notes:

1. The LVD SCSI backplane is also known as the SCSI backplane or the hot-swap hard disk drive backplane.
2. Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for the SCSI identifiers (IDs) for the LVD SCSI backplane and the hot-swap hard disk drives that are attached to SCSI channels A and B.
3. Carefully route all cables so that they do not become damaged.
4. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled "HDD".
5. For information on cabling options and using the LVD SCSI backplane, refer to the documentation that comes with the option kit.
6. For additional information on cabling the ServeRAID adapter, see "Cabling example for the ServeRAID adapter" on page 16.
7. The illustrations in this document might differ slightly from your hardware.

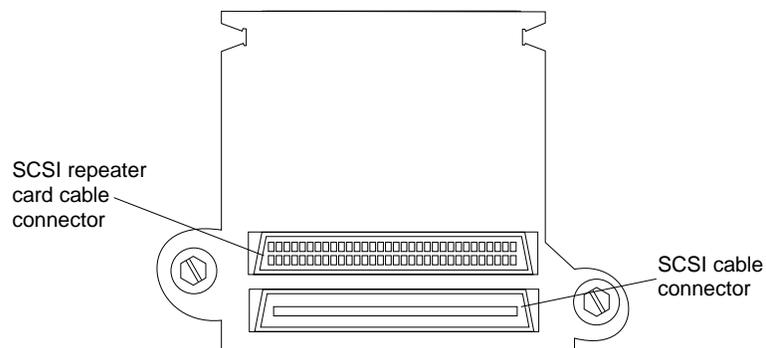
The following illustration shows the main SCSI backplane component locations.



Installing a SCSI repeater card

You must install an optional SCSI repeater card to connect all of your internal hot-swap hard disk drives to the same SCSI channel.

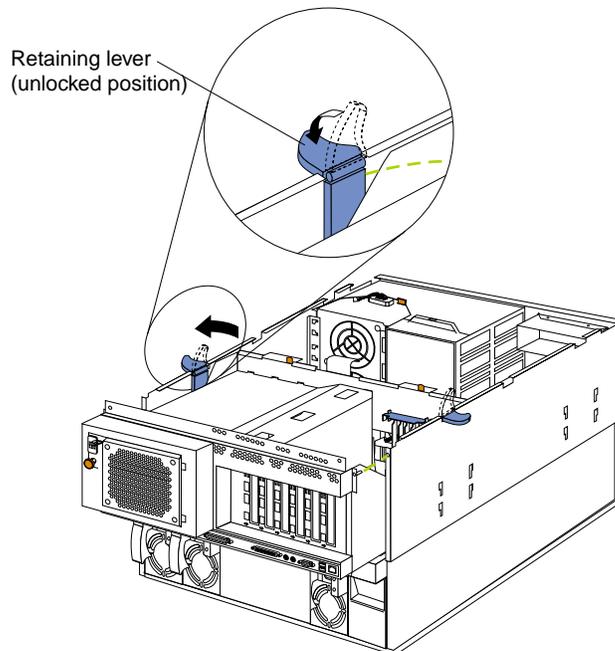
The following illustration shows the rear connectors on the optional SCSI repeater card, as viewed from the rear of the server.



To install a SCSI repeater card:

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 8.

1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
2. Turn off the server and peripheral devices, and disconnect all power cords and external cables; then, remove the top cover (see “Removing the server top cover and bezel” on page 9).
3. If a ServeRAID adapter is installed in the server, disconnect the SCSI cable from the adapter (see “Cabling example for the ServeRAID adapter” on page 16).
4. Disconnect the shuttle:

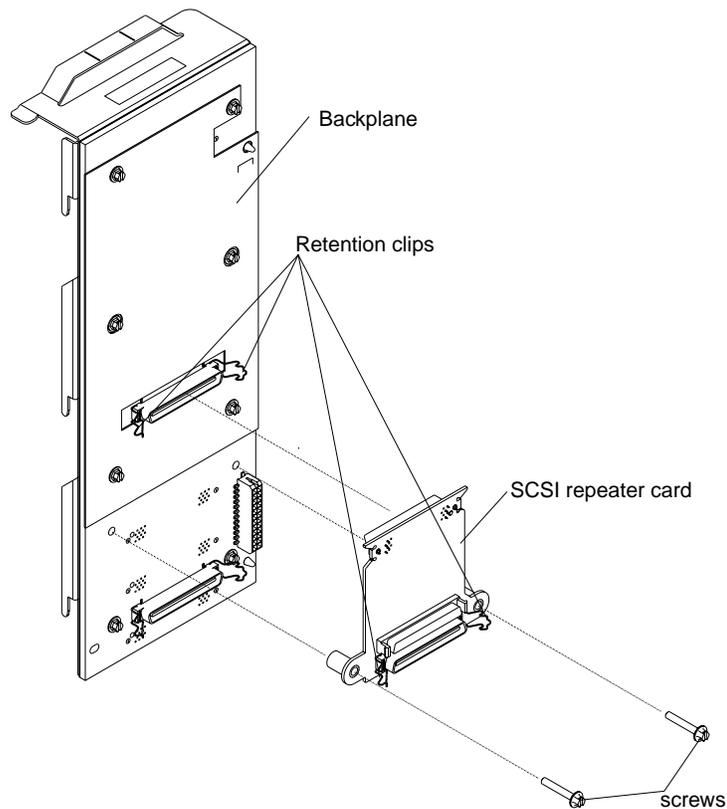


- a. Disengage the retaining levers by pressing inward.
 - b. Move the retaining levers back to the unlocked position.
 - c. Slide the shuttle toward the rear of the server until it stops.
- Note:** It is not necessary to remove the shuttle from the server.
5. Remove fan assembly 1 from the server.
 6. Disconnect the hot-swap hard disk drives from the corresponding SCSI backplane connectors; then, pull the drives forward.
- Note:** It is not necessary to remove the drives from the server.
7. Remove the SCSI backplane from the server:
 - a. Lift the SCSI backplane guides from the corresponding slots on the server; then, slide the SCSI backplane upward.
 - b. Disconnect the power cable from the SCSI backplane.
 - c. Disconnect the SCSI cables from the channel A and B connectors on the SCSI backplane.
 - d. Lift the SCSI backplane from the server.

8. Touch the static-protective package that contains the repeater card option to any unpainted metal surface on the server; then, remove the repeater card option from the package.

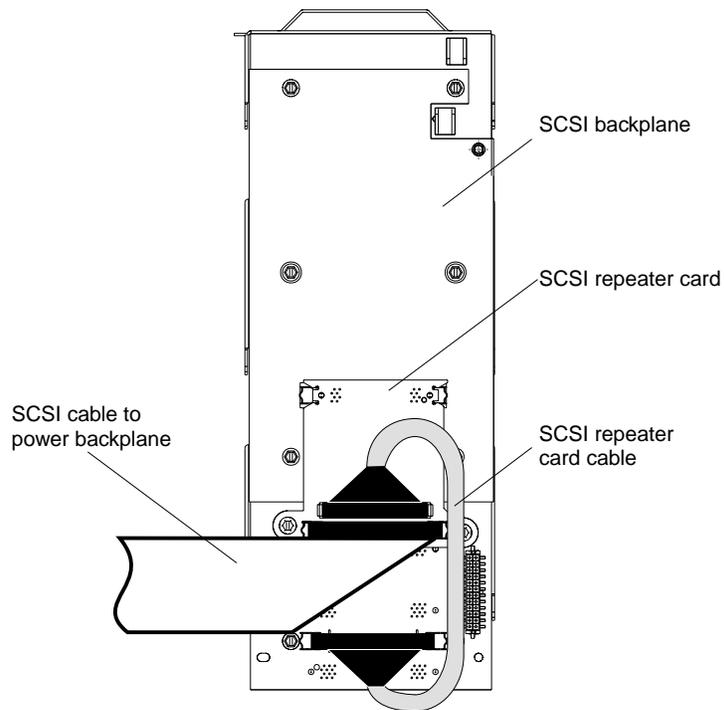
Note: If necessary, refer to the documentation that comes with the repeater card option kit to assemble the repeater card option.

9. Connect the repeater card option to the SCSI backplane:
 - a. Align the corresponding connectors on the repeater card and the SCSI backplane. The corresponding screw holes on the repeater card and the SCSI backplane will automatically align.



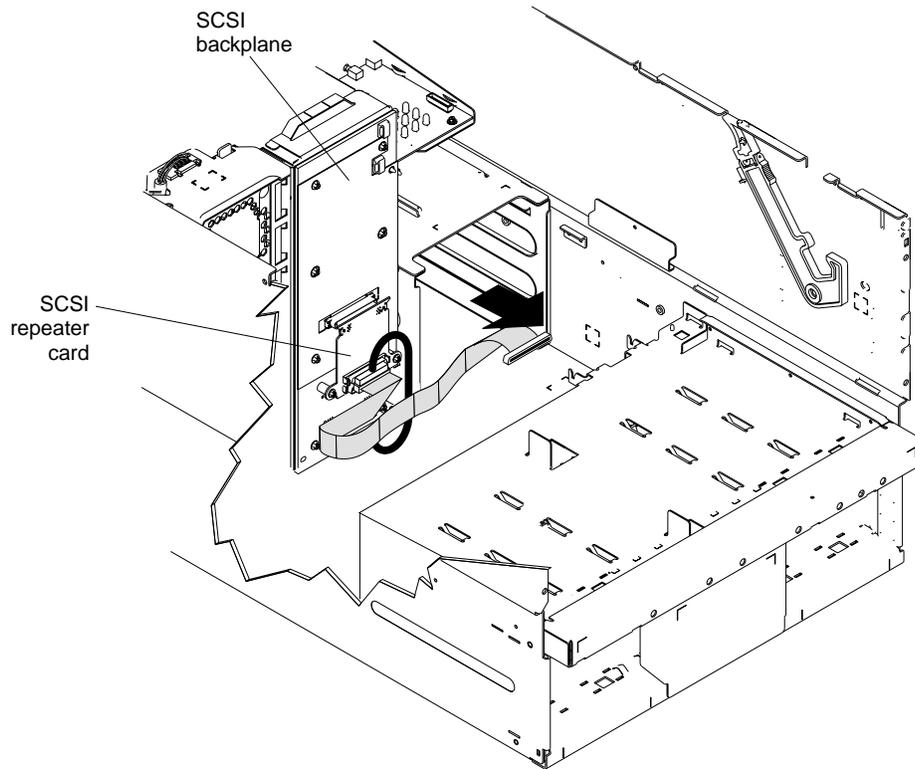
- b. Use a small, flat-blade screwdriver to connect the repeater card to the SCSI backplane with the two screws from the repeater card option kit.
 - c. Secure the repeater card with the retention clips on the SCSI channel A connector on the SCSI backplane.

10. A short SCSI cable comes with the repeater card option kit.
 - a. Connect one end of this cable to the repeater card.
 - b. Connect the other end of the cable to the SCSI channel B connector on the SCSI backplane.
 - c. Secure both cable ends with the retention clips on the SCSI connectors.

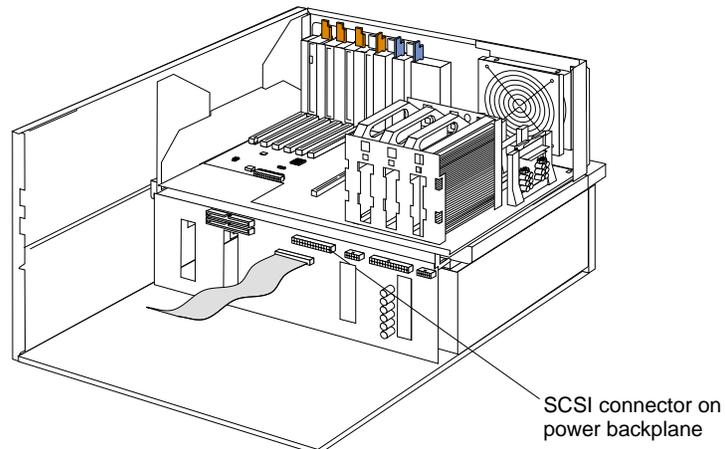


11. Reinstall the SCSI backplane in the server:

- a. Reconnect the power cable to the SCSI backplane.
- b. Align the SCSI backplane guides with the corresponding slots on the server.
- c. Slide the SCSI backplane into the server.
- d. Connect one end of the SCSI cable to the repeater card.



- e. Make sure that the other end of the SCSI cable is attached to the power backplane located on the rear of the shuttle.

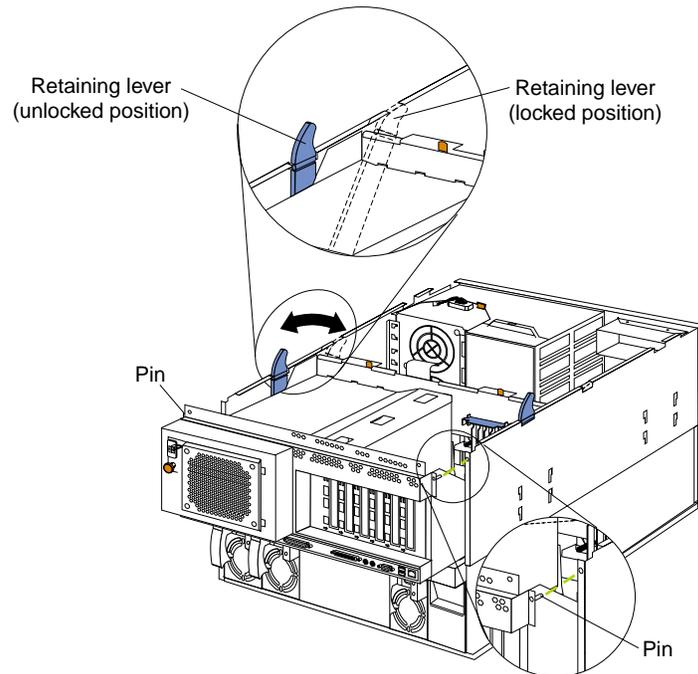


12. Slide the hot-swap hard disk drives back into place in the drive bays. If you need to install additional hot-swap drives, do so now (see “Installing a drive in a hot-swap bay” on page 31). You can connect a maximum of 10 hard disk drives to the SCSI backplane.

Note: After you connect these hard disk drives to the SCSI backplane, the backplane sets the SCSI IDs for the backplane and the hard disk drives. Refer to the *User's Reference* on the *IBM xSeries Documentation CD* for additional information.

13. Reinstall fan assembly 1 in the server.

14. Reconnect the shuttle.



- a. Align the two shuttle pins with the holes on each side of the rear of the chassis, and disengage the retaining levers from the notches on the chassis.
 - b. Move the retaining levers toward the front of the server, and secure the retaining levers in the horizontal (locked) position.
15. If you disconnected the SCSI cable from the ServeRAID adapter in step 3 on page 26, reconnect the SCSI cable to the adapter.
 16. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 36.

Installing a drive in a hot-swap bay

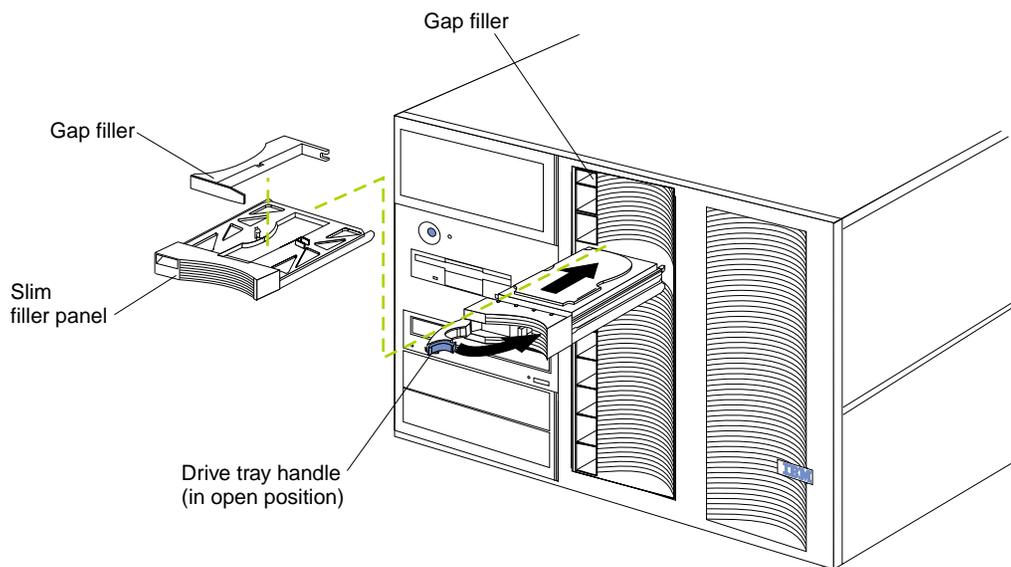
Your server supports 10 1-inch (26 mm) slim-high, 3.5-inch hot-swap hard disk drives in the hot-swap bays. These drives must be LVD hard disk drives that operate at 160 MB per second or lower.

Note: Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for information on installing devices in the non-hot-swap bays.

Attention: If you are replacing a drive that is part of a RAID level 1 or RAID level 5 logical drive, ensure that you install the replacement drive in the correct bay. Failure to replace the drives in their correct bays can result in loss of data.

Refer to the following illustration when installing a hot-swap drive. The server comes with a gap filler installed at the top of the hot-swap hard disk drive bays. You cannot install a drive in the gap. Some gap fillers also come attached to a slim filler panel. The gap filler is removable from the slim filler panel, when available.

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



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 8.

To install a drive in a hot-swap bay:

1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
2. Remove the slim filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.

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

3. Install the hard disk drive in the hot-swap bay:
 - a. If there is a small gap above or below the drive, separate the gap filler from the slim filler panel and insert it in the gap.

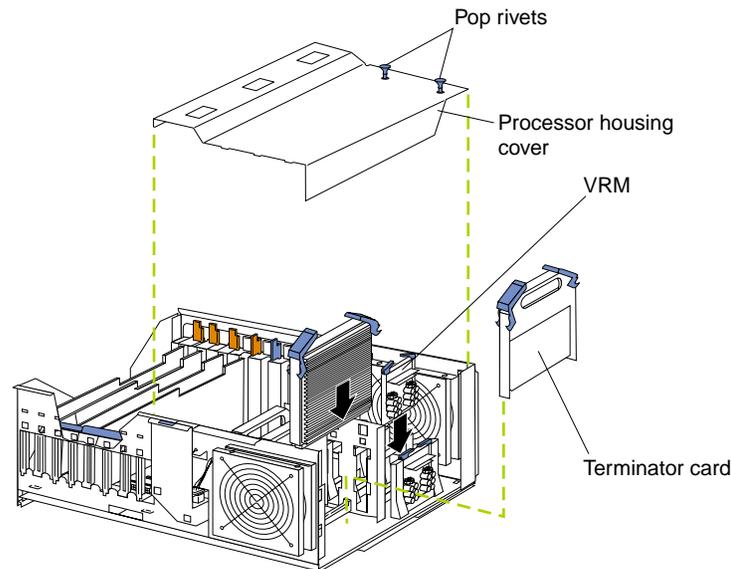
Note: A drive placement guide is located on the inside edge of the bezel. The drive placement guide indicates the placement for slim-high drives. The guide also shows the SCSI ID assigned to the drive.
 - b. Ensure that the tray handle is open (that is, perpendicular to the drive).
 - c. Align the drive assembly with the guide rails in the bay.
 - d. Gently push the drive assembly into the bay until the drive stops.
 - e. Push the tray handle to the closed (locked) position.
 - f. Check the hard disk drive status indicators to verify that the hard disk drive is operating properly.

If the amber hard-disk status light for a drive is lit continuously, that individual drive is faulty and needs to be replaced. If the green hard-disk activity light is flashing, the drive is being accessed.
- Note:** If your server has an optional ServeRAID adapter installed, you must configure your disk arrays after installing hard disk drives. Refer to the information that comes with your ServeRAID adapter for details.

Installing a microprocessor

Your server comes with one microprocessor installed in connector J2. This is the startup (boot) microprocessor. A microprocessor installed in connector J3 is microprocessor 2; a microprocessor installed in connector J4 is microprocessor 3; a microprocessor installed in connector J5 is processor 4. If more than one microprocessor is installed, the highest numbered microprocessor is the one from which the server will start. The lower numbered microprocessors are used as application microprocessors.

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



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 8.

To install an additional microprocessor kit:

1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
2. Turn off the server and remove the power cords.
3. Remove the top cover.
4. Remove the processor housing cover.
5. Remove the terminator card from the connector.
6. Install the microprocessor.

Note: Each microprocessor connector must contain either a terminator card or a microprocessor.

7. Install the voltage regulator module (VRM).
8. Install the processor housing cover.
9. Install the top cover (see “Completing the installation” on page 36).
10. Cable the server and connect all power cords.

Installing a hot-swap power supply

Before you continue with the power supply-installation procedure, review the following.

Notes:

1. During normal operation, each power supply bay must have either a power supply or filler panel installed for proper cooling.
2. Before you install a power supply in the right-most power supply bay, you must disconnect the cable-management arm. You can reconnect the cable-management arm after installing the power supply.

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

Statement 8



CAUTION:

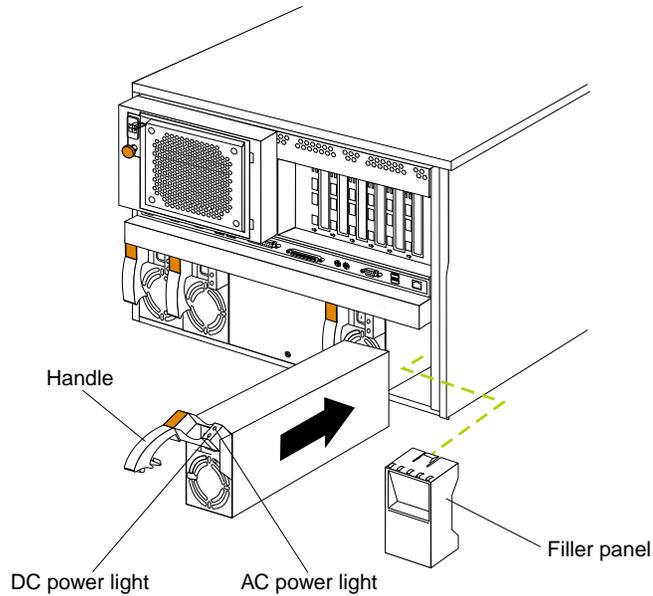
Never remove the cover on a power supply or any part that has the following label attached.



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

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

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 8.



To install an additional power supply:

1. Review the information in “Before you begin” on page 7 through “Handling static-sensitive devices” on page 8.
2. Remove the filler panel.
3. Place the handle on the power supply in the open position.
4. Slide the power supply into the chassis and press the handle to the closed position.
5. Plug one end of the power cord into the corresponding outlet on the rear of the server; then, plug the other end of the power cord into a properly grounded electrical outlet.
6. Verify that the DC Power light and the AC Power light on the power supply are lit, indicating that the power supply is operating properly.

Statement 6



CAUTION:

If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible power source.

Completing the installation

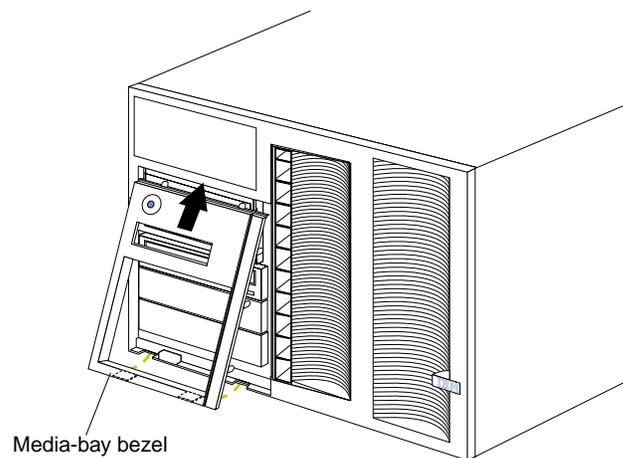
To complete your installation, you must reinstall the media bay bezel, reinstall the top cover, reconnect all the cables that you disconnected, and for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

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

Installing the media-bay bezel

Refer to the following illustration to install the media-bay bezel.

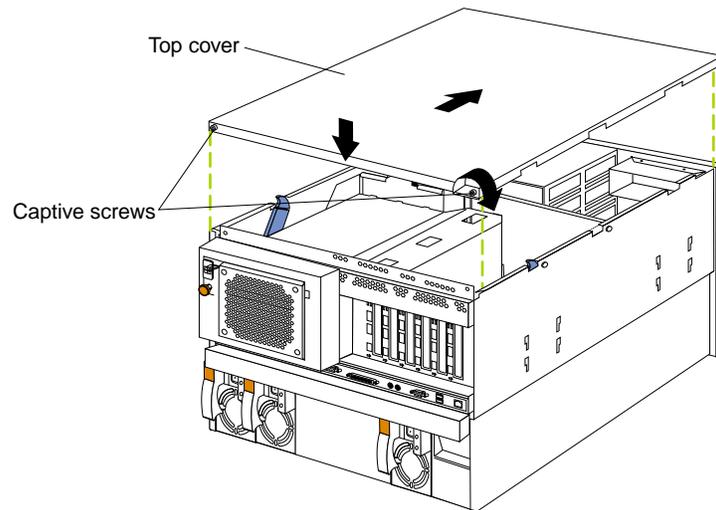
Note: The illustrations in this book might differ slightly from your hardware.



To install the media-bay bezel:

1. Insert the two tabs on the top of the media-bay bezel into the matching holes on the server chassis.
2. Push the bottom of the media-bay bezel toward the server until the two tabs at the bottom of the bezel snap into place.

Installing the top cover



To install the server top cover:

1. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Lower the cover with the rear edge of the cover about 25 mm (1 inch) back from the rear edge of the server.
3. Slide the cover forward.
4. Tighten the two captive screws on the back edge of the cover.
5. If you disconnected any cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

Note: If necessary, see “Cabling the server” on page 38 for connector locations.

Reconfiguring the server

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. Run the Configuration/Setup Utility program to save the new configuration information. See “Chapter 4. Configuring your server,” on page 45.

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

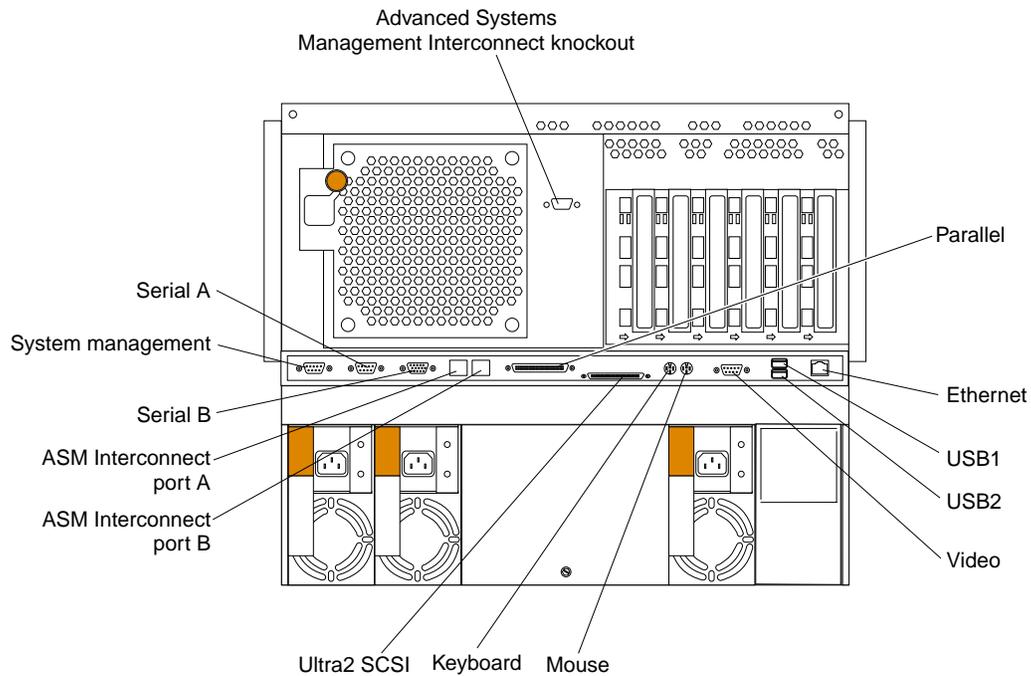
If you have installed a new microprocessor, you might want to upgrade your operating system to support symmetric multiprocessing (SMP). Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for additional information.

If you have installed or removed a hard disk drive, refer to the information that comes with your ServeRAID adapter for details on configuring your disk arrays.

Cabling the server

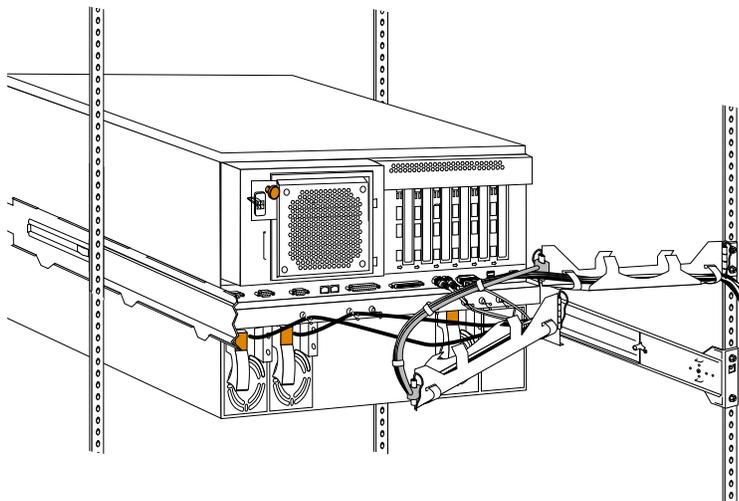
Refer to the following illustration for the location of the input and output connectors on your server.

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



Refer to the following illustration for an example of proper cable routing.

Note: Refer to the *Rack Installation Instructions* for rack installation instructions.



Chapter 3. Server power, controls, and indicators

Use the following procedure to start your server.

1. Turn on all external devices, such as the monitor.

Note: After you plug the power cord into an outlet, wait 20 seconds before pressing the power control button. During this time, the power control button will not respond because the system management microprocessor is being initialized.

2. Press the power control button on the front of the server. The power-on light comes on, and the power-on self-test (POST) begins.

Turning on the server

Turning on the server refers to the act of plugging the power cord of your server into the power source and starting the operating system.

The server can start in any of the following ways:

- You can press the power-control button on the front of the server to start 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 cord of your server into an electrical outlet, wait approximately 20 seconds before pressing the power-control button. During this time, the Advanced System Management processor is initializing; therefore, the power-control button does not respond.
- If the server is turned on and a power failure occurs, the server will start automatically when power is restored.
 - If the server is turned on, a power failure occurs, and unattended-start mode is enabled in the Configuration/Setup Utility program, the server will start automatically when power is restored.
 - If AC power is present, the server is off, and the wake-up feature is enabled in the Configuration/Setup Utility program, the wake-up feature will turn on the server at the set time.
 - If AC power is present, the server is off, and ring-signal detect is enabled in the Configuration/Setup Utility program, you can turn on the server by telephone input.
 - If your operating system supports the system-management software, the system-management software can turn on the server.
 - If your operating system supports the Wake on LAN feature, the Wake on LAN feature will turn on the server at the set time.

Note: For more detailed information about the Wake on LAN feature, refer to the documentation that comes with the Wake on LAN adapter and cables.

Turning off the server

Turning off the server refers to the act of disconnecting the server from the power source.

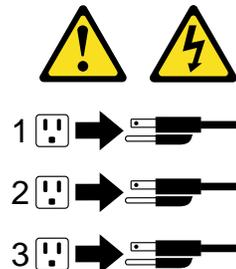
You can turn off the server in any of the following ways:

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.

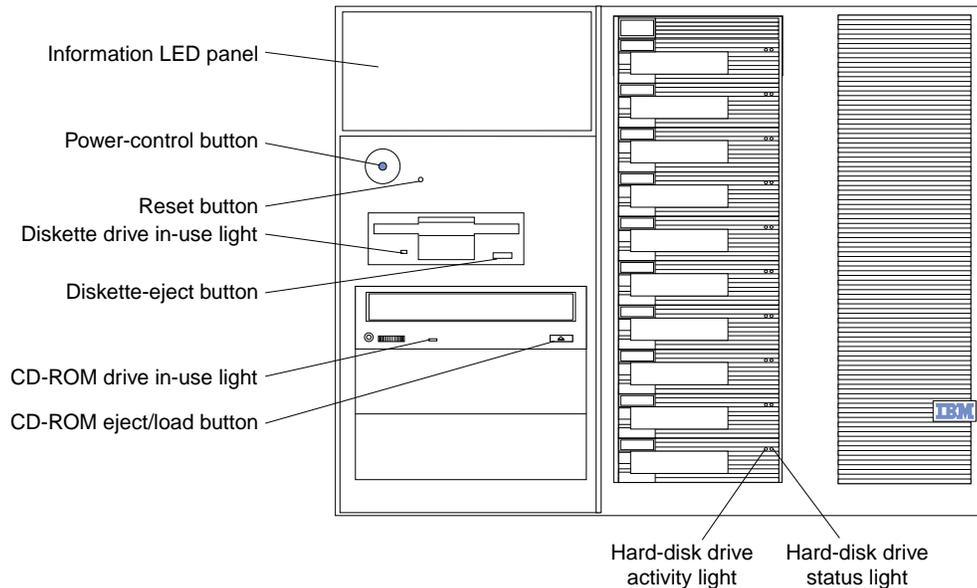


- You can press the power-control button on the front of the server. If this feature is supported by your operating system, this starts an orderly shutdown of the operating system, and places the server in standby mode.
Note: After turning off the server, wait at least five seconds before you press the power-control button to turn on the server again.
- You might need to press and hold the power-control button for more than four seconds to cause an immediate shutdown of the server and to force the power off. You can use this feature if the operating system stops functioning.
- You can disconnect the server power cords from the electrical outlets to shut off all power to the server.
Note: After disconnecting the power cords, wait about 15 seconds for your system to stop running. Watch for the power-on light on the information panel to stop blinking.

Server controls and indicators

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

The following illustration shows the controls and indicators on the server.



Hard-disk drive status light: Each hot-swap drive has a status light. When this amber light is on continuously, the drive has failed. If an optional IBM ServeRAID™ adapter is installed in the server, when the light flashes slowly (one flash per second), the drive is being rebuilt. When the light flashes rapidly (three flashes per second), the controller is identifying the drive.

Hard-disk drive activity light: Each hot-swap drive has a hard-disk activity light. When this green light is flashing, the drive is being accessed.

CD-ROM eject/load button: Press this button to eject or retract the CD-ROM tray.

CD-ROM drive in-use light: When this light is on, the CD-ROM drive is being accessed.

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

Diskette drive in-use light: When this light is on, the diskette drive is being accessed.

Reset button: Press this button to reset the server and run the power-on self-test (POST).

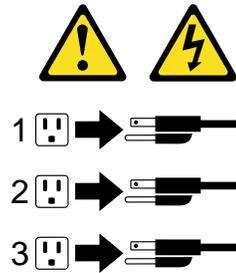
Power control button: Press this button to manually turn on or off the server.

Statement 5



CAUTION:

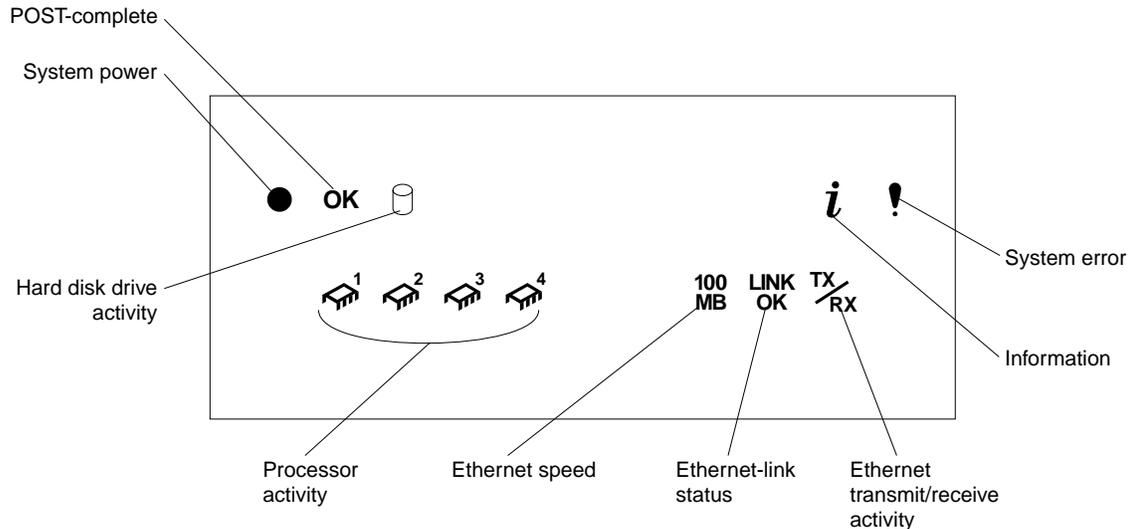
The power control button on the device and the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Information LED panel: The lights on this panel give status information for your server. See “Information LED panel” on page 43.

Information LED panel

The following illustration shows the status lights on the Information LED panel.



System error light: This amber light is on when a system error occurs. A light on the diagnostics LED panel will also be on to further isolate the error. (For more information, see the *User's Reference* on the *IBM xSeries Documentation CD*.)

Information light: When this amber light is on, the server power supplies are nonredundant or some other noncritical event has occurred. The event is recorded in the Event log. See the *User's Reference* on the *IBM xSeries Documentation CD* for instructions on viewing the Event log.

Ethernet transmit/receive activity light: When this green light is on, there is activity between the server and the network.

Ethernet-link status light: When this green light is on, there is an active connection on the Ethernet port.

Ethernet speed 100 Mbps light: When this green light is on, the Ethernet speed is 100 Mbps. When the light is off, the Ethernet speed is 10 Mbps.

Processor activity lights: One or more of these green lights are on when there is microprocessor activity. The number of lights that are on indicates the number of microprocessors with activity.

Hard-disk drive activity light: This green light flickers when there is activity on a hard disk drive.

System power light: When this green light is on, power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and ac current is present). When this light is off, the power subsystem, the ac power, or a light has failed.

Attention: If the system power light is off, it does not mean there is no electrical current present in the server. The light might be burned out. To remove all electrical current from the server, you must unplug the server power cords from the electrical outlets or from the uninterruptible power device.

POST-complete light: This green light is on when the power-on self-test (POST) completes without any errors.

Chapter 4. Configuring your server

The ServerGuide CDs provide software setup tools and installation tools that are specifically designed for your IBM xSeries server. Use these CDs during the initial installation of your server to configure basic hardware features and to simplify your network operating system installation. (See “Using the ServerGuide CDs” for more information.) The ServerGuide CDs also contain a collection of application programs, which you can install after your server is up and running.

In addition to the ServerGuide CDs, you can use the following configuration programs to customize your server hardware:

- **Configuration/Setup Utility**

The Configuration/Setup Utility program is part of the *basic input/output system (BIOS)* code that comes with your server. You can use this program to configure serial and parallel port assignments, change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, and set passwords.

- **SCSISelect Utility**

With the built-in SCSISelect Utility program, you can configure the devices that are attached to the integrated SCSI controller. Use this program to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive.

- **ServeRAID programs**

If you have a ServeRAID adapter installed in your server, you must use the ServeRAID configuration program to define and configure your disk-array subsystem before you install your operating system.

Note: Refer to the *User's Reference* on the *IBM xSeries Documentation CD* for detailed instructions for using the configuration programs.

Using the ServerGuide CDs

The ServerGuide CDs provide state-of-the-art programs to detect the server model and hardware options that are installed, configure xSeries server hardware, provide device drivers, and install your network operating system (NOS).

Note: If the ServerGuide CD does not start, see “ServerGuide startup problems” on page 50.

1. Insert the *Setup and Installation CD*, and restart the server.
2. Follow the instructions on the screens to:
 - a. Select your language.
 - b. Select your keyboard layout and country.
 - c. View the Overview to learn about ServerGuide features.
 - d. View the README file to review installation tips about your 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, refer to the *Setup and Installation CD* label.

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, refer to the "Solving problems" section on the *IBM xSeries Documentation CD* and the "Support for Servers" flowchart in the front of this booklet.

POST beep code descriptions

POST emits one beep to signal successful completion. If POST detects a problem during startup, other beep codes might occur. You can use the following beep code descriptions to help identify and resolve problems that are detected during startup.

Note: See the "Solving problems" section of the *User's Reference* on the *IBM xSeries Documentation CD* for more information about the POST beep codes.

Beep code	Descriptions of the POST beep codes
No beep	Call for service.
Continuous	If no video appears, the startup microprocessor failed. Verify that the startup microprocessor is installed correctly. If it is, replace the startup microprocessor. If the problem persists, call for service.
One short	POST completed successfully. One beep also occurs after POST if you enter an incorrect password.
Two short	Follow the instructions that appear on the screen.
Three short	POST detected a system memory error. Verify that the memory is installed correctly. If it is, replace the failing memory module.
Repeating short	The system board might contain a failing component. <ol style="list-style-type: none">1. Verify that the keyboard and pointing devices are connected properly.2. Ensure that nothing is resting on the keyboard.3. Disconnect the pointing device; then, restart the server. If the problem goes away, replace the pointing device. If the problem remains, call for service.
One long and one short	If the video controller on the system board is being used, call for service. If you installed an optional video adapter, replace the failing adapter.
One long and two short	A video I/O adapter ROM is not readable, or the video subsystem is defective. If you installed an optional video adapter, replace the failing adapter. If the problem remains, call for service.
One long and three short	The system-board video subsystem has not detected a monitor connection to the server. Ensure that the monitor is connected to the server. If the problem persists, replace the monitor.
Two long and two short	POST does not support the optional video adapter. Replace the optional video adapter with one that is supported by the server or use the integrated video controller.
All other beep codes	<ol style="list-style-type: none">1. Verify that the system memory modules are installed correctly.2. Turn off the server; then, restart the server. If the problem remains, call for service.

Table 3. POST beep code descriptions.

POST error messages

The following table provides an abbreviated list of the error messages that might appear during POST.

Note: See the "Solving problems" section of the *User's Reference* on the *IBM xSeries Documentation* CD for more information about the POST beep codes.

POST message	Failing device or problem found	Suggested action
129	L1 cache of a microprocessor	Check the installation of your microprocessors.
162	Change in device configuration	Verify that your optional devices are turned on and installed correctly.
163	Time of day has not been set	Set the correct date and time.
164	Change in memory configuration	Verify that your memory is installed properly; then, restart the server and run the Configuration/Setup Utility program.
201	Change in memory configuration	Verify that your memory is fully seated and installed properly.
229	L2 cache of a microprocessor	Check the installation of your microprocessors.
289	Failing DIMM was disabled	Verify that your memory is correct for your server and that it is installed properly.
301 303	Keyboard and keyboard controller	Ensure that the keyboard cable is connected and nothing is resting on the keyboard keys.
962	Parallel port configuration error	Start the Configuration/Setup program and verify that the parallel-port setting is correct.
11xx	Serial port error	Verify that the serial cable is connected correctly.
1162	Serial port configuration conflict	Start the Configuration/Setup program and ensure that the IRQ and I/O port assignments needed by the serial port are available.
1601	BIOS code update needed	Download and install the latest system BIOS level.
1800	PCI adapter hardware interrupt	Start the Configuration/Setup program and verify that the interrupt resource settings are correct.
2400 2462	Video controller and memory	Verify that the monitor is connected correctly.
00019xxx	Processor <i>x</i> is not functioning or failed the built-in test	Verify that processor <i>x</i> is installed correctly. If the problem remains, replace processor <i>x</i> .
00180xxx	A PCI adapter requested a resource that is not available	Start the Configuration/Setup program and ensure that the resources needed by the PCI adapter are available.
012980xx 012981xx	Data for processor <i>x</i>	Download and install the latest system BIOS level.
01298200	Microprocessor speed mismatch	Install microprocessors with identical speeds.
I9990305	POST could not find an operating system.	Install your operating system.

Table 4. Abbreviated list of POST error messages.

ServerGuide startup problems

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

<i>Setup and Installation CD</i>	Action
<i>Setup and Installation CD</i> will not start.	<ul style="list-style-type: none"> • Ensure that the system is a supported server model with a startable (bootable) CD-ROM drive. • If the startup (boot) sequence settings have been altered, be sure that the CD-ROM is first in the startup sequence. • If more than one CD-ROM drive is installed, be sure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID program cannot view all installed drives or cannot install NOS.	<ul style="list-style-type: none"> • Ensure that there are no duplicate SCSI IDs or IRQ assignments. • Ensure that the hard disk drive is connected properly.
The operating system installation program continuously loops.	Free up more space on the hard disk.
ServerGuide will not start your NOS CD.	Ensure that the NOS CD is supported by ServerGuide. See the <i>Setup and Installation CD</i> label for a list of supported NOS versions.
Cannot install NOS.	Ensure that the NOS is supported on your server. If the NOS is supported, 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 the setup is complete.

<i>System Updates and Applications CD</i>	Action
Get "time out" or "Unknown host" errors.	Ensure that you have access to the Internet through FTP directly.

Troubleshooting chart

Notes:

1. Refer to the "Solving problems" section of the *User's Reference* on the *IBM xSeries Documentation* CD for more detailed troubleshooting charts.
2. If you cannot find the problem in the troubleshooting charts, run the diagnostic programs. If you have run the diagnostic test programs, or if running the tests does not reveal the problem, call for service.

Monitor problems	Suggested action
Testing	<p>Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, refer to 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"> 1. The server power cord is plugged into the server and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on, and the Brightness and Contrast controls are adjusted correctly. <p>If the items above are correct and the screen remains blank, call for service.</p>
Only the cursor appears.	Call for service.
The monitor works when you turn on the server, but goes blank when you start some application programs.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The primary monitor cable is connected to the video port. 2. You installed the necessary device drivers for the applications. <p>If the items above are correct and the screen remains blank, call for service.</p>
Wavy, unreadable, rolling, distorted screen, or screen jitter.	<p>If the monitor self-tests show the monitor is OK, 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>Notes:</p> <ol style="list-style-type: none"> 1. To prevent diskette drive read/write errors, be sure that the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM reseller or IBM marketing representative. <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>

Power problems	Suggested action
The server does not power on.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of memory that is installed is correct. 4. If you just installed an option, remove it, and restart the server. If the server now powers on, you might have installed more options than the power supply can support. 5. The LEDs on the power supply are on. <p>If the problem remains, call for service.</p>
Microprocessor problems	Suggested action
The server emits a continuous tone during POST.	<p>The startup (boot) microprocessor is not working properly.</p> <p>Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor.</p> <p>If the problem remains, call for service.</p>
Memory problems	Suggested action
The amount of memory displayed is less than the amount of memory installed.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. If you changed the memory, you updated the memory configuration using the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The server might have detected a problem and automatically disabled a DIMM bank, or a DIMM bank could have been manually disabled. <p>If the above items are correct, run the memory-diagnostic program. The system might have detected a bad memory module and automatically reallocated memory to enable you to continue to operate. If the memory tests fail, call for service or replace the failing DIMM.</p>

Option problems	Suggested action
An IBM option that was just installed does not work.	Verify that: <ol style="list-style-type: none"> 1. The server supports the option. Refer to the "Support for Servers" flowchart for information about obtaining ServerProven™ compatibility information from the World Wide Web. 2. You followed the installation instructions that came with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information using the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. If the problem remains, call for service.
Expansion enclosure problems	Suggested action
The SCSI expansion enclosure used to work, but does not work now.	Verify that: <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. For more information, see the documentation for your SCSI options and expansion enclosure.
System-management processor problems	Suggested action
System-management processor reports a general monitor failure	Disconnect the server from all electrical sources, wait for 30 seconds, reconnect the server to the electrical sources, and restart the server. If a problem remains, call for service.

Appendix A. Product warranties and notices

This chapter contains warranty and emission notices. It also contains trademarks and general-information notices.

Warranty Statement

Warranty Period

Machine - IBM @server xSeries 250

Warranty Period* - Three Years

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

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.

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Important notes

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

When referring to hard disk drive capacity, MB stands for 1000000 bytes and GB stands for 1000000000 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.

Unless otherwise stated, 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.

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Federal Communications Commission (FCC) Statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de 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.

Taiwan electrical emission statement

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Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
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

Index

A

- AC power 39
- acoustical noise emissions 2
- activity lights
 - CD-ROM drive 41
 - diskette drive 41
 - processor 43
- adapters
 - considerations 11, 13
 - hot-plug devices 12
 - installing
 - hot-plug 12
 - non-hot-plug 14
 - slot locations 11
 - system requirements 11

B

- backplane, hot-swap drive
 - connectors 25
 - installing 29
 - removing 26
 - using 24
- beep codes 47

C

- cable
 - SCSI 19, 29
- cabling
 - options 24, 25
 - SCSI backplane 24
 - ServeRAID adapter 16
- CD-ROM drive
 - activity light 41
 - eject button 41
 - specifications 2
- Class A electronic emission notice 65
- components
 - color 4, 7
 - major 4
 - SCSI backplane 25
- Configuration/Setup Utility program 45
- configuring your server 45
- connecting
 - See also installing
 - repeater card to SCSI backplane 27
 - shuttle 30
- connectors
 - hot-swap drive backplane 25
 - memory module 22
 - SCSI repeater card 25
- controls and indicators 41
- cover
 - removing 9
 - replacing 37

D

- depth 2
- DIMMs
 - installation order 22
 - installing 23

- disconnecting
 - See also removing
 - shuttle 26
- diskette
 - eject button 41
- diskette drive
 - activity light 41
 - specifications 2
- documentation CD 1
- drive
 - bays 24
 - hot-swap 31
 - placement guide 32

E

- eject button
 - CD-ROM 41
 - diskette 41
- electrical input 2
- electronic emission Class A notice 65
- electrostatic discharge-sensitive devices, handling 8, 12, 14
- environment 2
- environmental specifications
 - dimensions 2
- error messages
 - POST 48
- Ethernet speed 100 Mbps light 43
- Ethernet transmit/receive activity light 43
- Ethernet-link status light 43

F

- FCC Class A notice 65
- features
 - LVD SCSI backplane 24
 - server 2
- filler panel
 - hot-swap drive 31
 - power supply 34

H

- hard-disk drive activity light 41, 43
- hard-disk drive status light 41
- heat output 2
- hot-swap and hot-plug devices
 - adapters 12
 - color 4, 7
 - hard disk drives 31
 - power supplies 35
- hot-swap drive
 - backplane
 - components 25
 - installing 29
 - removing 26
 - using 24
 - installing 31
 - specifications 2
- hot-swap power supply
 - installing 35

I

- important notes 64
- indicators
 - See lights
- information LED panel 42
- information light 43
- installation order
 - memory modules 22
- installing
 - hot-plug adapter 12
 - hot-swap drive 31
 - hot-swap drive backplane 29
 - hot-swap power supply 35
 - media-bay bezel 36
 - memory module 23
 - microprocessor 33
 - non-hot-plug adapter 14
 - non-hot-swap drive 31
 - options
 - major components 4
 - system requirements 7
 - SCSI repeater card 25
 - VRM 33

L

- LEDs
 - See also lights
 - front of server 43
 - hard disk drive 43
- lights
 - CD-ROM drive activity 41
 - diskette drive activity 41
 - Ethernet speed 100 Mbps 43
 - Ethernet transmit/receive 43
 - Ethernet-link status 43
 - hard-disk drive activity 41, 43
 - hard-disk drive status 41
 - information 43
 - POST-complete 43
 - processor activity 43
 - system error 43
 - system power 43
- LVD SCSI backplane 24, 25, 29

M

- major components 4
- media-bay bezel
 - installing 36
 - removing 10
- memory
 - connectors 22
 - installation order 22
 - installing 22
 - specifications 2
- microprocessor
 - activity lights 43
 - installing 33
 - location 33
 - specifications 2
 - VRM 33

N

- non-hot-swap drive

- installing 31
- specifications 2

NOS See operating system

O

operating system, installing 45

options

- internal cabling 24, 25

P

PCI expansion slots 2, 11, 13

POST error messages 48

POST-complete light 43

power cords 35, 67

power supply

- installing 35
- operating requirements 34
- specifications 2

power-control button 41

power-control button shield 39

problems, solving 47

processor activity lights 43

R

removing

- cover 9
- hot-swap drive backplane 26
- media-bay bezel 10

repeater card

- connectors 25
- installing 25

replacing

- cover 37

reset button 41

S

safety information

- book v
- electrical vii
- laser viii
- lifting ix
- power cord 35
- statements v

SCSI

- backplane

 - components 25
 - installing 25, 29
 - removing 26
 - using 24

- cable

 - repeater card 29
 - ServeRAID adapter 19

IDs

- assigning 32

repeater card

- connectors 25
- installing 25

SCSISelect Utility program 45

ServeRAID adapter 16

ServeRAID Configuration program 45

ServerGuide

- CDs 45
- error symptoms 50

shield

- power-control button 39

shutting down the server 40

shuttle

- connecting 30
- disconnecting 26

size 2

solving problems 47

specifications 2

starting the server 39

static-sensitive devices, handling 8

stopping the server 40

system error light 43

system power light 43

system reliability 7

T

trademarks 64

troubleshooting chart 51

turning off the server 40

turning on the server 39

U

United States electronic emission Class A notice 65

United States FCC Class A notice 65

V

video

- specifications 2

voltage regulator module

- installing 33
- location 33

VRM See voltage regulator module

W

Web site 1

weight 2

working inside server with power on 8



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