IBM®

@server

xSeries 220
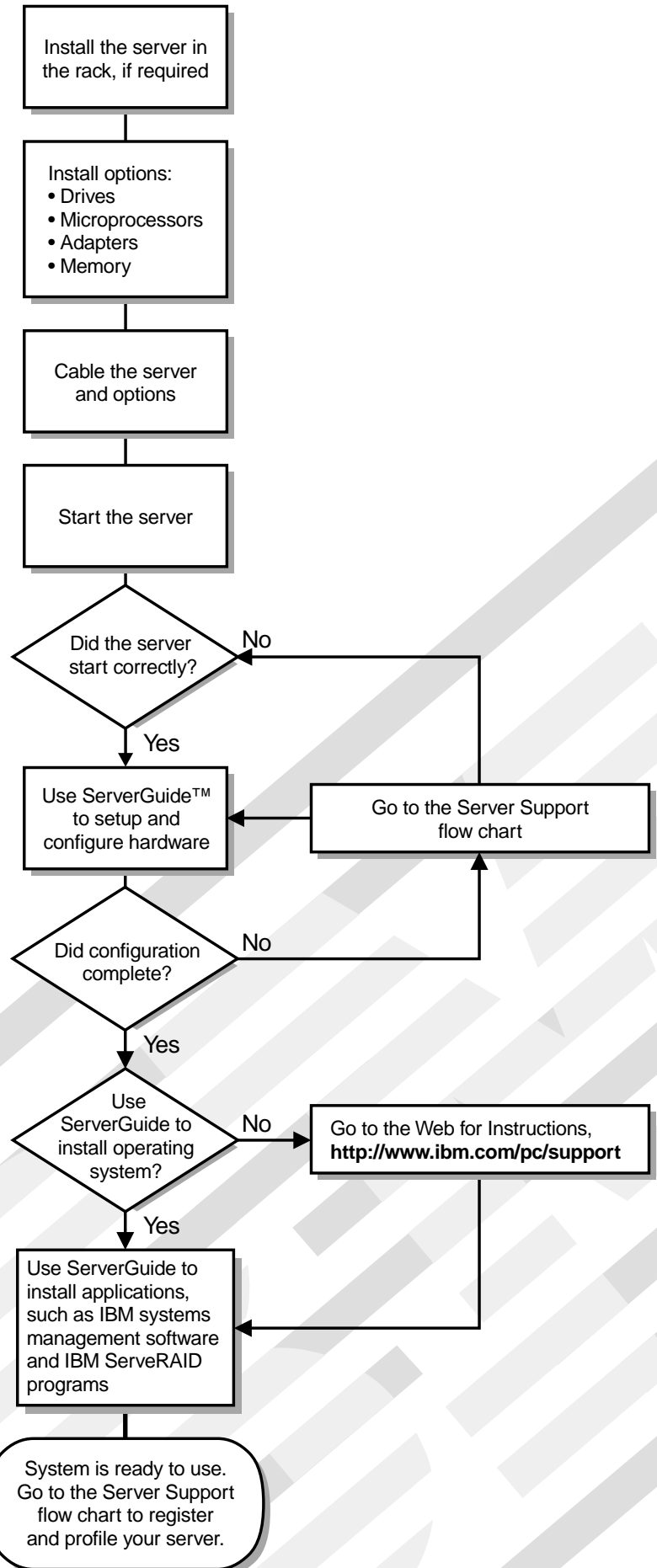
Installation Guide

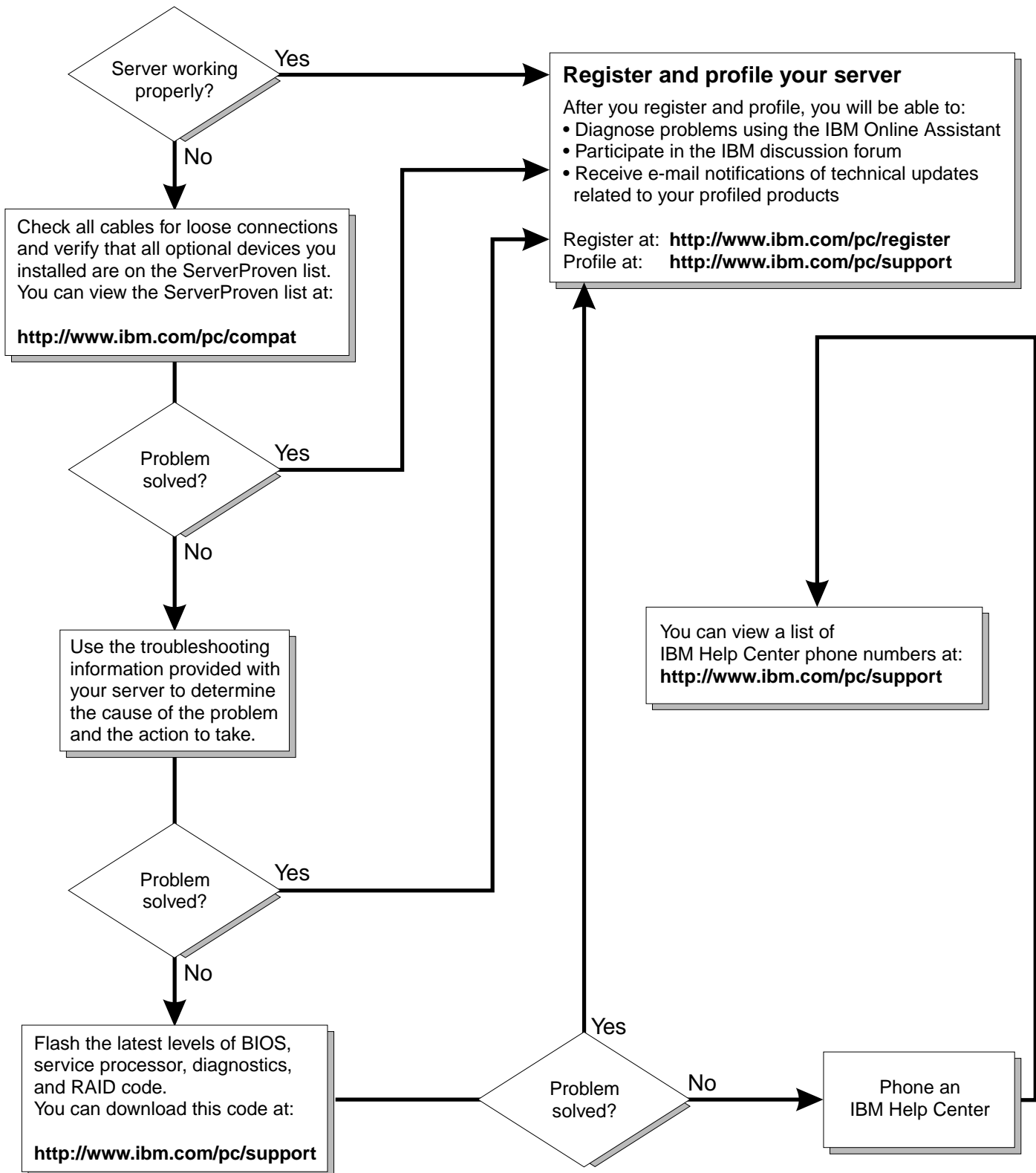## Welcome. . .

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

Install the server in
the rack, if required

Install options:
• Drives
• Microprocessors
• Adapters
• Memory

Cable the server
and options

Start the server

Did the server
start correctly? — No

Yes

Use ServerGuide™
to setup and
configure hardware ← Go to the Server Support
flow chart

Did configuration
complete? — No

Yes

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

Yes

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

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

Server Support

Server working properly? — Yes →

No ↓

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

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

↓

Problem solved? — Yes →

No ↓

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

↓

Problem solved? — Yes →

No ↓

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

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

→ **Problem solved?** — No → Phone an IBM Help Center

Yes ↑

Register and profile your server

After you register and profile, you will be able to:
- Diagnose problems using the IBM Online Assistant
- Participate in the IBM discussion forum
- Receive e-mail notifications of technical updates related to your profiled products

Register at: **http://www.ibm.com/pc/register**
Profile at: **http://www.ibm.com/pc/support**

You can view a list of IBM Help Center phone numbers at:
http://www.ibm.com/pc/support

IBM® xSeries 220

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 49.

Contents

Safety

Before installing this product, read the Safety Information book.

مج، يجب قراءة   دات السلامة

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

安装本产品前请先阅读《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.

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

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

Danger

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

To avoid a shock hazard:

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

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

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

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

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

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

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

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

Statement 2

CAUTION:

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

Do not:

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

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

Statement 3

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

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

Danger

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

Statement 4
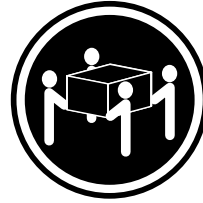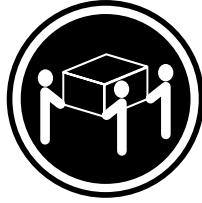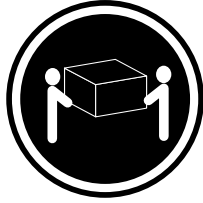
≥18 kg (39.7 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

Statement 5

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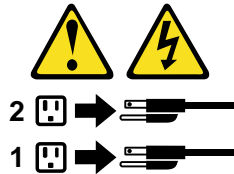**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the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

2
1

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 bag 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 anti-static 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, as heating reduces indoor humidity and increases static electricity.

Chapter 1. Introduction

Thank you for purchasing an IBM® @server xSeries 220 server. This *Installation Guide* provides the information that is needed to:

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

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

Also included is an *IBM xSeries Documentation* CD, which provides detailed information about your server.

Your server comes with a 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 xSeries 220 model and other IBM server products at the following World Wide Web address: http://www.ibm.com/eserver/xseries

To install your server in a rack, refer to the *Tower-to-Rack Conversion Kit* manual and the *Rack Installation Instructions* that are provided with your optional rack hardware for complete installation and removal instructions.

Record your product information in this table.

Product name   _____

Machine type   _____

Model number   _____

Serial number   _____

Key:

Serial number   (tower model only) _____

Manufacturer   (tower model only) _____

Phone number   (tower model only) _____

The server serial number is located on labels on the rear of the server and on the front of the server below the bezel.

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

Features and specifications

Table 1 provides a summary of the features and specifications for your xSeries 220 server.

Microprocessor:

- Intel® Pentium® III microprocessor with MMX™ technology and SIMD extensions
- 256 KB* ECC, level-2 cache (min.)
- 133 MHz front-side bus (FSB)
- Support for up to two microprocessors

Memory:

- Standard: 128 MB*
- Maximum: 4 GB*
- Type: 133 MHz, ECC, SDRAM, registered DIMMs
- Slots: 4 dual in-line

Drives standard:

- Diskette: 1.44 MB
- CD-ROM: 48X IDE
- Supports hot-swap SCSI hard disk drives (some models)

Expansion bays:

- Two 5.25-in. bays (one CD-ROM drive installed)
- Two 3.5-in. bays (one diskette drive installed)
- Three 3.5-in. slim bays available in drive cage (some models have a hard disk drive installed)

PCI expansion slots:

- Three 33 MHz/64-bit
- Two 33 MHz/32-bit

Power supply:

One 330 watt autosensing (115-230 V ac)

Video:

- S3 video controller (integrated on system board)
- Compatible with SVGA and VGA
- 8 MB SDRAM video memory

Size:

- Height: 470 mm (18.5 in.)
- Depth: 508 mm (20 in.)
- Width: 165 mm (6.5 in.)
- Weight: approximately 19.5 Kg (43 lb.) when fully configured or 15.9 Kg (35 lb.) minimum

Integrated functions:

- Ultra160 SCSI low voltage differential (LVD) controller
- One 10BASE-T/100BASE-TX Intel Ethernet controller on the system board
- Two serial ports
- Parallel port
- Two Universal Serial Bus (USB) ports
- Keyboard port
- Mouse port
- IDE controller port
- Video port

Acoustical noise emissions:

- Sound power, idling: 5.9 bel maximum
- Sound power, operating: 6.1 bel maximum

Environment:

- Air temperature:
  — Server on: 10º to 35º C (50.0º to 95.0º F). Altitude: 0 to 914 m (2998.7 ft)
  — Server on: 10º to 32º C (50.0º to 89.6º F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft)
  — Server off: 10º to 43º C (50.0º to 109.4º F). Maximum altitude: 2133 m (6998.0 ft)
- Humidity:
  — Server on: 8% to 80%
  — Server off: 8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour

- Minimum configuration: 341 Btu (100 watts)
- Maximum configuration: 1604 Btu (470 watts)

Electrical input:

- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  — Minimum: 100 V ac
  — Maximum: 127 V ac
- Input voltage high range:
  — Minimum: 200 V ac
  — Maximum: 240 V ac
- Input kilovolt-amperes (kVA), approximately:
  — Minimum: 0.08 kVA
  — Maximum: 0.52 kVA

Table 1. Features and specifications

*KB equals approximately 1000 bytes. MB equals approximately 1000000 bytes. GB equals approximately 1000000000 bytes.

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 220 server

The orange color on components and labels in your server identifies hot-swap 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. For information about installing or removing a hot-swap component, see "Chapter 2. Installing options," on page 9.

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

Notes:

1. You must turn off the server before touching these touch points.

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

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

Microprocessor

Rear adapter
retaining bracket

EMC shields

Memory modules

Filler
panels

Drive cage

Front adapter
support bracket

Support bracket assembly

Cover
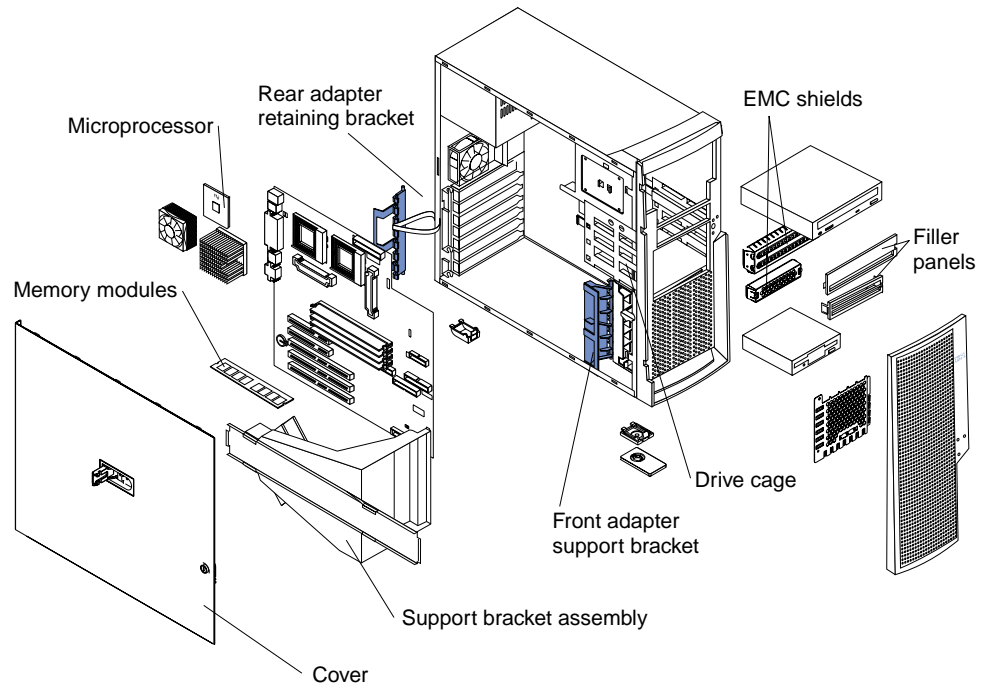
System board

The illustrations in the following sections show the components on the system board.

System board option connectors

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

Microprocessor 2
(U11)

Microprocessor 1
(U12)

Voltage regulator
module
(VRM) 2 (J12)

Voltage regulator
module
(VRM) 1 (J42)

DIMM 1
(J19)

DIMM 2
(J21)

DIMM 3
(J23)

DIMM 4
(J26)

PCI 1
(J29)

PCI 2
(J31)

Battery
(BH1)

PCI 5 (J40)

System
management
(J32)

PCI 4 (J39)

PCI 3 (J35)
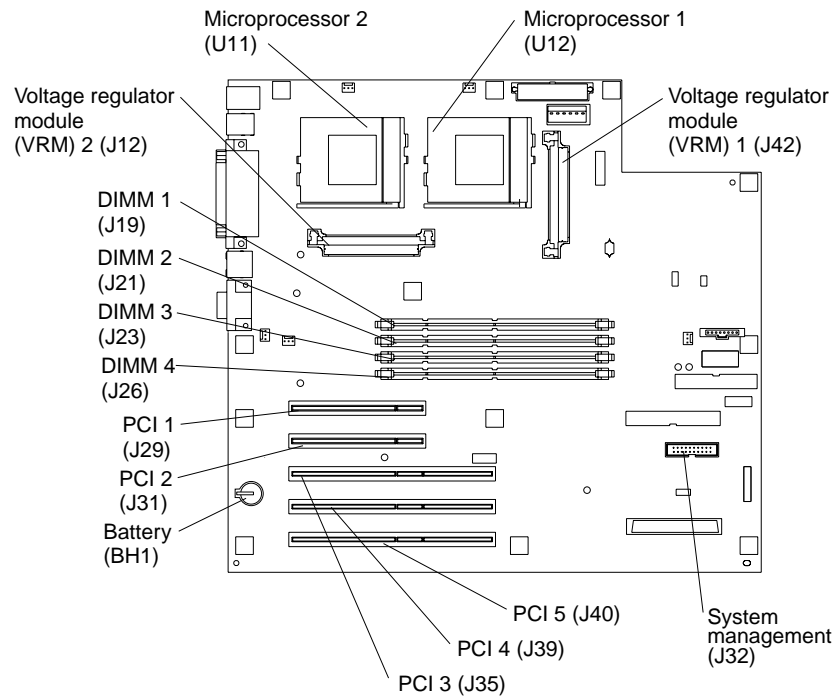
Notes:

1. If your server and operating system support system-management functions and, if the optional system-management adapter is installed in your server, the system-management connector (J32) is dedicated for use by the system-management adapter.

2. The system-management adapter is also known as the service processor.

System board internal cable connectors

The following illustration identifies system-board connectors for internal cables.
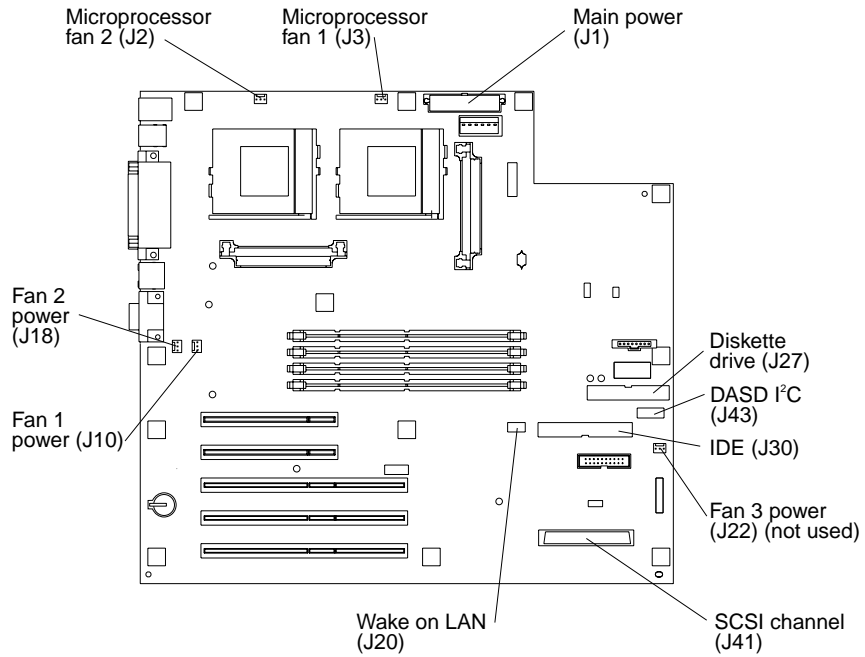
System board external port connectors

The following illustration identifies system-board connectors for external devices.

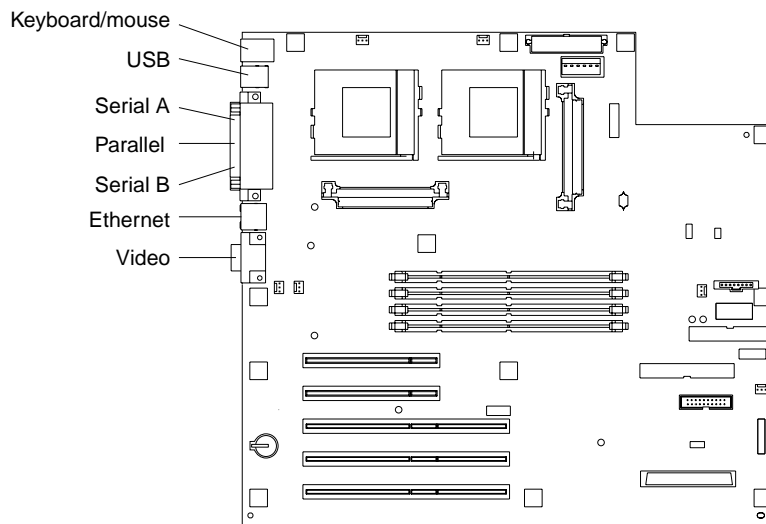> **Note:** For information on adding external small computer system interface (SCSI) devices to your server, refer to the *User's Reference* on the *IBM xSeries Documentation* CD.

System board jumpers and switches

The following illustration identifies the jumpers and switches on the system board.
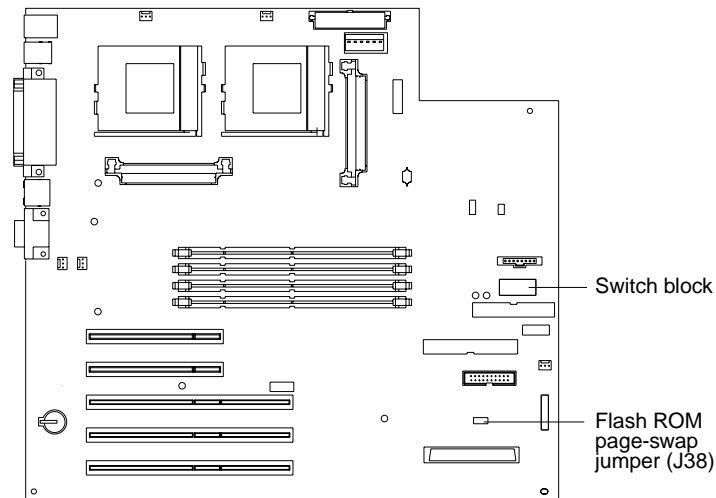
System board jumper blocks

Any jumper blocks on the system board that are not shown in the illustration are reserved. For normal operation of the system, no jumpers should be installed on any of the jumper blocks. Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for information about the flash read-only memory (ROM) page-swap jumper.

System board switch block

The switch block contains microswitches 1 through 8. As pictured in this illustration, switch 8 is at the right of the switch block, and switch 1 is at the left.

The following table describes the function for each switch. The default setting is Off for all switches in the switch block.

Switch number	Switch description
8	Power-on password-override switch. When toggled to the side that is opposite the default position, bypasses the power-on password, if one is set.
7	Reserved.
6	Reserved.
5	Force power on.
4	Reserved.
3	Reserved.
2	Reserved.
1	Reserved.

Table 2. Switches 1 through 8

Chapter 2. Installing options

This chapter provides the basic information that is needed to install hardware options in your server. If you need more detailed installation information, refer to 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 under "Handling static sensitive devices" on page xi, and read the safety statements in "Safety" on page v. These guidelines will help you work safely while working with your server or options.

- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.

- Back up all important data before you make changes to disk drives.

- Have a small, flat-blade screwdriver available.

- For a list of supported options for your server, refer to http://www.ibm.com/pc/compat on the World Wide Web.

System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.

- The cover is in place during normal operation, or is removed for no longer than 30 minutes while the server is operating.

- There is space around the server to allow the server cooling system to work properly. Leave about 127 mm (5 in.) of space around the front and rear of the server.

- Cables for optional adapters are routed according to the instructions that are provided with the adapters.

- A failed fan is replaced within one hour.

Removing the side cover

The following information describes how to remove the side cover.

Note: The illustrations in this document might differ slightly from your hardware.
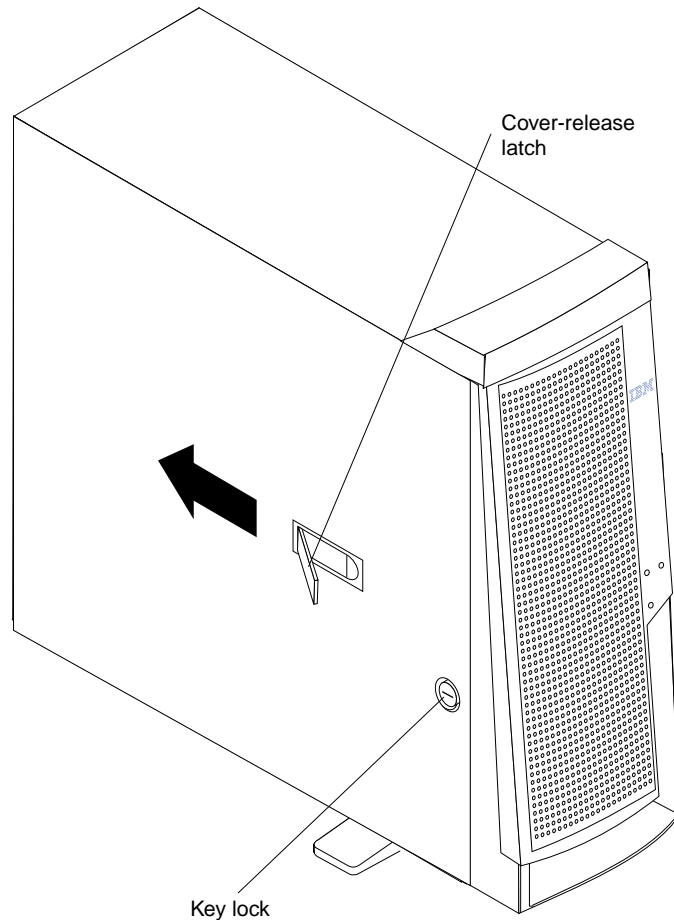
To remove the left-side cover from the server, do the following:

1. Review the information in "Before you begin" on page 9.

2. Turn off the server and all attached devices, and disconnect all external cables and power cords.

3. If necessary, unlock the server cover.

4. Pull out on the cover-release latch at the rear of the server; then, slide the cover toward the rear of the server and remove it.

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

5. For a tower model, rotate the stabilizing feet on the bottom of the server, and place the server on its side to install or remove components.

Removing the support bracket assembly

When working with some options such as hard disk drives and microprocessors, you must first remove the support bracket assembly to access the location of the option. The support bracket assembly consists of a support bracket, an air baffle, and a fan.
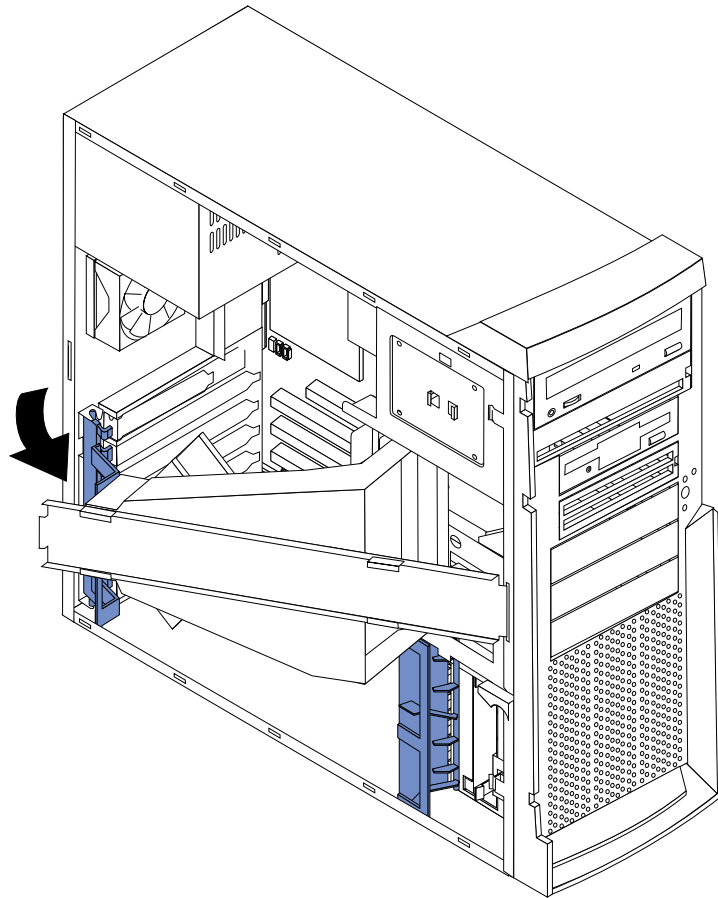
To remove the support bracket assembly, do the following:

1. Review the safety precautions in "Safety" on page v.

2. Turn off the server and peripheral devices and disconnect all external cables and power cords.

3. Remove the cover (see "Removing the side cover" on page 10 for details).

4. If your server is a non-hot-swap model, continue with step 6.

5. If your server is a hot-swap model, press down on the latches on either side of connector J42, and remove the voltage regulator module (VRM) from connector J42. (See "System board option connectors" on page 4 for connector locations.)

   Note: Remember to reinstall this VRM after you reinstall the support bracket assembly.

6. Disconnect the fan cable (connector J10) from the system board. (See "System board internal cable connectors" on page 5 for connector locations.)

   Note: Remember to reconnect this cable after you reinstall the support bracket assembly.

7. Carefully pull up on the end of the support bracket assembly that is closer to the rear of the server; then, rotate and lift the support bracket assembly out of the server.

8. Store the support bracket assembly in a safe place.

Working with adapters

You can install up to five peripheral component interconnect (PCI) adapters in the PCI slots on the system board.

Your server comes with an integrated video controller. When you install a video adapter, the server BIOS automatically disables the integrated video controller.

The following illustration shows the location of the 33 MHz PCI expansion slots.

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

PCI slot 1 32-bit 33 MHz (J29)

PCI slot 2 32-bit 33 MHz (J31)

PCI slot 3 64-bit 33 MHz (J35)

PCI slot 4 64-bit 33 MHz (J39)

PCI slot 5 64-bit 33 MHz (J40)
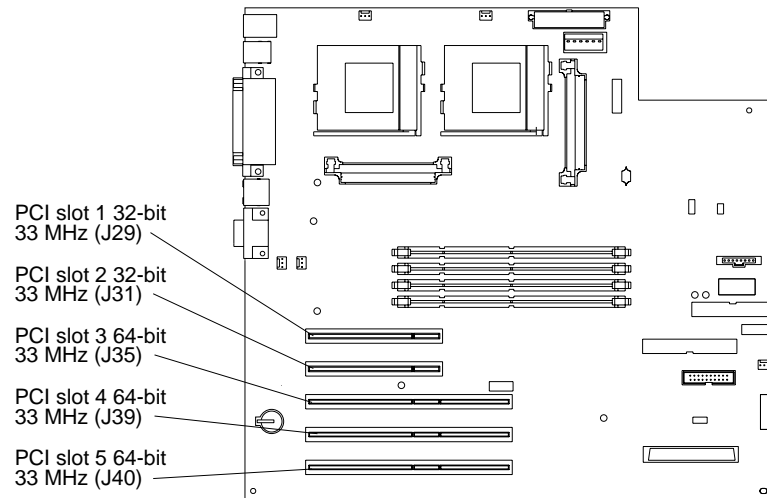
Adapter considerations

Before you install adapters, review the following:

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

- You can install full-length adapters in all expansion slots.

- You can install a 32-bit adapter in any of the PCI slots, but you might want to install it in a 32-bit slot and use the 64-bit slots for 64-bit adapters.

- Your server supports 5.0 V and universal PCI adapters; it does not support 3.3 V adapters.

- Your server uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.

- The server has two PCI buses. PCI slots 1 and 2 are on PCI bus A, and PCI slots 3, 4, and 5 are on PCI bus B.

  Note: PCI bus A is sometimes referred to as bus 0; PCI bus B is sometimes referred to as bus 1.

  The system scans PCI slots 1 through 5 to assign system resources; then, the system starts (boots) the PCI devices in the following order: PCI slots 1 and 2, system board SCSI devices, and then PCI slots 3 through 5.

- If you plan to use the Wake on LAN (WOL) function in the server, you must install a Wake on LAN-enabled network interface card (NIC adapter) in PCI slot 1, and install the Wake on LAN cable that comes with the Wake on LAN adapter to connect this adapter to the system board. You must use a Wake on LAN-enabled adapter as identified in the xSeries 220 ServerProven list at http://www.ibm.com/pc/compat/. Only PCI slot 1 supports a Wake on LAN-enabled adapter. For additional information on the Wake on LAN function, adapter, and cables, refer to the documentation that comes with the Wake on LAN adapter.

- If you plan to use the optional system-management adapter function in the server, you must install the optional system-management adapter in PCI slot 2. Only PCI slot 2 supports the optional system-management adapter. For additional information on the optional system-management adapter, refer to the documentation that comes with the adapter.

Installing an adapter

The illustrations in this document might differ slightly from your hardware.
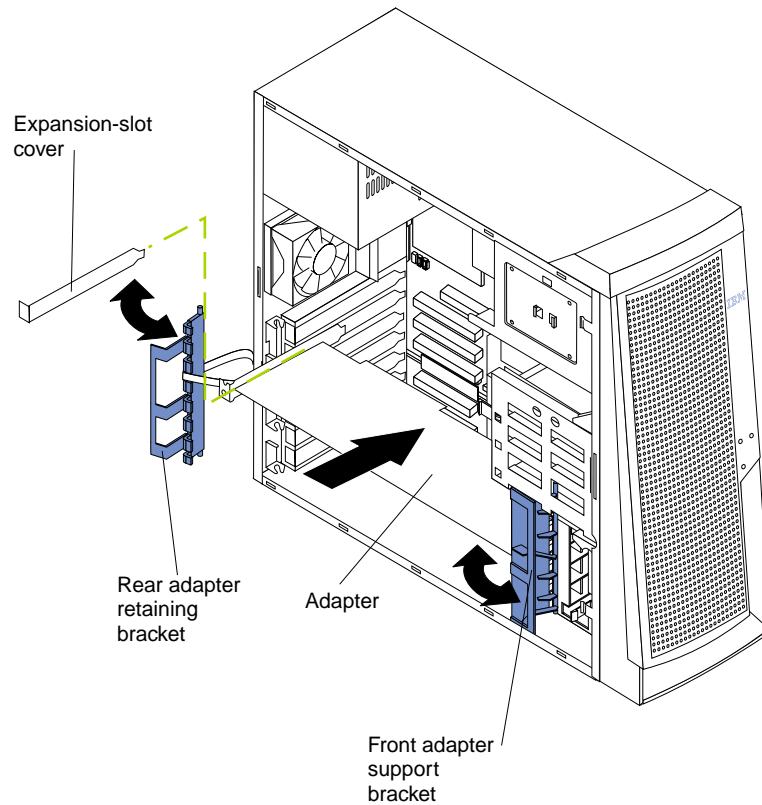
Attention: When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static sensitive devices" on page xi.

To install an adapter, do the following:

1. Review the safety precautions in "Safety" on page v.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Remove the cover (see "Removing the side cover" on page 10 for details).
4. Carefully remove the support bracket assembly from the server (see "Removing the support bracket assembly" on page 10). Store the cover and the support bracket assembly in a safe place.
5. Determine which expansion slot you will use for the adapter.

   Note: Check the instructions that come with the adapter for any requirements or restrictions.

6. Remove the rear adapter retaining bracket from the server. If you are installing a full-length adapter, rotate the front adapter support bracket to the open (unlocked) position.
7. Remove the expansion-slot cover. Store it in a safe place for future use.

   Attention: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emission characteristics of the system and ensures proper cooling of system components.

8. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route cables before you install the adapter.

9. Remove the adapter from the static-protective package.

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

10. Place the adapter, component-side up, on a flat, static-protective surface.

11. Set any jumpers or switches as described by the adapter manufacturer.

12. Install the adapter:

    a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system 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 system-board connector before you apply power. Incomplete insertion might cause damage to the system board or the adapter.

    c. When the adapter is fully seated, release the front adapter support bracket by pushing inward on the latch. Make sure that the front adapter support bracket holds the adapter securely in place.

    d. If you opened the front adapter support bracket, rotate it to the closed (locked) position; then, reinstall the rear adapter retaining bracket in the server.

13. Connect any needed cables to the adapter.

    Attention: Route cables so that they do not block the flow of air from the fans.

    The following illustration shows how to reroute the SCSI cable. If you install a ServeRAID™ adapter and intend to use it with hot-swap, hard disk internal drives, remove the cable from the internal SCSI connector (J41) on the system board and connect it to the ServeRAID adapter.

    Note: You can also install a ServeRAID adapter in non-hot-swap models; however, non-hot-swap models do not support hot-swap hard disk drives.

SCSI cable

ServeRAID
adapter
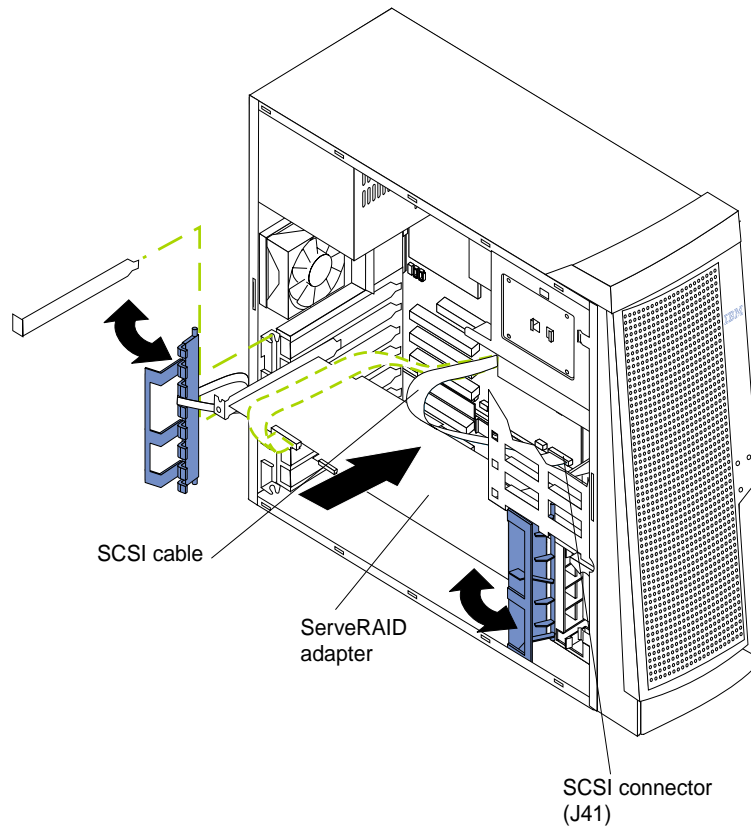
SCSI connector
(J41)

14. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly and the side cover (see "Installing the cover" on page 31 for details).

   Note: If your server is a hot-swap model, reinstall the VRM in connector J42 after you reinstall the support bracket assembly.

15. Reconnect the external cables and power cords; then, turn on the server.

Installing memory modules

Your server comes with a dual in-line memory module (DIMM) that is installed on the system board in DIMM slot 1 (connector J19).

Notes:

1. When installing additional memory modules, install the second memory module in the connector labeled DIMM3 (J23), the third in DIMM2 (J21), and the fourth in DIMM4 (J26). (See the following illustration for memory-connector locations.)

2. Your xSeries 220 server supports 128 MB, 256 MB, 512 MB, and 1 GB DIMMs. Your server supports a maximum of 4 GB of system memory. See the ServerProven list at http://www.ibm.com/pc/us/compat for a list of memory modules for use with your server.

3. 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 by using the Configuration/Setup Utility program. When you restart the server, the system displays a message that indicates that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings.** Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for more information.

Note: The illustrations in this document might differ slightly from your hardware.
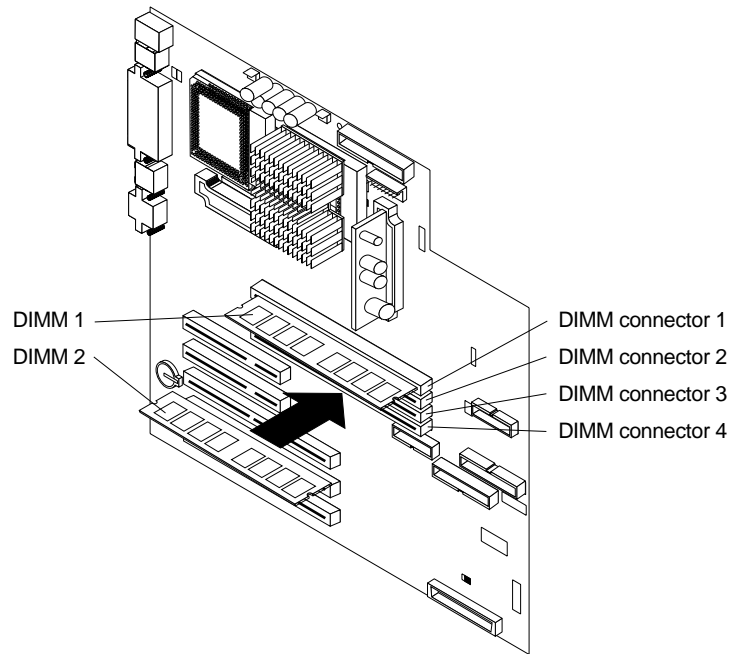
Attention: When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static sensitive devices" on page xi.

To install a DIMM, do the following:

1. Review the safety precautions in "Safety" on page v.
2. Turn off the server, and remove the power cords.
3. Remove the cover (see "Removing the side cover" on page 10 for details).
4. Select the connector in which to install the DIMM.
5. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
6. Install the DIMM:
   a. Open the retaining clips on the connector.
   b. Turn the DIMM so that the pins align correctly with the connector.
   c. Insert the DIMM into the connector by pressing on one edge of the DIMM and then on the other edge of the DIMM. Ensure that you press the DIMM straight into the connector.
   d. Make sure that the retaining clips are in the closed position. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
7. If you have other options to install or remove, do so now.
8. Replace the cover (see "Installing the cover" on page 31 for details).
9. Reconnect the power cords, and turn on the server.

Internal drive bays

Internal drives are installed in *bays*. The bays of the xSeries 220 are in the front of the server, as shown in the following illustration.

Note: The illustrations in this document might differ slightly from your hardware.
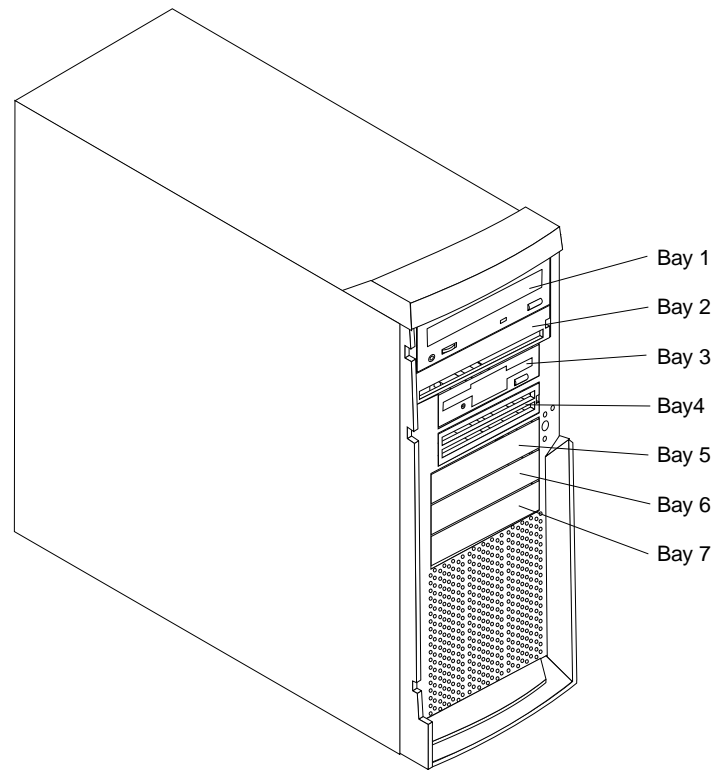
To remove or install a drive, you must turn off the server first, unless you are removing or installing a hot-swap hard disk drive. Diskette drives, tape drives, and CD-ROM drives are removable-media drives. You can install removable-media drives in bays 1, 2, 3, and 4. You can install SCSI hard disk drives in bays 4, 5, 6, and 7.

- Your server comes with a 3.5-inch, 1.44 MB diskette drive in bay 3, an integrated drive electronics (IDE) CD-ROM drive in bay 1, and a hard disk drive in bay 7 (in some models).

- The xSeries 220 server supports five 3.5-inch drives; however, the server supports only one diskette drive.

- The diskette drive uses 1 MB and 2 MB diskettes. For optimum use, format 1 MB diskettes to 720 KB and format 2 MB diskettes to 1.44 MB.

- The xSeries 220 server supports two 5.25-inch drives and four SCSI hard disk drives. The server does not support IDE hard disk drives. Some models support hot-swap hard disk drives. Other models support only non-hot-swap hard disk drives. Refer to the documentation that comes with your server for additional information.

  Your server supports four 1-inch (26 mm) slim, 3.5-inch SCSI hard disk drives in the hard disk drive bays (4, 5, 6, and 7). You can install four non-hot-swap hard disk drives in the models that have the standard non-hot-swap drive cage. You can install three hot-swap hard disk drives and one non-hot-swap hard disk drive in the models that come with the hot-swap drive cage. Both the non-hot-

swap and hot-swap drive cages hold a maximum of three hard disk drives. The drive cages comprise bays 5, 6, and 7.

- Bay 2 comes without a device installed. This bay is for a 5.25-inch, half-high, removable-media drive, such as a tape backup drive.
- Bay 4 is for a 3.5-inch, slim, removable-media drive or SCSI hard disk drive.

Note: The electromagnetic interference (EMI) integrity and cooling of the server are both protected by having bays 1 through 4 covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

Preinstallation steps (all bays)

Before you install drives in your server, verify that you have all the cables and any other equipment specified in the documentation that comes with the drive. You might also need to perform certain preinstallation activities. Some of the steps are required only during the initial installation of an option.

1. Read "Safety" on page v, "Handling static sensitive devices" on page xi, and the documentation that comes with your drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive.

Installing a drive in bay 1, 2, 3, or 4
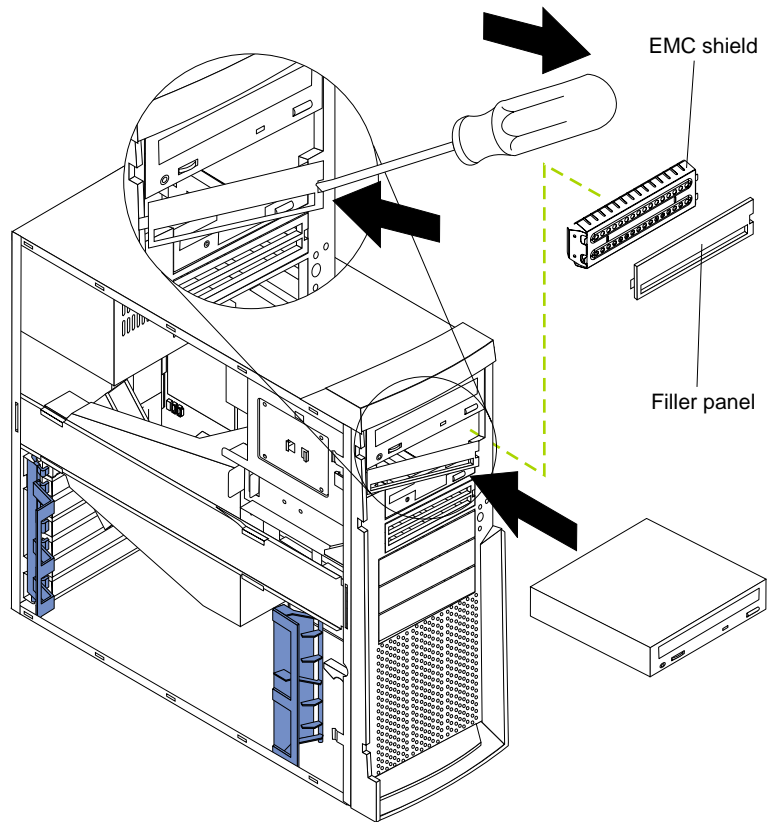
To install a drive in bay 1, 2, 3, or 4, do the following:

1. Read the information in "Preinstallation steps (all bays)" on page 19.

2. Turn off the server and peripheral devices; then, remove the side cover (see "Removing the side cover" on page 10 for details).

3. Insert a screwdriver into the slot on the right side of the filler panel, and remove the filler panel from the server.

4. Insert a screwdriver into the slots on the front of the EMC shield, and remove the EMC shield from the bay.

5. If the drive is a laser product, observe the following safety precaution.

Statement 3

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

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**

- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

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

6. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag and place it on a static-protective surface.

7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

8. Push the drive into the bay.

9. If the drive is an IDE device, plug one connector of the IDE cable into the back of the drive and the other end of the cable into the IDE connector (J30) on the system board.

   If the drive is a SCSI device, plug one connector of the SCSI cable into the back of the drive and make sure that the other end of the cable is connected to the SCSI connector (J41) on the system board.

   Note: Ensure that you route the SCSI cable so that it does not block the airflow to the rear of the drives or over the microprocessors.

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

11. If you are installing another drive, do so now. Otherwise, continue with the next step.

12. If you have other options to install or remove, do so now; otherwise, replace the cover (see "Installing the cover" on page 31 for details).

Installing a hard disk drive

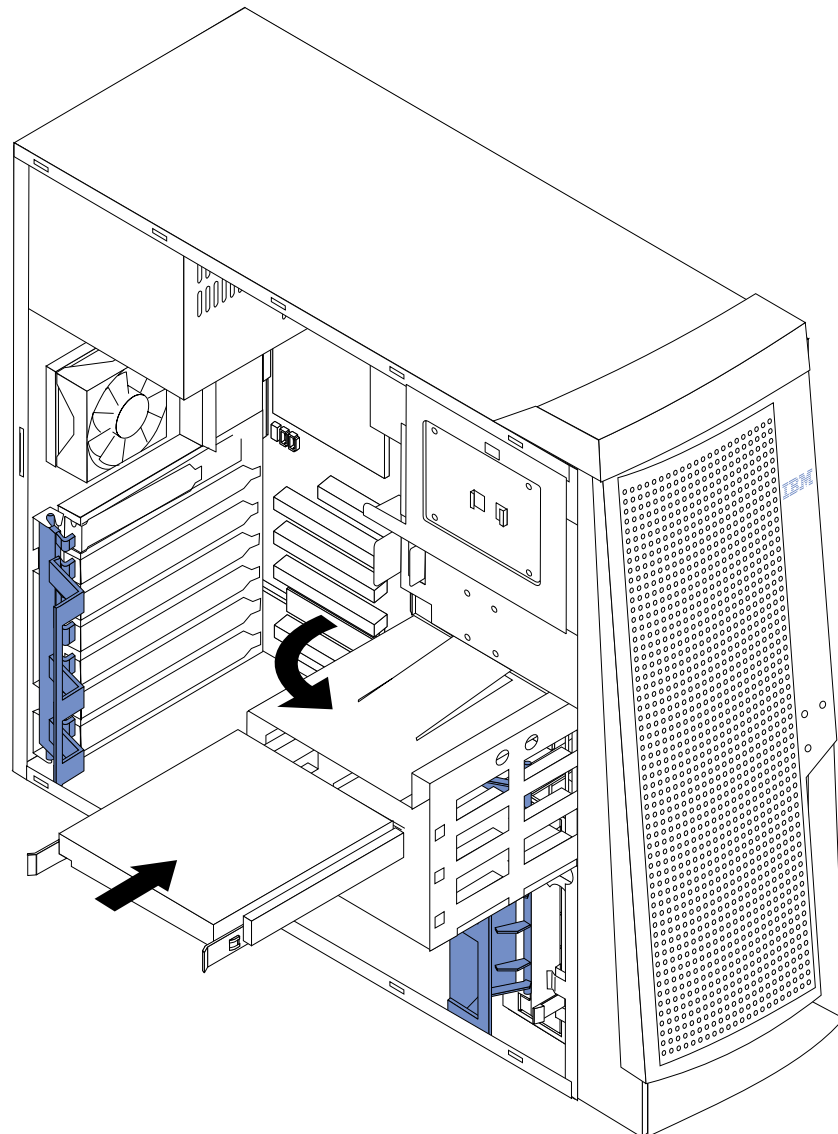Refer to the following sections to install a hard disk drive.

Attention:

- When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static sensitive devices" on page xi.

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

Notes:

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

2. If your server has a redundant array of independent disks (RAID) adapter installed, refer to the information provided with the RAID adapter for information about configuring a drive.

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

Note: You can also install a non-hot-swap hard disk drive in bay 4. See "Installing a drive in bay 1, 2, 3, or 4" on page 20 for instructions.

To install a non-hot-swap hard disk drive in bay 5, 6, or 7, do the following:

1. Read the information in "Preinstallation steps (all bays)" on page 19.

2. Turn off the server and peripheral devices, and disconnect all external cables and power cords; then, remove the cover (see "Removing the side cover" on page 10 for details).

3. Carefully remove the support bracket assembly from the server (see "Removing the support bracket assembly" on page 10). Store the cover and the support bracket assembly in a safe place.

4. Rotate the drive cage upward. If your server has a hard disk drive installed in the drive cage, disconnect the cables from the rear of the drive.

5. Remove the plastic bag that contains the drive rails and screws from inside the drive cage.

6. Install rails on each drive in the drive cage:

   a. Pull the blue slide rails out of the plastic bag.

   b. Install the screws on the sides of the drive.

   c. Align the rails on the drive with the guide rails in the drive bay.

   d. Push the drive into the bay until it clicks into place.

7. Reinstall the drive cage in the server. Rotate the drive cage downward until it snaps into place.

8. Connect the server SCSI and power cables to the rear of the drives.

   Note: Ensure that you route the SCSI cable so that it does not block the airflow to the rear of the drives or over the microprocessors.

9. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly and the side cover (see "Installing the cover" on page 31 for details).

   Note: If your server is a hot-swap model, reinstall the VRM in connector J42 after you reinstall the support bracket assembly.

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

If you purchased a hot-swap model, your server contains hardware that you can use 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. If these drives are connected to an optional controller, such as a ServeRAID controller, that supports this function, and if one of these drives becomes defective, the ServeRAID controller can rebuild the data from that drive onto another hot-swap drive. Refer to the information that comes with your ServeRAID controller for details.

Each hot-swap drive has two indicator lights: the hard disk drive activity light and the hard disk drive status light. When the green hard disk drive activity light is flashing, the controller is accessing the hard disk drive. When this occurs, the SCSI activity light on the front of the server also illuminates. The SCSI activity light is illustrated and described in "Server controls and indicators" on page 37. If the amber hard disk drive status light for a drive is lit continuously, that individual drive is faulty and requires replacement. When the hard disk drive status light indicates a drive fault, you can replace a hot-swap drive without turning off the server.
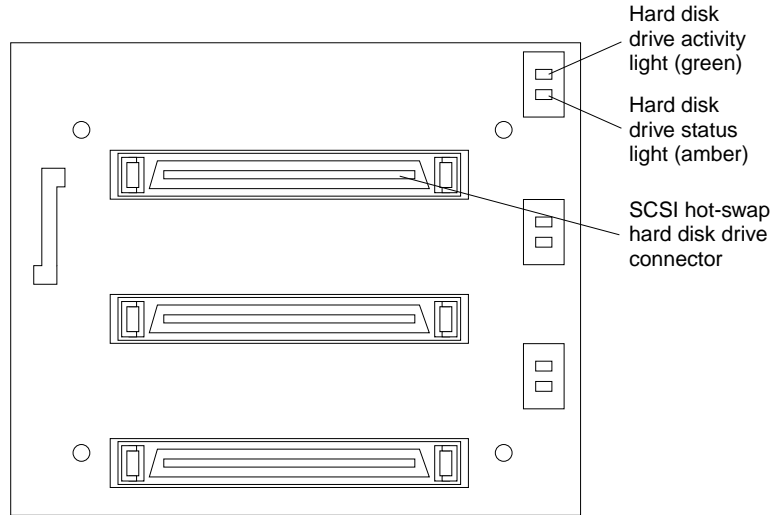
Note: The hard disk drive activity light is also known as the SCSI hard disk drive activity light.

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

The hot-swap bays connect to a SCSI *backplane*. This backplane is the printed circuit board behind the bay. The backplane controls the SCSI IDs for the hot-swap drives.
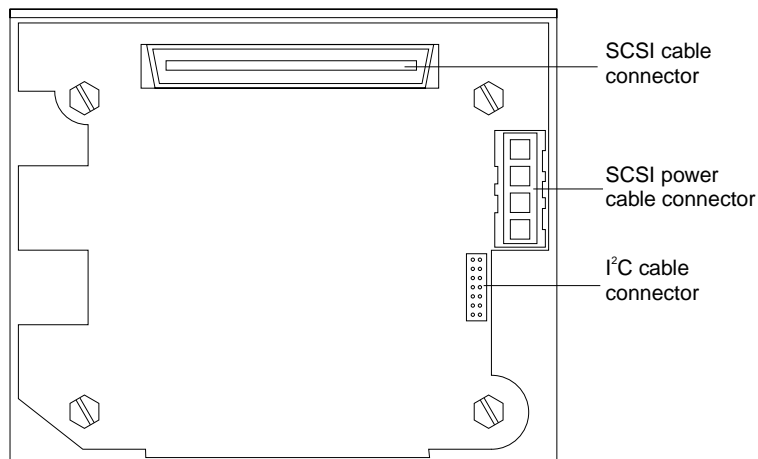
The following illustration shows the hot-swap-drive backplane component locations, as viewed from the front of the server.

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

Note: The hard disk drive activity light and hard disk drive status light on the backplane match the hard disk drive activity light and hard disk drive status light on the hot-swap drive.

The following illustration shows the rear connectors on the hot-swap-drive backplane, as viewed from the rear of the server.

The following illustration shows how to install a hot-swap hard disk drive in the server. When you install hot-swap hard disk drives, install them in the following order: bay 7, bay 6, and bay 5.
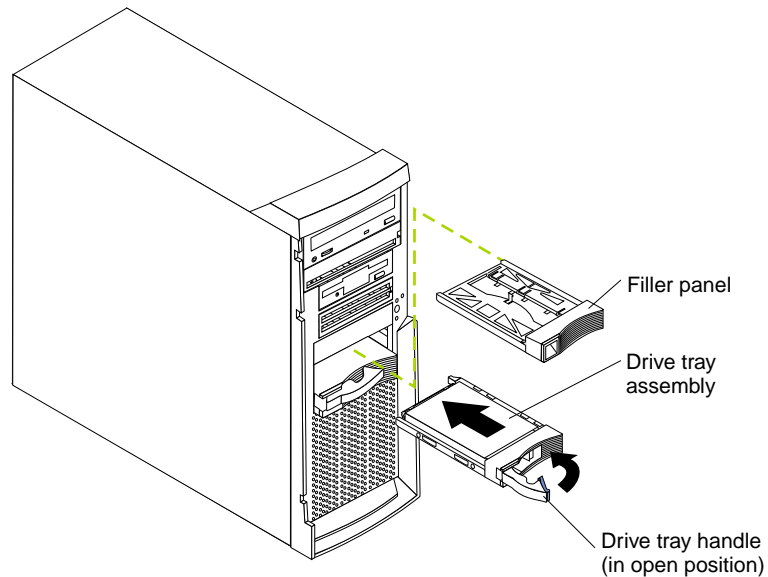
Filler panel

Drive tray
assembly

Drive tray handle
(in open position)

Attention:

- When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static sensitive devices" on page xi.

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

To install a hot-swap hard disk drive in bay 5, 6, or 7, do the following:

1. Review "Before you begin" on page 9.

2. Read the information in "Preinstallation steps (all bays)" on page 19.

   Note: You do not have to turn off the server to install hot-swap hard disk drives in these bays.

3. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.

4. Install the hard disk drive in the hot-swap bay:

   a. Ensure that the tray handle is open (that is, perpendicular to the drive).

   b. Align the drive tray assembly with the guide rails in the bay.

   c. Gently push the drive tray assembly into the bay until the drive stops.

   d. Push the tray handle to the closed (locked) position.

   e. Check the hard disk drive status light to verify that the hard disk drive is operating properly.

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

   Note: If your server has a ServeRAID controller, you might need to reconfigure your disk arrays after installing hard disk drives. Refer to the information that comes with your ServeRAID controller.

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

Installing a microprocessor

Your server comes with one microprocessor, which is installed in microprocessor connector U12 (the microprocessor connector that is closer to the power supply). This is the startup (boot) microprocessor. If you install a microprocessor in microprocessor connector U11, that one becomes the startup microprocessor, and the microprocessor that is installed in microprocessor connector U12 is the application microprocessor.

You must also install a VRM when you install a microprocessor.

Notes:

1. The illustrations in this document might differ slightly from your server.

2. If necessary, see "System board option connectors" on page 4 for connector locations.

Attention:

- To avoid damage and ensure proper server operation when you install a new or additional microprocessor, use microprocessors that have the same cache size and type and the same clock speed. Microprocessor internal clock frequencies and external clock frequencies must be identical. See the ServerProven list at http://www.ibm.com/pc/compat for a list of microprocessors for use with your server.

- When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static sensitive devices" on page xi.

To install an additional microprocessor, do the following:

1. Review the safety precautions in "Safety" on page v.

2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover (see "Removing the side cover" on page 10 for details).

3. Carefully remove the support bracket assembly from the server (see "Removing the support bracket assembly" on page 10). Store the cover and the support bracket assembly in a safe place.

4. Lift the release lever on the microprocessor connector, and remove the terminator card from the microprocessor connector.

5. Install the microprocessor:

   a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

   b. Orient the microprocessor over the microprocessor connector, as shown in the following illustration. Carefully press the microprocessor into the connector.

Microprocessor 2
connector

Terminator card

Microprocessor 2

intel

Lever

Microprocessor
orientation indicator
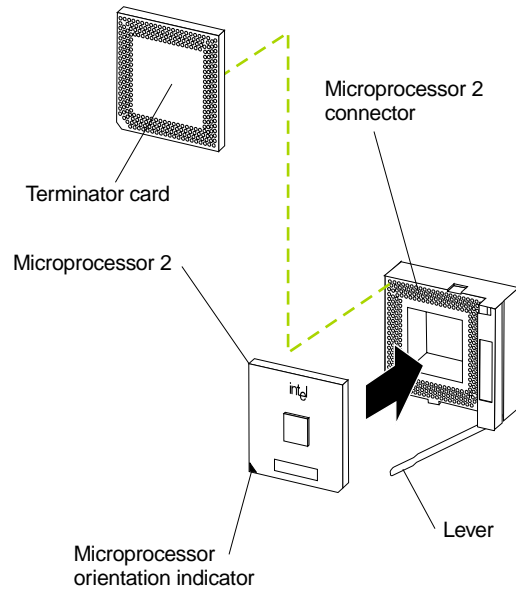
**Attention:** To avoid bending the pins, do not use excessive force when pressing the microprocessor into the connector.

6. Press the release lever down to lock the microprocessor into place.

7. If you are installing a microprocessor that has a speed of 933 MHz or higher, continue with step 9 on page 29.

   If you are installing a microprocessor that has a speed lower than 933 MHz, continue with step 8 on page 28.

8. If you are installing a microprocessor that has a speed lower than 933 MHz, install the heat sink onto the microprocessor:
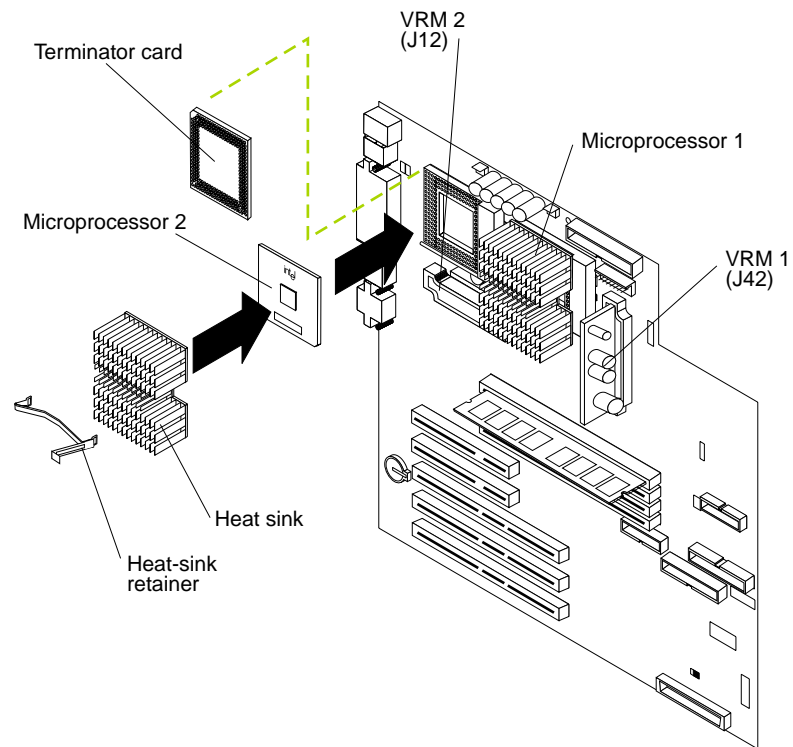
a. Peel the plastic protective strip off the bottom of the heat sink. Make sure that the square of thermal material is still on the bottom of the heat sink.

b. Align and place the heat sink on top of the microprocessor.

c. Align and place the heat-sink retainer (clip) over the heat sink; then, snap it into place.

d.

9. If you are installing a microprocessor that has a speed of 933 MHz or higher, install a fan sink on the microprocessor and connect the fan-sink power cable to the system board:
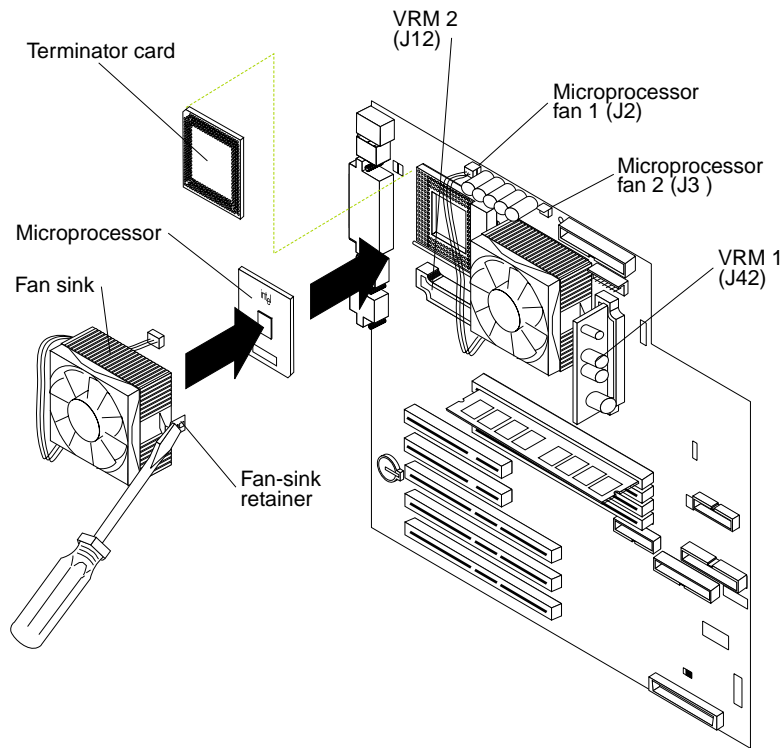
a. Peel the plastic protective strip off the bottom of the fan sink. Make sure that the square of thermal material is still on the bottom of the fan sink.

b. Align and place the fan sink on top of the microprocessor.

c. Align and place the fan-sink retainer (clip) over the fan sink.

d. Insert a small, flat-blade screwdriver into the tab on the fan-sink retainer.

e. Press down and in with the screwdriver handle to snap the fan-sink retainer into place in the slot on the microprocessor, over the fan sink.

f. Connect the built-in fan-sink power cable to the appropriate connector on the system board:

- If you installed the microprocessor in connector U11, connect the fan-sink power cable to connector J2.

- If you installed the microprocessor in connector U12, connect the fan-sink power cable to connector J3.

10. Place the terminator card in the static-protective package that your new microprocessor was shipped in, and store it in a safe place. You will need to install the terminator card again if you ever remove the microprocessor and do not replace it with another microprocessor.

11. Install the VRM that is included in the microprocessor kit.

    Attention: Use of other VRMs might cause your server to overheat.

    a. Center the VRM over the appropriate VRM connector:

    (1) If you installed the microprocessor in connector U11, press down on the latches on either side of connector J12, and install the VRM in connector J12.

(2) If you installed the microprocessor in connector U12, press down on the latches on either side of connector J42, and install the VRM in connector J42.

   Note: If your server is a hot-swap model, reinstall the VRM in connector J42 after you reinstall the support bracket assembly.

b. Make sure that the VRM is oriented and aligned correctly.

c. Press the VRM into the connector.

   Note: If you remove the microprocessor later, remember to install the terminator card in the appropriate microprocessor connector and to remove the VRM from the appropriate VRM connector. Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for details.

12. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly.
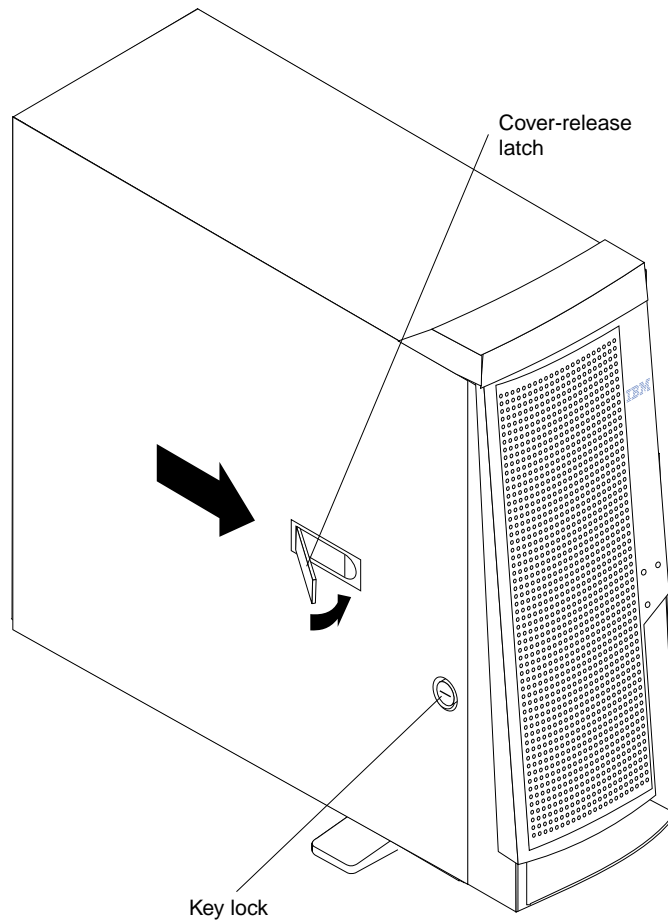
13. Replace the cover (see "Installing the cover" on page 31 for details).

14. Reconnect the external cables and power cords; then, turn on the server.

Installing the cover

The following information describes the cover installation procedure.

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

Note: If you removed the support bracket assembly after you removed the cover, reinstall it before you install the cover.

To install the server left-side cover:

1. Clear any cables that might impede the replacement of the cover.

2. Align the bottom tabs of the side cover with the matching slots in the server chassis; then, insert the tabs into the slots.

3. Close the cover-release latch to pull the cover forward and lock the cover in place.

4. Make sure that the stabilizing feet are rotated outward so that they properly support the server.

5. Reconnect the external cables and cords to the server; then, plug the power cords into electrical outlets.

Cabling the server

When you cable the server, ensure that you route the power, keyboard, and mouse cables through the two plastic cable ties on the rear of the server. Route the power cable through the upper cable tie; route the keyboard and mouse cables through the lower cable tie.

Notes:

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

2. Refer to the documentation that comes with your options for additional cabling instructions. It might be easier for you to route any cables before you install certain options.

3. To install your server in a rack, refer to the *Tower-to-Rack Conversion Kit* manual and the *Rack Installation Instructions* that are provided with your optional rack hardware for complete installation and removal instructions.

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.

Cabling the rear of the server

The following illustration shows the external cable-access areas for a typical server configuration.
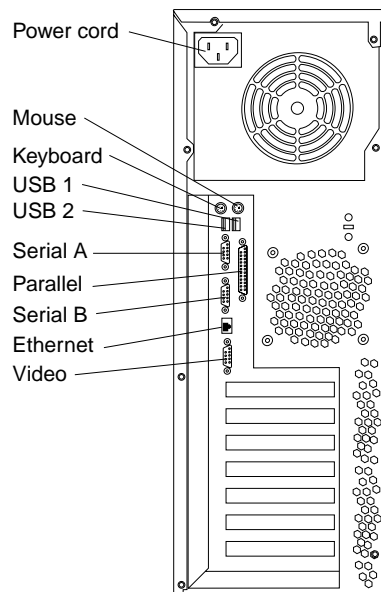
Routing cables through the cable-management assembly

Additionally, if you install your server in a rack, ensure that you route all the cables through the cable-management assembly on the rack (see the following illustration). Detailed cabling instructions are given in the *Tower-to-Rack Conversion Kit* manual that comes with your optional rack hardware.
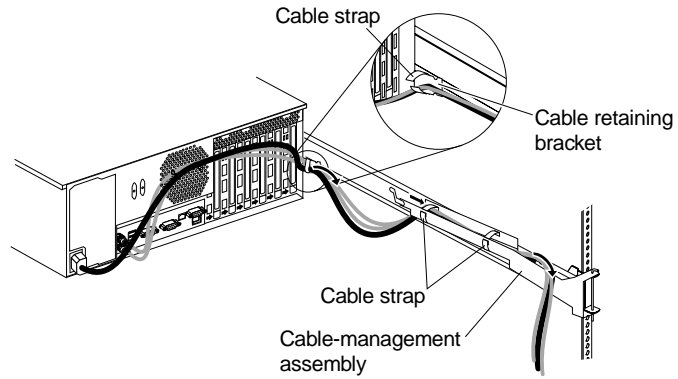
Chapter 3. Server power, controls, and indicators

This chapter describes how to start the server, and what the controls and indicators mean.

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 system 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.

- The Wake on LAN feature will turn on the server at the set time (when a Magic Packet is received), provided that all of the following conditions are met:

  — AC power is present.

  — The server is either off or shut down from an Advanced Configuration and Power Interface (ACPI) operating system.

  — The Wake on LAN feature is enabled in the Configuration/Setup Utility program.

  — The Wake on LAN adapter is installed in PCI slot 1 and is connected to the system board with the 3-pin auxiliary power connector.

  Note: For more detailed information about these features, refer to the *User's Reference* on the *IBM xSeries Documentation* CD.

- If the optional system-management adapter is installed in the server, the system-management adapter can turn on the server.

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:
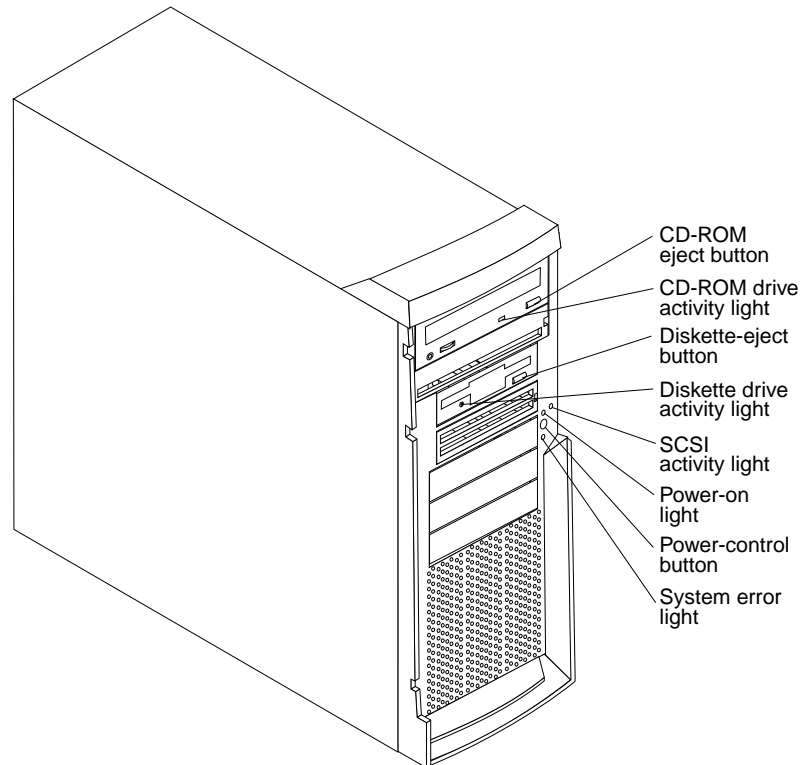
Statement 5

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.
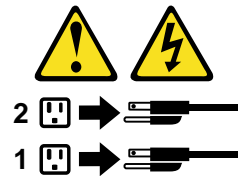
- You can press the power-control button on the front of the server. If this feature is supported by your operating system, this starts an orderly shutdown of the operating system, and places the server in standby mode.

  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 front of the server to stop blinking.

Server controls and indicators

The following illustrations show the controls and indicators on the front of the server.

CD-ROM
eject button

CD-ROM drive
activity light

Diskette-eject
button

Diskette drive
activity light

SCSI
activity light

Power-on
light

Power-control
button

System error
light

CD-ROM eject button: Press this button to release a CD from the drive.

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

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

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

SCSI activity light: When this green light is flashing, the controller is accessing a SCSI device; for example, a hard disk drive.

Note: Hot-swap hard disk drives also have an activity light. This light is also known as the SCSI hard disk drive activity light.

If your server has a ServeRAID controller and this 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.

Power-on light: When this green light is on, system power is present in the server.

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

System error light: When this amber light is on, it indicates that a system error has occurred. An amber error light on the interior of the server, adjacent to the faulty component, will also be on to further isolate the error. Refer to the *User's Reference* on

the *IBM xSeries Documentation* CD for detailed information on using the Diagnostic LEDs.

Cover-release latch: Slide this lever to release the cover.

Cover-release
latch

Key lock
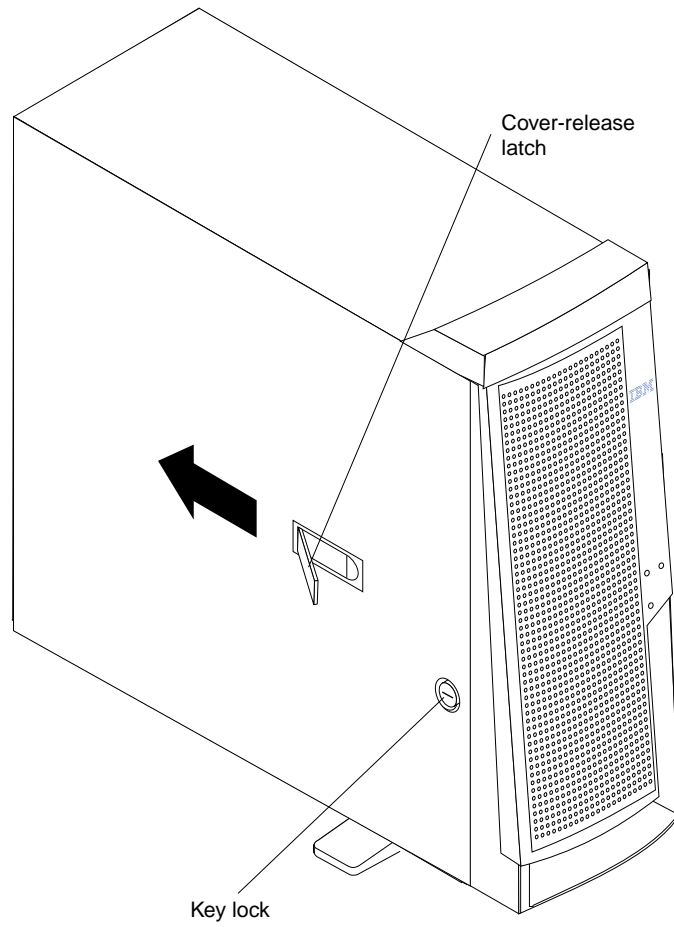
Chapter 4. Configuring your server

The ServerGuide™ CDs provide software setup tools and installation tools that are specifically designed for your IBM 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.

* **PXE Boot Agent Utility**

   The Preboot eXecution Environment (PXE) Boot Agent Utility program is part of the BIOS code that comes with your server. You can use this program to change network startup (boot) protocols and startup (boot) order, to select operating system wake up support, and to set menu wait times.

* **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 the 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 44.

1. Insert the *Setup and Installation* CD, and restart the server.

2. Follow the on-screen instructions 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 *User's Reference* on the *IBM xSeries Documentation* CD and the "Server Support" flowchart in the front of this booklet for additional information.

Diagnostic tools overview

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

* **Beep codes and error messages**

  The power-on self-test (POST) generates beep codes to indicate successful test completion or the detection of a problem.

  — One beep indicates successful completion of POST.
  — More than one beep indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem.

  See "POST beep code descriptions" on page 42 and "POST error messages" on page 43 for more information.

* **Troubleshooting chart**

  This chart lists problem symptoms and suggested steps to correct the problems. See the "Troubleshooting chart" on page 45 for more information.

* **Event/error logs**

  The POST error log contains the three most recent error codes and messages that the system generated during POST. The system event/error log contains all error messages that are issued during POST and all system status messages from the system-management adapter.

  To view the contents of the error logs, start the Configuration/Setup Utility program; then, select **Event/Error Logs** from the main menu.

* **Diagnostic programs and error messages**

  The server diagnostic programs are stored in upgradeable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your server.

  Note: Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for more detailed information about the diagnostic programs.

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: Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for more detailed 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. 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	1. Verify that the system memory modules are installed correctly. 2. Turn off the server. 3. Disconnect all power cords. 4. Wait 30 seconds; then, reconnect all power cords and 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: Refer to the *User's Reference* on the *IBM xSeries Documentation* CD for more detailed information about POST error messages.

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.
11*xx*	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 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.
00019*xxx*	Processor *x is* not functioning or failed the built-in test	Verify that processor *x* is installed correctly. If the problem remains, replace processor *x*.
00180*xxx*	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.
012980*xx* 012981*xx*	Data for processor *x*	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.

Setup	Suggested action
Setup and Installation CD will not start.	• Ensure that the system is a supported server with a startable (bootable) CD-ROM drive. • If the startup (boot) sequence settings have been altered, ensure that the CD-ROM is first in the boot sequence. • If more than one CD-ROM drive is installed, ensure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID program cannot view all installed drives - or - cannot install NOS.	• 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 drive.
ServerGuide will not start *your* NOS CD.	Ensure that the NOS CD you have is supported by ServerGuide. See the *Setup and Installation* CD label for a list of NOS versions supported.
Cannot install NOS - option is grayed out.	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 setup is complete.

System Updates and Applications CD	Suggested action
Get "time out" or "Unknown host" errors	Be sure you have access to the Internet through FTP directly.

Troubleshooting chart

Notes:

1. Refer to 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
The screen is blank.	Verify that: 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. If the items above are correct and the screen remains blank, call for service. **Attention:** In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank screen. If this occurs and the Boot Fail Count feature in the Start Options of the Configuration/Setup Utility is set to Enabled (its default setting), you must restart the server three times to force the system BIOS to reset the memory connector or bank of connectors from Disabled to Enabled.
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.	Verify that: 1. The primary monitor cable is connected to the video port. 2. You installed the necessary device drivers for the applications. If the items above are correct and the screen remains blank, call for service.
Wavy, unreadable, rolling, distorted screen, or screen jitter.	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. 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. **Notes:** 1. To prevent diskette drive read/write errors, be sure 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. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS with the correct language. If the problem remains, call for service.

Power problems	Suggested action
The server does not power on.	Verify that: 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 supports. 5. The LEDs on the power supply are on. If the problem remains, call for service.
Microprocessor problems	**Suggested action**
The server emits a continuous tone during POST.	The startup (boot) microprocessor is not working properly. Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor. If the problem remains, call for service.
Memory problems	**Suggested action**
The amount of memory displayed is less than the amount of memory installed.	Verify that: 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 with the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled. 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.
Option problems	**Suggested action**
An IBM option that was just installed does not work.	Verify that: 1. The option is designed for the server. Refer to the "Server Support" 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 in 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: 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 your SCSI and expansion enclosure documentation.
System-management adapter problems	**Suggested action**
System-management adapter manager 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 Statements

The warranty statements consist of two parts: Part 1 and Part 2. Part 1 varies by country. Part 2 is the same for all countries. Be sure to read both the Part 1 that applies to your country and Part 2.

- **United States, Puerto Rico, and Canada (Z125-4753-05 11/97)**

  (page 49, Part 1 - General Terms)

- **Worldwide except Canada, United States, and Puerto Rico (Z125-5697-01 11/97)**

  ("Part 1 - General Terms," on page 52)

- **Worldwide Country-Unique Terms**

  ("Part 2 - Worldwide Country-Unique Terms" on page 55)

IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (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 may 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 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.

Machine - IBM @server **xSeries 220**

Warranty Period*

- Canada - Parts: Three (3) years Labor: Three (3) years
- United States and Puerto Rico - Parts: Three (3) years Labor: One (1) year

IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period.

   IBM will charge you for any labor it provides in performance of the repair or replacement.

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.

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. 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.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

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. The replacement may not be new, but will be in good working order.

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.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

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 the Machine, contact your reseller or IBM. In the United States, call IBM at 1-800-772-2227. In Canada, call IBM at 1-800-565-3344. (In Toronto, call 416-383-3344.) You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, 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. IBM may repair the failing Machine or exchange it at its discretion.

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.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. 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.

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

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), 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 greater of U.S. $100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

   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 (INCLUDING LOST PROFITS OR 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.

IBM Statement of Warranty Worldwide except United States, Puerto Rico, and Canada (Part 1 – General Terms)

This Statement of Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. **The terms of Part 2 may replace or modify those of Part 1.**The warranties provided by IBM in this Statement of 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 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.

Machine - IBM @server **xSeries 220**

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During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

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. The replacement may not be new, but will be in good working order.

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.

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Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, 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. IBM may repair the failing Machine or exchange it at its discretion.

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.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. 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.

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

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), 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 greater of U.S. $100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

   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 (INCLUDING LOST PROFITS OR 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.

Part 2 - Worldwide Country-Unique Terms

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 legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section:
The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

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, 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.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement:
The laws of the State of New York govern this Statement.

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

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.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

The terms of this Statement of Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service

If you purchased 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 purchased 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.

The applicable laws, Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section:
2. 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.

Applicability of suppliers and resellers (unchanged).

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

GERMANY: 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 are 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.

Production Status: The following paragraph replaces this Section:
Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

Limitation of Liability: The following is added to this Section:
The limitations and exclusions specified in the Statement of Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace "U.S. $100,000" with "1.000.000 DEM."

The following sentence is added to the end of the first paragraph of item 2:
IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

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 the greater of Irish Pounds 75,000 or 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: (item 1 unchanged) 2)as to any other actual damage arising in all situations involving non-performance 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 second 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.

TURKIYE: Production Status: The following replaces this Section:
IBM fulfills customer orders for IBM Machines as newly manufactured in accordance
with IBM's production standards.

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 the
greater of Pounds Sterling 150,000 or 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 will be limited to damages.

<u>NORTH AMERICA</u>

CANADA: Warranty Service: The following is added to this section:
To obtain warranty service from IBM, call **1-800-565-3344**. In Toronto, call **416-383-
3344**.

UNITED STATES OF AMERICA: Warranty Service: The following is added to this
section:
To obtain warranty service from IBM, call **1-800-772-2227**.

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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 1 000 000 bytes and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

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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Electronic emission notices

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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

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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