IBM®

@server

xSeries 232
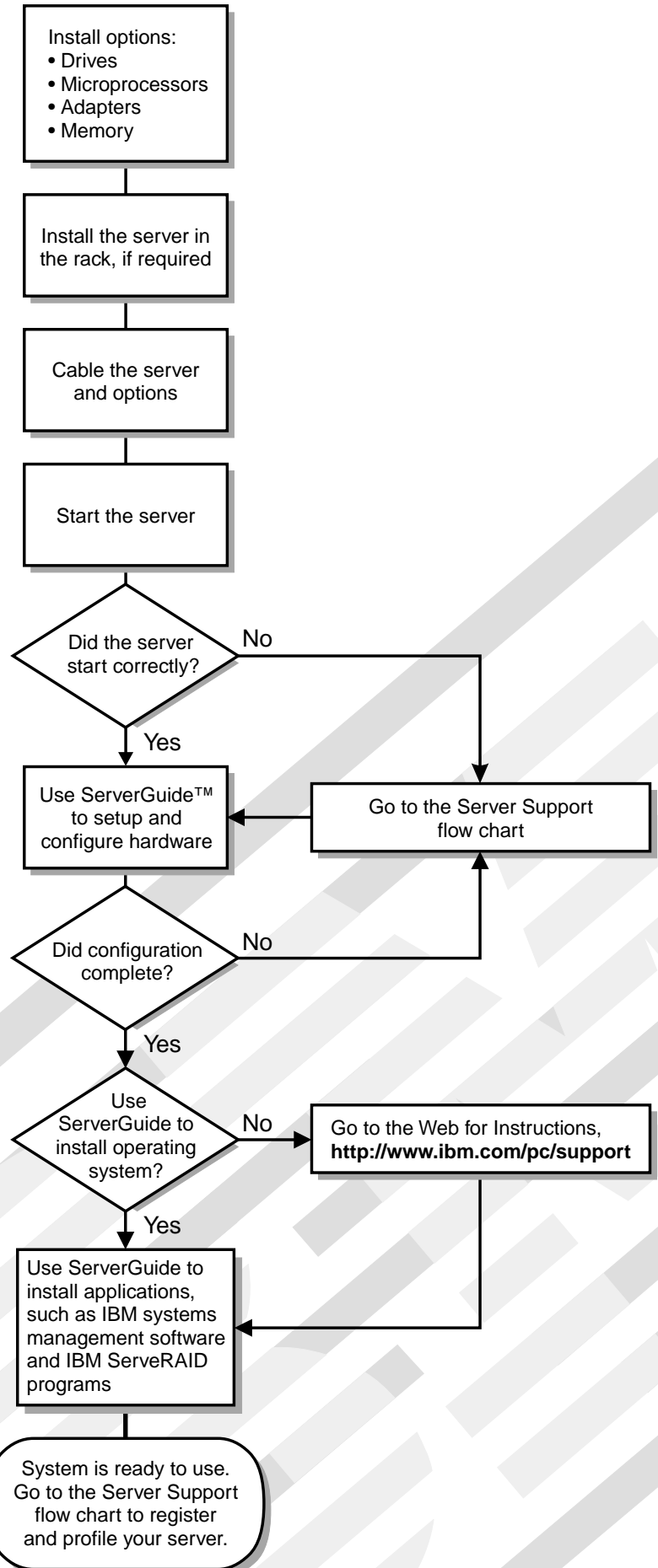
Installation Guide

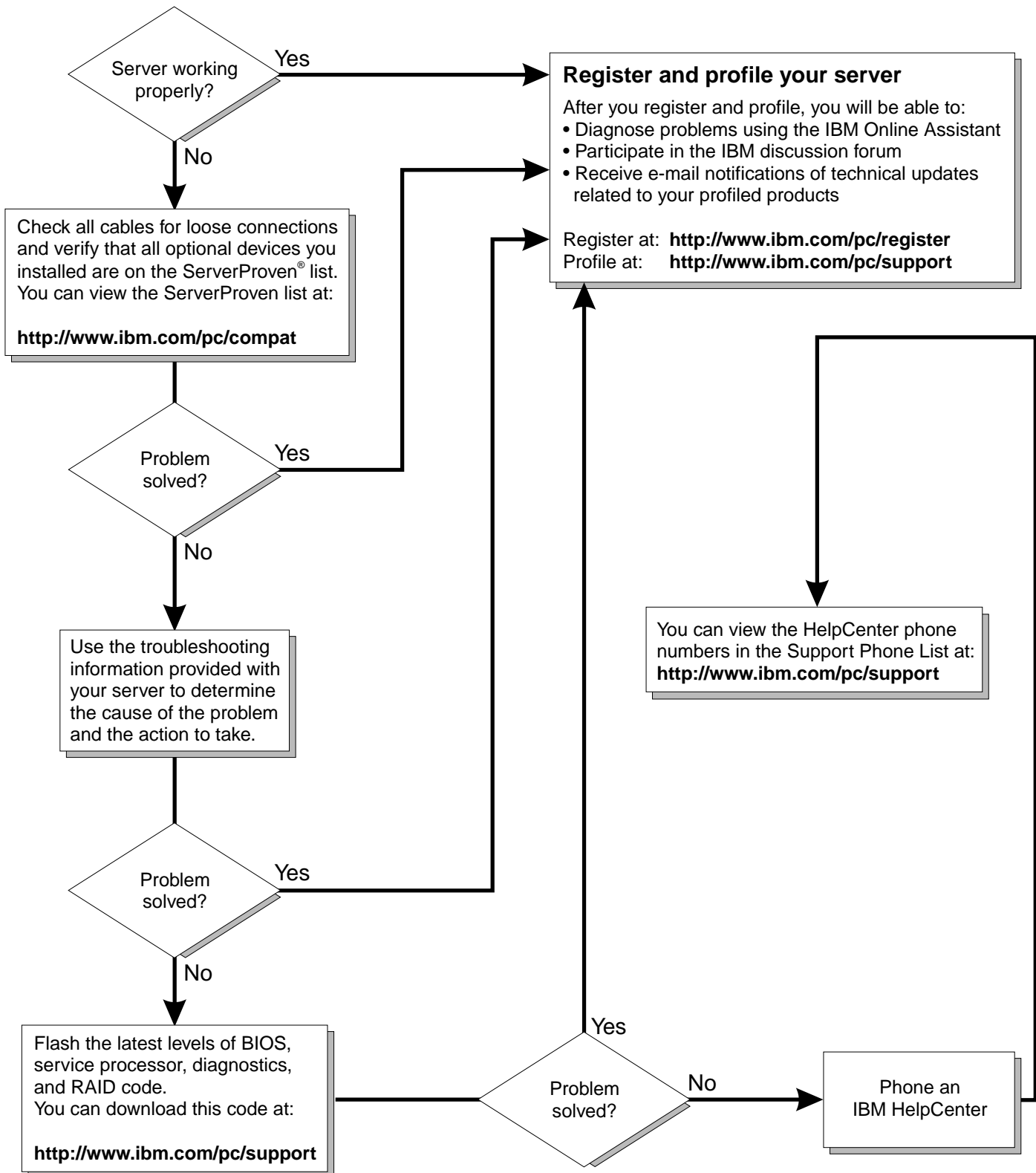## Welcome. . .

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 options:
- Drives
- Microprocessors
- Adapters
- Memory

Install the server in
the rack, if required

Cable the server
and options

Start the server

Did the server
start correctly? — No

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 → **Register and profile your server**

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 HelpCenter

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 the HelpCenter phone numbers in the Support Phone List at:
http://www.ibm.com/pc/support

IBM xSeries 232

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 39.

First Edition (June 2001)

Contents

Safety

Before installing this product, read the Safety Information.

مج، يجب قراءة دات السلامة

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1

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

To connect:	To disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from 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.

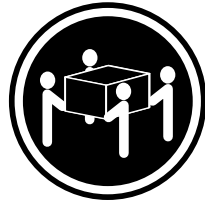**Statement 3**

⚠️

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.**

⚠️

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

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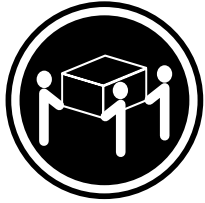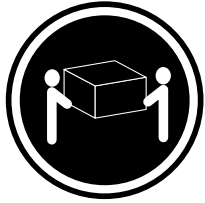
≥18 kg (39.7 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)

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
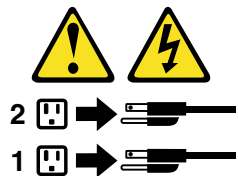
Statement 8

CAUTION:

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

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

Chapter 1.   Introduction

Thank you for purchasing an IBM® *@*server xSeries 232. This *Installation Guide* provides the information 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 (NOS).

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

Your server comes with a three-year limited warranty and 90-Day IBM Start-Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your server and other IBM products at the following World Wide Web address:

`http://www.ibm.com/eserver/xseries`

For a rack model, refer to the *Rack Installation Instructions* provided with your server 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) _____
Key manufacturer	(tower model only) _____
Key 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 phone number of the manufacturer are on a tag attached to the keys.

Features and specifications

The following table provides a summary of the features and specifications for your xSeries 232 server.

Microprocessor:

- Intel® Pentium® III
- 256 or 512 KB Level-2 cache
- Supports up to two microprocessors

Memory:

- Maximum: 4 GB
- Type: ECC, SDRAM, PC133, registered DIMMs
- Slots: Four (two-way interleaved)

Drives standard:

- Diskette: 1.44 MB
- CD-ROM: 48X IDE

Expansion bays:

- Hot-swap: Six slim high
- Non-hot-swap: Three 5.25-inch (one used by CD-ROM drive)
- You can install a drive-bay expansion kit to convert two of the 5.25 inch bays so that they support three hot-swap drives

PCI expansion slots:

- One 33 MHz/32-bit
- Two 33 MHz/64-bit
- Two 66 MHz/64-bit

Power supplies:

Either one of the following power supplies is supported:

- One 385-watt non-redundant unit
- Two 250-watt (115-230 V ac) with a maximum of three 250-watt units for power supply redundancy, which requires a power backplane upgrade option on non-redundant mode

Acoustical noise emissions:

- Sound power, idling: 6.6 bel maximum
- Sound power, operating: 6.8 bel maximum
- Sound pressure, operating: 53 dBa maximum

Video:

- S3 video controller
- Compatible with SVGA and VGA
- 8 MB video memory

Size (rack model 5U)

- Height: 217 mm (8.5 in.)
- Depth: 688 mm (27.1 in.)
- Width: 440 mm (17.3 in.)
- Weight: approximately 35.4 Kg (78 lb) when fully configured

Size (tower model)

- Height: 440 mm (17.3 in.)
- Depth: 700 mm (27.5 in.)
- Width: 217 mm (8.5 in.)
- Weight: approximately 37.64 Kg (83 lb) when fully configured

Integrated functions:

- Ultra160 SCSI controller
- One 10BASE-T, 100BASE-TX, 100BASE-FX, Intel Ethernet controller with Alert on LAN™ and Wake on LAN® support
- Two serial ports
- Two Universal Serial Bus (USB) ports
- Keyboard port
- Mouse port
- Video port
- Integrated System Management Processor
  - Two ISM RJ-45 connectors
  - One System management Serial C port

Environment:

- Air temperature:
  - Server on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 914 m (2998.7 ft)
  - Server on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft)
  - Server off: 10° to 43° C (50.0° to 109.4° 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: 683 Btu (200 watts)
- Maximum configuration: 1877 Btu (550 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 and statements used in this book

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

The following types of notices and statements 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 statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Handling static-sensitive devices

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

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

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

Major components of the xSeries 232 server

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

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

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

Microprocessor

Terminator card

Memory module

Power supply

Fan

Adapter retention bracket

Adapter support bracket

Fan (blower)
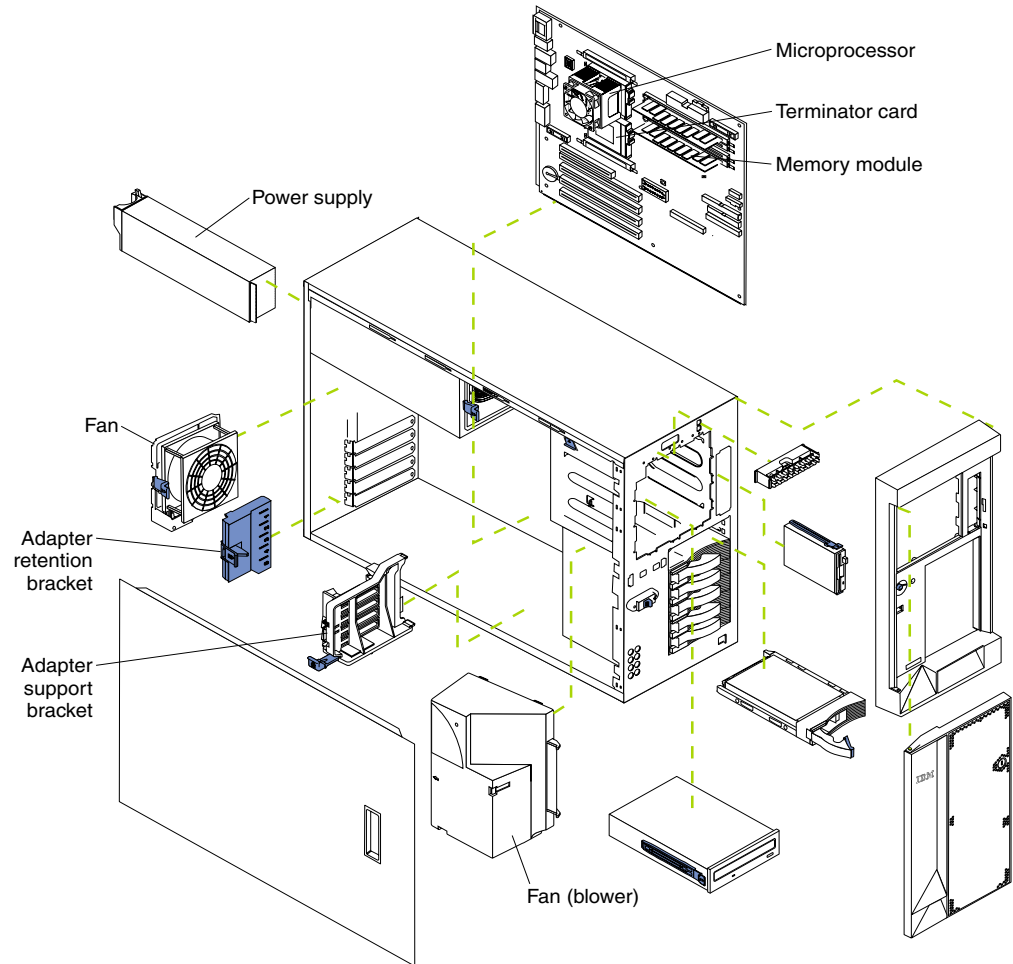
Chapter 2. Installing Options

This chapter provides the basic information needed to install hardware options in your server. This section is for all users, but is written with the experienced user in mind. If you need more detailed installation information for options such as tape drives or the 3-pack hard disk drive expansion kit, refer to the *User's Reference* on the IBM xSeries Documentation CD.

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, review "Handling static-sensitive devices" on page 3.

Removing the cover

The following sections describe how to remove the cover of the tower model and the rack model server.

Removing the left-side cover (tower model)

Notes:

1. To remove or install a hot-swap hard disk drive or hot-swap power supply, it is not necessary to remove the cover.

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

Left-side cover

Cover release lever
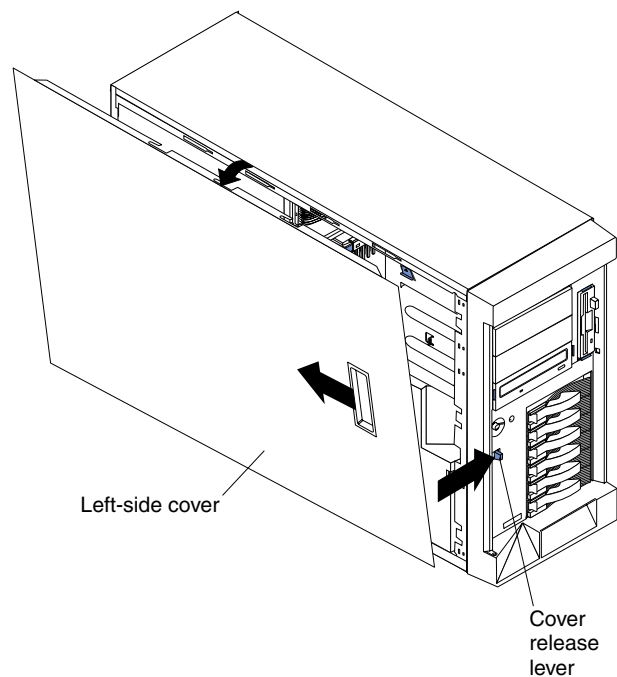
To remove the left-side cover of the tower model:

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

2. Slide the cover-release lever on the front of the server to release the cover; then, slide the cover toward the rear of the server approximately 25 mm (1 inch). Move the top edge of the cover out from the server; then, lift the cover off the server. Set the cover aside.

   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.

Removing the cover (rack model)

Notes:

1. To remove or install a hot-swap hard disk drive or hot-swap power supply, it is not necessary to remove the cover.

2. The illustrations in this document might differ slightly from your hardware.
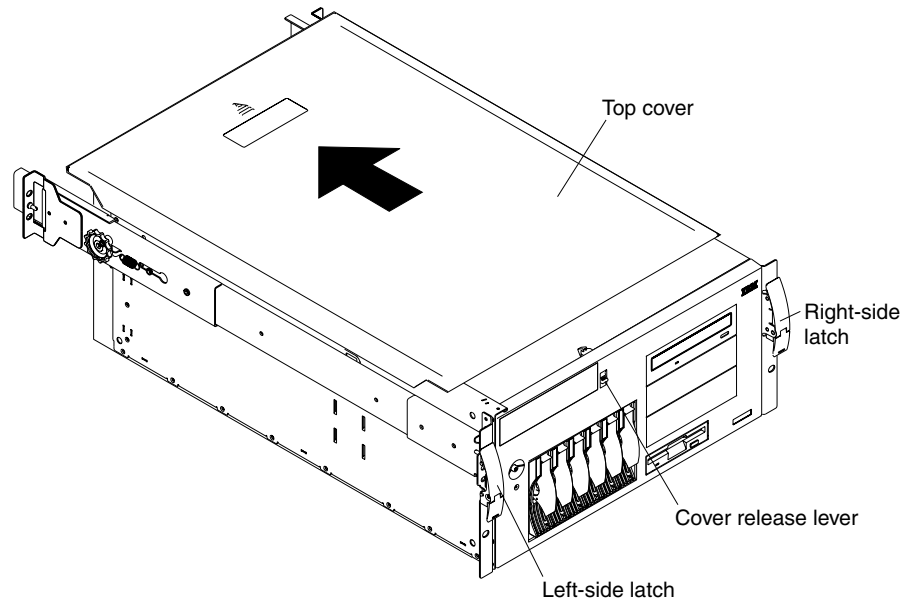
To remove the server top cover:

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

2. Move the cover-release lever down while sliding the top cover toward the rear of the server approximately 25 mm (1 inch). Lift the cover off the server and set the cover aside.

   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.

Working with adapters

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

Your server comes with an integrated video controller, which is a component on the system board. When you install a video adapter, the server basic input/output system (BIOS) code automatically disables the integrated video controller.

The following illustration shows the location of the PCI expansion slots on the system board.

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

PCI Slot 1
32-bit
33 MHz (J44)

PCI Slot 2
64-bit
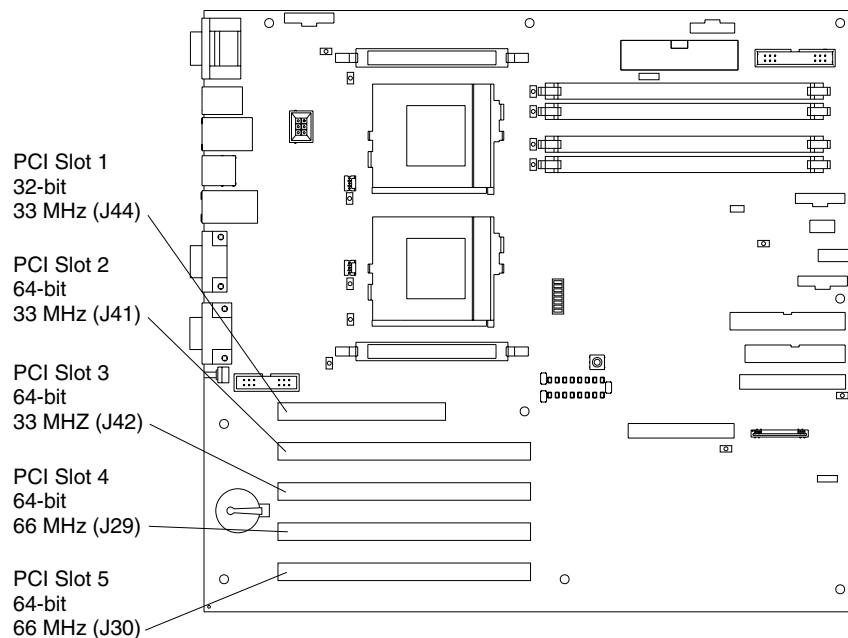33 MHz (J41)

PCI Slot 3
64-bit
33 MHZ (J42)

PCI Slot 4
64-bit
66 MHz (J29)

PCI Slot 5
64-bit
66 MHz (J30)

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 the 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.

- If using SCSI channel B, some full-length adapters with daughterboards might interfere with SCSI channel B and should not be installed in PCI slot 1.

- You can install a 32-bit adapter or device in any of the PCI slots.

- Your server supports 5.0 V and universal PCI adapters; it supports only 3.3 V universal adapters in PCI slots 4 and 5.

- You might require additional power supplies if adapters or devices are added that have electrical current requirements that exceed the installed power-supply capabilities.

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

- The IBM Remote Supervisor Adapter is supported in PCI slot 1 only.

> **Note:** The ribbon cable that ships with the adapter is required to connect the adapter to the system board. The external power adapter that ships with the adapter is not required with this server.

- PCI slot 1 is on PCI bus A, PCI slots 2 and 3 are on PCI bus B, and PCI slots 4 and 5 are on PCI bus C.

  > **Note:** PCI bus A is often referred to as bus 0; PCI bus B is often referred to as bus 1; and PCI bus C is often referred to as bus 2.

- The system scans PCI slot 1, the system board Ethernet, PCI slots 2-5, and then the system board SCSI channel A, and then SCSI channel B, if you have not changed the boot precedence from the default.

  You can use the Configuration/Setup Utility program to change the boot precedence for your server. Select **Start Options** from the Configuration/Setup Utility program main menu.

Installing an adapter

Refer to the following illustration to install an adapter.

Note: The illustrations in this document might differ slightly from your hardware.
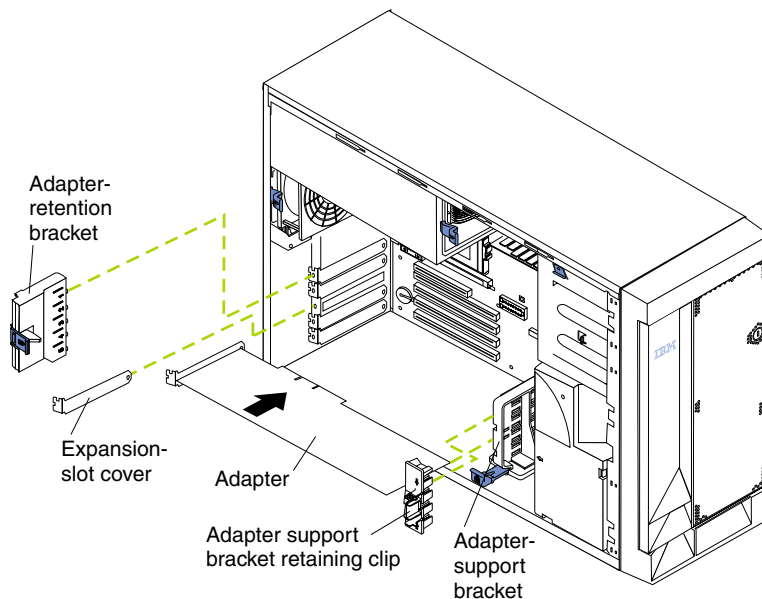
To install an adapter:

1. Review the safety precautions listed in "Safety" on page v and review the "Handling static-sensitive devices" on page 3.

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

3. Remove the cover.

4. Remove the adapter retention bracket.

5. Remove the expansion-slot cover.

6. Refer to the documentation that comes with your adapter for any cabling instructions.

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

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

9. Install the adapter:

a. If necessary, remove the adapter support bracket retaining clip.

b. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.

c. 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.

d. Replace the retaining clip on the adapter support bracket, if you removed it.

e. Align the bottom tabs of the adapter retention bracket with the holes at the top of the expansion slots, and press the adapter retention bracket toward the back of the server until it clicks into the locked position.

10. Connect any needed cables to the adapter.

   Attention: Route cables so that the flow of air from the fans is not blocked. In addition, route any cables plugged into the PCI card under adjacent cards so they are not pinched between the top of the card and the top cover.

   The following illustration shows the rerouting of the SCSI cable if you install a ServeRAID™ adapter (remove the cable from SCSI connector A (J24) on the system board and connect it to the RAID adapter).

   Note: The illustrations in this document might differ slightly from your hardware.
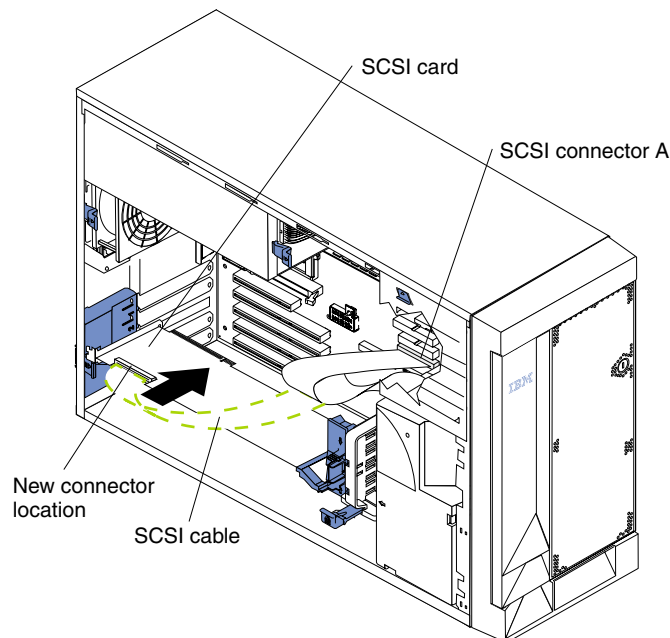
11. If you have other options to install or remove, do so now.

12. Install the cover.

13. Continue with "Cabling the server" on page 19.

Installing memory modules

Adding memory to your server is an easy way to make programs run faster. You can increase the amount of memory in your server by installing options called *memory-module kits*. Each kit contains one industry-standard, dual inline memory module (DIMM). Your server supports a two-way interleaved memory configuration. You must

install matched pairs of memory kits. The set in slots 1 and 4 do not need to be the same size as the set in slots 2 and 3.

Notes:

1. Your server comes with two dual inline memory modules (DIMM) installed in DIMM slots 1 and 4. Install additional DIMMs as a matched pair in DIMM slots 2 and 3 as instructed in the documentation that comes with your option.

2. Your xSeries 232 server supports 128 MB, 256 MB, 512 MB, and 1 GB DIMMs. You must install the DIMMs in pairs of the same size. Place pair 1 in slots 1 and 4 and pair 2 in slots 2 and 3. Refer to the ServerProven™ list on the World Wide Web at http://www.ibm.com/pc/compat for information about 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 in the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings.**

Note: The illustrations in this document might differ slightly from your hardware.
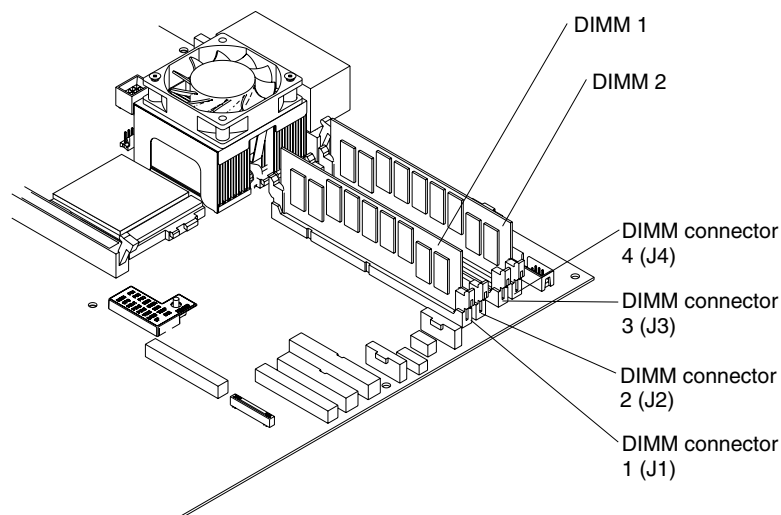
To install a DIMM:

1. Review the information listed in "Safety" on page v and review the "Handling static-sensitive devices" on page 3.

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

3. Remove the cover.

4. Install the DIMM:

   a. Carefully rotate the retaining clips away from the connector and into the open position.

DIMM 3

DIMM 2

DIMM 4

DIMM 1
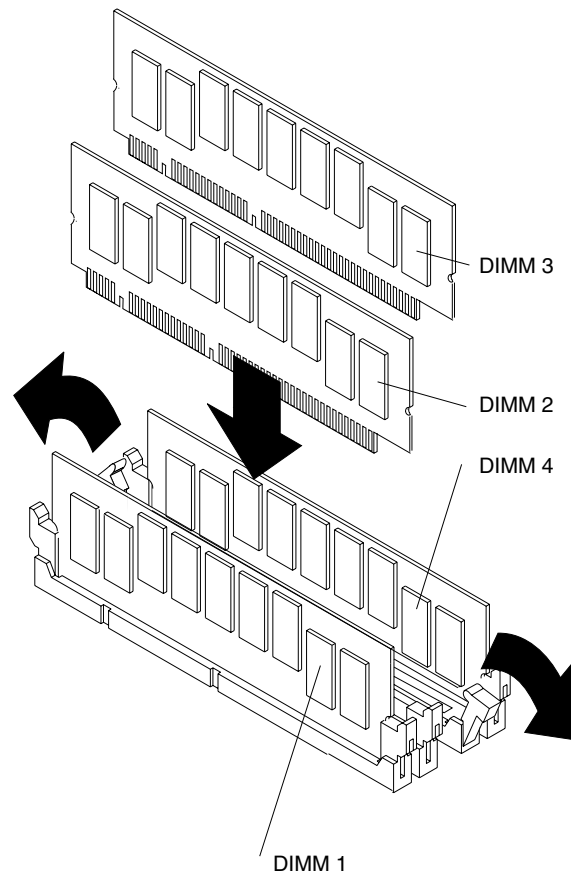
   b. Position the DIMM so that it aligns correctly with the connector.

      Note: The DIMM is "keyed" for proper insertion.

   c. Insert the DIMM into the connector by pressing one edge of the DIMM and then the other edge of the DIMM.

   d. Make sure 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.

   e. Repeat steps 4a through 4d for the second DIMM; then continue with step 5.

5. Make sure the retaining clips are in the closed position.

6. If you have other options to install, install them now.

7. Install the cover.

8. Continue with "Cabling the server" on page 19.

Installing a hot-swap drive

The hot-swap drive bay supports hot-swap drives only. Refer to the following illustration to install a hot-swap drive.

Note: The illustrations in this document might differ slightly from your hardware.
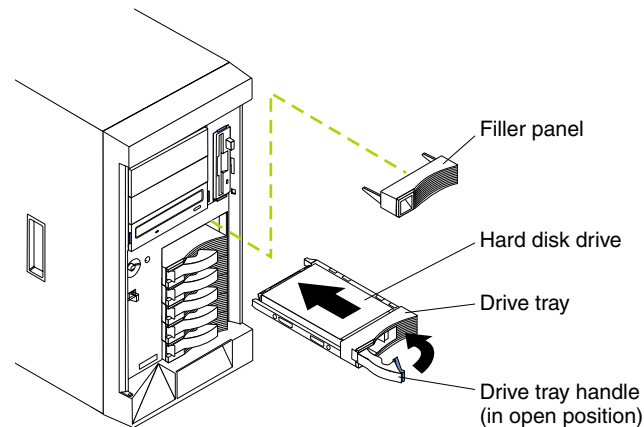
To install a drive in a hot-swap drive bay:

Attention:

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

- When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling the devices, review "Handling static-sensitive devices" on page 3.

1. Remove the filler panel from one of the empty hot-swap bays.

2. Ensure the tray handle is in the open position.

3. Gently push the drive and tray assembly into the bay until the drive touches the backplane.

4. Push the tray handle down into the closed position until it locks.

5. If you have other options to install, install them now.

6. If you removed the server cover, reinstall it.

7. Continue with "Cabling the server" on page 19.

Installing a microprocessor

Your server comes with one microprocessor installed on the system board. If you install an additional microprocessor, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

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 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.

Note: The illustrations in this document might differ slightly from your hardware.
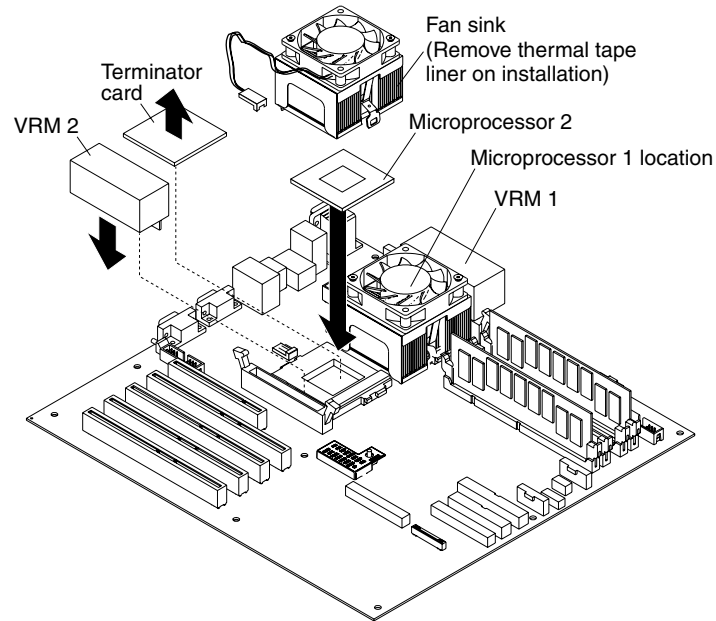
To install an additional microprocessor:

1. Review the safety precautions in "Safety" on page v and review the "Handling static-sensitive devices" on page 3.

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

3. Remove the cover.

4. Remove the terminator card from the microprocessor connector.

    Note: After you install the microprocessor, store the terminator card in the static-protective package for future use.

5. Install the microprocessor.

6. Install the voltage regulator module (VRM) included in the microprocessor kit.

    Attention: When installing or replacing a VRM, use only a VRM specified for use with the xSeries 232 server. Use of other VRMs might cause your server to overheat.

7. Remove the clear plastic liner from the thermal material on the underside of the fan sink and discard.

8. Set the fan sink into place.

Fan sink
(Remove thermal tape
liner on installation)

Insure correct alignment
of fan sink, mounting clip,
and mounting socket
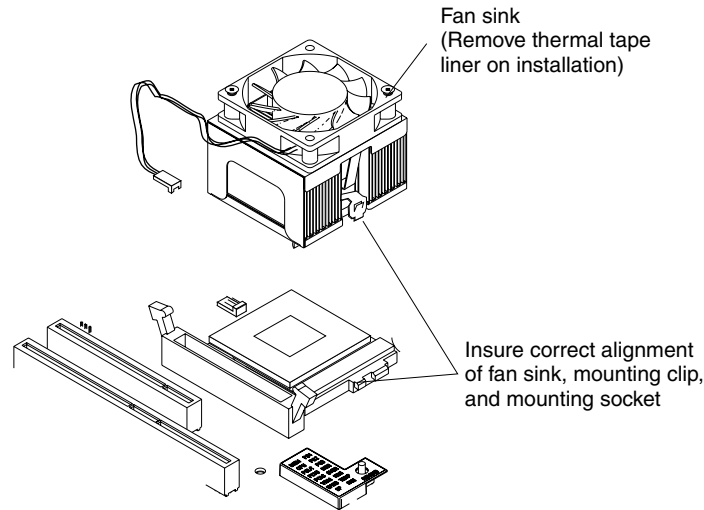
Make sure the fan sink guide fits between the microprocessor and the
microprocessor socket.

Spring retention clip

Fan sink guide
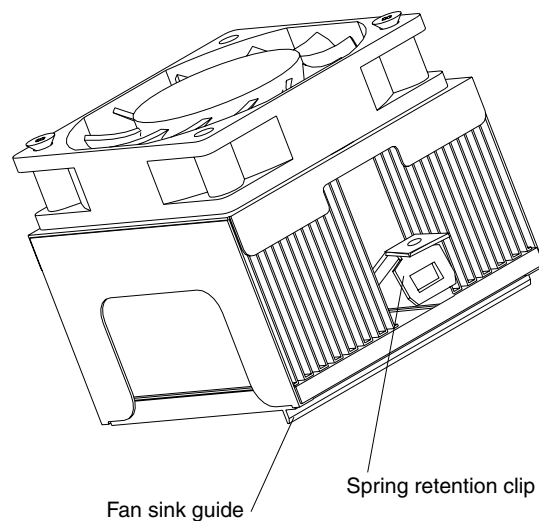
9. Press down and latch the spring retention clip on the back of the fan sink (the side
   facing the back of the server).

10. Press down and latch the spring retention clip on the front of the fan sink (the side
    facing the front of the server).

11. Plug the fan sink into the fan sink connector on the system board (J46). Make
    sure the cable is not in a position to interfere with the fan sink operation.

12. If you have other options to install, install them now.

13. Install the cover.

14. Continue with "Cabling the server" on page 19.

Installing a power supply

Your server comes with one 385-watt power supply or two 250-watt power supplies.
The 385-watt power-supply configuration can be upgraded with an optional backplane

that will enable you to install up to three power supplies, which enables redundancy and will make the power supplies hot-swappable. Each power supply has two status indicators; see the following illustration for information about the status indicators and power-supply bay locations.

Note: The illustrations in this document might differ slightly from your hardware.
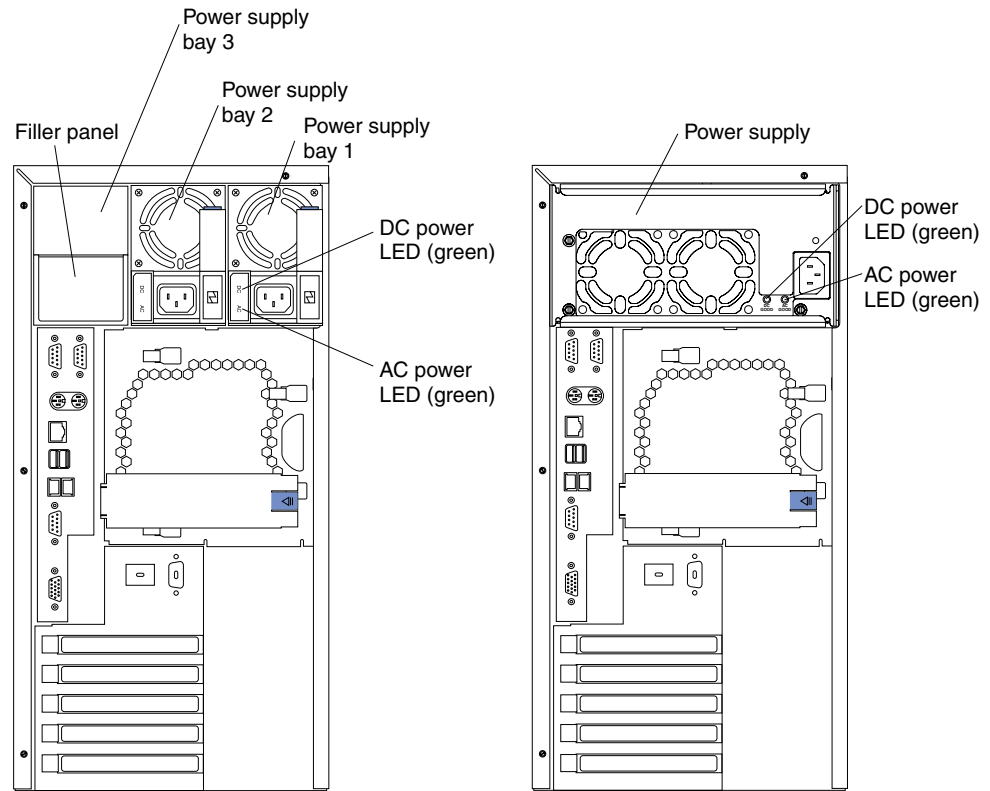
Two 250-watt configuration   **385-watt configuration**

Note: The following description refers to the 250-watt configuration figure.

Filler panel
> To maintain proper airflow, keep the filler panel in place on empty power-supply bays as shown.

Power supply bay 1
> Your server comes with this power supply installed in this bay. LED PS1 on the system board diagnostics panel refers to this power supply. See the *User's Reference* on the *xSeries Documentation* CD for the location of the PS 1 LED.

Power supply bay 2
> Your server comes with this power supply installed in this bay. LED PS2 on the system board diagnostics panel refers to this power supply. See the *User's Reference* on the *xSeries Documentation* CD for the location of the PS2 LED.

Power supply bay 3
> If you install an optional power supply in this bay, LED PS3 on the system board diagnostics panel refers to this power supply. See the *User's Reference* on the *xSeries Documentation* CD for the location of the PS3 LED.

AC power LED

This light provides status information about the power supply. During typical operation, the ac power LED is on.

DC power LED

This light provides status information about the power supply. During typical operation, the dc power LED is on.

Note: If the 385-watt power supply LED is flashing, the system is overloaded and the power supply will shut down.

Statement 8

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

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

Adding a hot-swap power supply

When the hot-swap power supply backplane is installed, you can replace the 385-watt power-supply with an optional backplane that will enable you to install up to three power supplies, which enables redundancy and will make the power supplies hot-swappable. After you install a power supply, verify that the power-supply status indicators (ac power light and dc power light) are lit, indicating that the power supply is operating properly.

Notes:

1. You do not need to turn off the power to the server to install hot-swap power supplies.

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

Filler panel

Power supply

Power supply handle
(in open position)

Power supply
backplane option

Cable-restraint
bracket
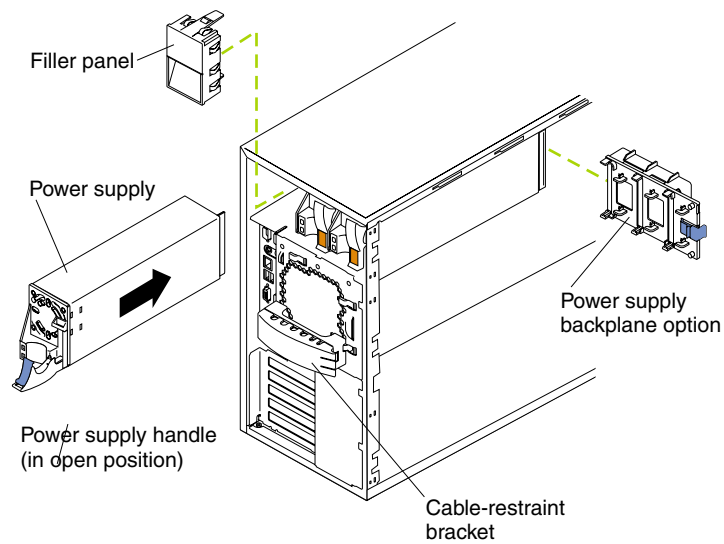
To install a hot-swap power supply:

1. Make sure the server has the power supply backplane option installed.

2. Remove the filler panel from the empty power supply bay.

   Note: During typical operation, each power-supply bay must have either a power supply or filler panel installed for proper cooling.

3. Install the power supply in the bay:

4. Plug the power cord for the added power supply into the power cord connector.

5. Route the power cord through the cable-restraint bracket.

6. Plug the power cord into a properly grounded electrical outlet.

7. Verify that the dc power light and ac power light on the power supply are lit, indicating that the power supply is operating correctly.

8. If you have other options to install, install them now.

9. If you removed the server cover, reinstall it.

10. Continue with "Cabling the server" on page 19.

Cabling the server

The following illustration shows the input/output connectors and cable routing for the server.

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

Serial A
Serial B
Mouse
Keyboard
Ethernet
Universal serial bus (USB) 1 and 2
ISM-A and B
Serial C
Video

Cable-restraint bracket
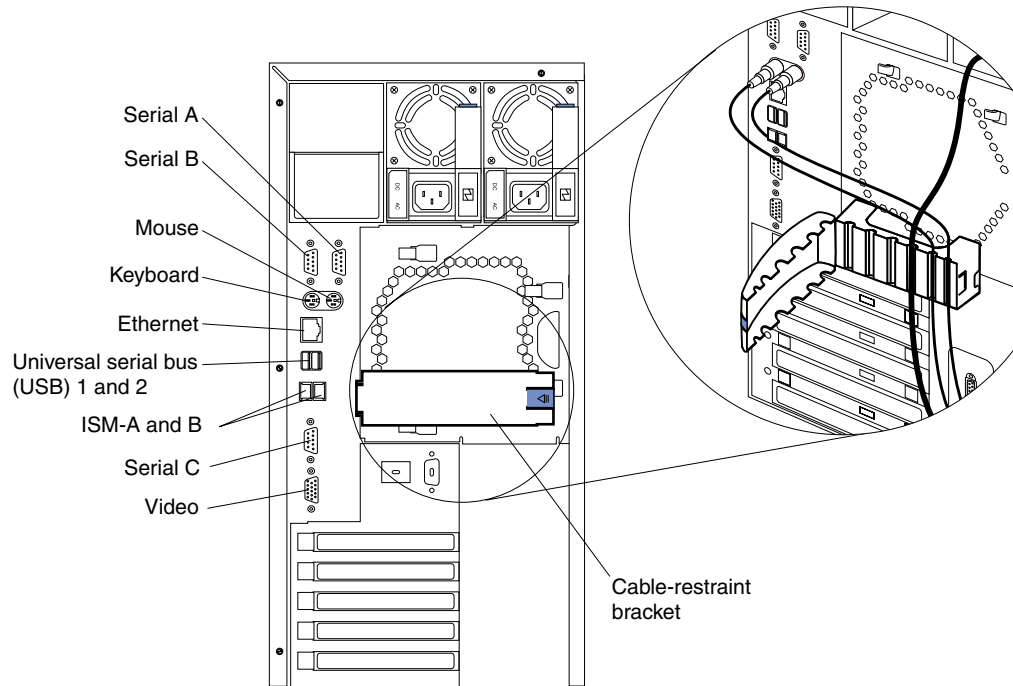
Additionally, for rack models, be sure to route the cables through the cable-management assembly on the rack (see page 20).

Note: The system management Serial C port and the ISM ports are dedicated for use by the system management subsystem.

Routing cables through the cable-management assembly

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

Cable straps
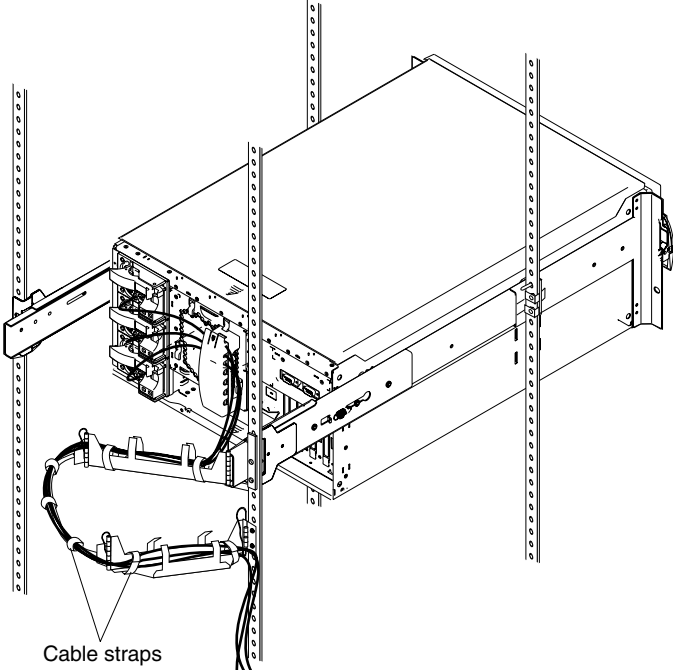
Chapter 3. Server power, controls, and indicators

This chapter describes how to turn on and turn off the server, and what the controls and indicators mean.

Turning on the server

After you plug the power cord of your server into the power supply and an electrical outlet, you can start the server in several ways:

- You can press the power-control button on the front of the server to start the server.

- If the server is turned on, a power failure occurs, and unattended-start mode is enabled in the Configuration/Setup utility program, the server will start automatically when power is restored.

- If ac power is present, the server is off, and the wake-up feature is enabled in the Configuration/Setup utility program, the wake-up feature will turn on the server at the set time.

- If ac power is present, the system is off, and the Wake on LAN feature is enabled, the system can be turned on by a network wake-up frame from the onboard Intel Ethernet controller.

- The Integrated System Management Processor can also turn on the server.

Turning off the server

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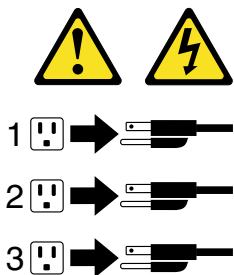
Turning off the server refers to the act of disconnecting the server from the power source.

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

- You can press the power-control button on the front of the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.

  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 4 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.

- If the system was turned on by the wake-up feature or Wake on LAN feature, you can turn it off by either a software runtime utility or by the fail-safe, power-down counter.

- The Integrated System Management Processor can turn off the server.

- 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 approximately 15 seconds for your system to stop running. Watch for the power-on light to stop blinking.

Controls and indicators

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

Tower model

Operator information panel

Power control button shield (if installed)

Hard disk drive activity light (green)

Power control button

Hard disk drive status light (amber)

Reset button

Cover release latch

Serial number

Rack model

Operator information panel

Cover release latch

Power control button shield (if installed)

Power control button

Reset button

Hard disk drive status light (amber)

Hard disk drive activity light (green)

Serial number

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

Operator information panel: The lights on this panel give status information for your server. See "Operator information panel" on page 25 for more information.

Power-control button shield: You can install this circular disk over the power-control button to prevent accidental manual power-off. This disk is provided with your server.

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

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

Hard disk drive status light: Each of the hot-swap drives has a hard disk drive status light. When this amber light is on continuously, the drive has failed.

If a ServeRAID adapter is installed 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.

Hard disk drive activity light: Each of the hot-swap drives has a hard disk drive light. When this green light is flashing, the controller is accessing the drive.

Serial number: This number uniquely identifies your server.

**Rear view
(tower shown)**
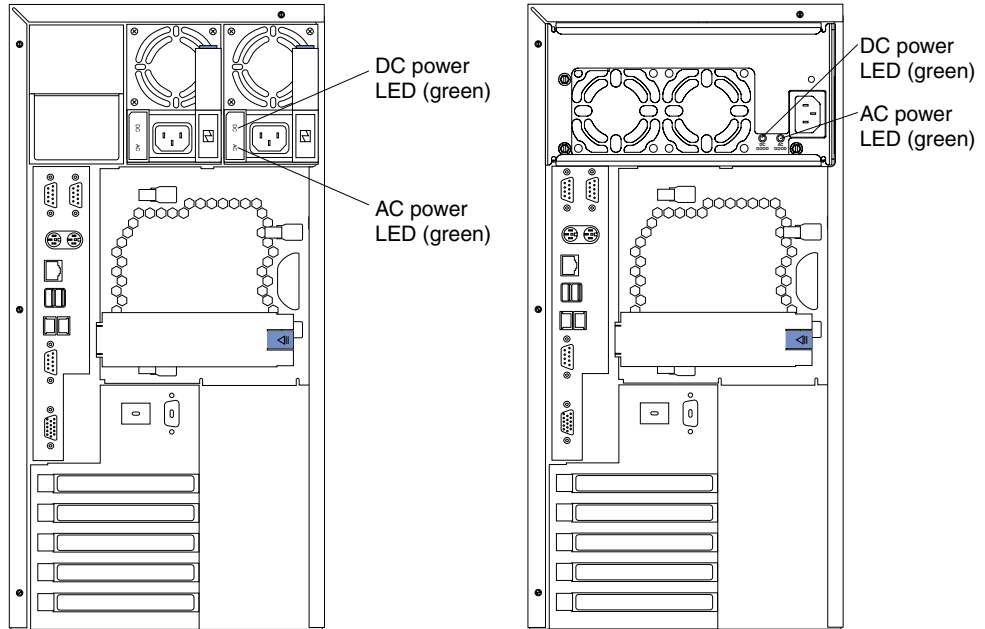
AC power light: This light provides status information about the power supply. During typical operation, the ac power LEDs is on.

DC power light: This light provides status information about the power supply. During typical operation, the dc power LEDs is on.

Note: If the 385-watt power supply LED is flashing, the system overloads and the power supply will shut down.

Operator information panel

The following illustration shows the location of the lights on the operator information panel on the front of the server (see "Controls and indicators" on page 23 for the location of the operation information panel).
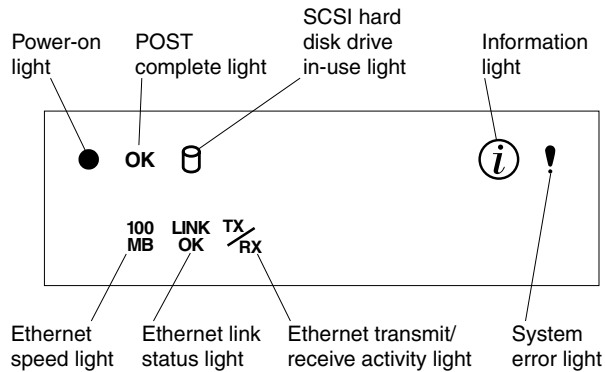
Power-on light: This green LED lights when system power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and current is present). If this light is not on, the power cord is not connected, the power supply has failed, or this LED has failed. See Chapter 5, "Solving problems," on page 31.

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

SCSI hard disk drive in-use light: This green LED lights when there is activity on a hard disk drive.

Information light: This amber LED lights when the information log contains information about certain conditions in your server that might affect performance. For example, the light will be on if your server has multiple power supplies and does not have redundant power. An LED on the diagnostic panel on the system board will also be on.

System error light: This amber LED lights when a system error occurs. An LED on the diagnostic panel on the system board will also be on to further isolate the error.

Ethernet transmit/receive activity light: This green LED lights when there is transmit or receive activity to or from the server.

Ethernet link status light: This green LED lights when there is an active connection on the Ethernet port during typical operation. When the system is powered off, the LED might remain green.

Ethernet speed light: This green LED lights when the Ethernet LAN speed is 100 Mbps during typical operation. When the system is powered off, the LED might remain green.

Chapter 4. Configuring your server

The following configuration program are provided with your server.

- **Configuration/Setup Utility**

  This program is part of the basic input/output system (BIOS) code that comes with your server. You can use this program to configure the serial connector assignment, change the drive startup sequence, set the date and time, and set passwords. For information on how to start this utility, see "Starting the Configuration/Setup Utility program" on page 28.

- **SCSISelect Utility**

  With the SCSISelect Utility program, you can configure the devices that are attached to the SCSI adapter (provided in some models). Use this program to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive. For information on how to start this utility, see "Starting the SCSISelect utility program" on page 28.

- **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 order, to select operating-system wake-up support, and to set menu wait times. For information on how to start this utility, see "Starting the PXE boot agent utility program" on page 29.

- **ServerGuide™ CDs**

  The *ServerGuide* CDs include software setup and installation tools that are specifically designed for xSeries servers. You can use these CDs during the initial installation of your server to configure the server hardware and to simplify your NOS installation. The *ServerGuide* CDs also contain a collection of application programs, which you can install after your server is up and running. See "Using the ServerGuide CDs" on page 30 for more information.

- **ServeRAID programs**

  The ServeRAID programs come with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If your server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure your disk-array subsystem *before* you install your operating system. Refer to the ServeRAID documentation provided on the *xSeries Documentation* CD for more information.

Starting the utility programs

This section provides the instructions for starting the utility programs. For more detailed information about these utility programs, refer to the *User's Reference* on the *IBM xSeries Documentation* CD.

Using the Configuration/Setup Utility program

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

- Configure serial connector assignments
- Change the drive startup sequence
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords

Starting the Configuration/Setup Utility program

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

1. Turn on the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1.
3. Follow the instructions that appear on the screen.

Using the SCSISelect utility program (some models)

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

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

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

Starting the SCSISelect utility program

Complete the following steps to start the SCSISelect Utility program:

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

Using the PXE boot agent utility program

The PXE boot agent is a built-in, menu-driven configuration utility program that you can use to:

- Change network startup (boot) protocols
- Change startup (boot) order
- Select whether or not to display setup prompt
- Set menu wait time
- Select OS wake up support

Starting the PXE boot agent utility program

The following sections provide the instructions needed to start the PXE Boot Agent Utility and descriptions of the menu choices available.

To start the PXE Boot Agent Utility program:

1. Turn on the server.

2. When the `Initializing Intel (R) Boot Agent Version X.X.XX PXE 2.0 Build XXX (WfM 2.0)` prompt appears, press Ctrl+S.

   Note: By default you will have two seconds after the prompt appears on the screen to press Ctrl+S.

3. Use the arrow keys or press Enter to select a choice from the menu.

   - Press Esc to return to the previous menu.
   - Press the F4 key to exit.

4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

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 error symptoms" on page 34.

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

2. Follow the instructions on the screens to:

   a. Select your language.

   b. Select your keyboard layout and country.

   c. View the Overview to learn about ServerGuide features.

   d. View the README file to review installation tips about your NOS and adapter.

   e. Start the setup and hardware configuration programs.

   f. Start the NOS installation. You will need your copy of the NOS CD.

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

Using the System Updates and Applications CD

Be sure to take advantage of the additional software that is provided on the *System Updates and Applications* CD.

Note: See the CD label for a current list of updates and applications to start the CD and view the online overview.

Chapter 5. Solving problems

This chapter provides basic troubleshooting information to help you resolve some common problems that might occur with your server.

If you cannot locate and correct the problem using the information in this section, refer to the " Solving problems" section in the *User's Reference* on the *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:

- **POST beep codes, error messages, and error logs**

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

- **Troubleshooting charts**

  These charts list problem symptoms, along with suggested steps to correct the problems. See the "Troubleshooting chart" on page 35 for more information.

- **Error log**

  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 issued during POST and all system status messages from the system environmental monitor subsystem.

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

- **Diagnostic programs and error messages**

  The server diagnostic programs are stored in upgradable 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 "Solving Problems" section in the *User's Reference* on the *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 "Solving Problems" section in the *User's Reference* on the *xSeries Documentation* CD for more detailed information about the POST beep codes.

Beep code	Descriptions of the POST beep codes
No beep	If no beep occurs after your server completes POST (that is, after the system POST complete (OK) light on the operator information panel is illuminated), call for service.
Continuous	Your startup (boot) microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the system continues through POST with no errors, call for service. If no video appears, the startup processor has failed; call for service.
One short	One beep indicates that your server successfully completed POST. POST detected no configuration or functional errors. One beep also occurs after your server completes POST if you type an incorrect power-on password.
Two short	POST encountered an error. The Configuration/Setup Utility program will display additional information; follow the instructions that appear on the screen. See "POST error messages" on page 33 for descriptions of the text messages that might appear.
Three short	A system memory error has occurred. This combination occurs only if the video basic input/output system (BIOS) code cannot display the error message. Replace the failing memory module.
Repeating short	The system board might contain a failing component, your keyboard might be defective, or a key on the keyboard might be stuck. Ensure that: • Nothing is resting on the keyboard and pressing a key. • No key is stuck. • The keyboard cable is connected correctly to the keyboard and to the correct connector on the server. Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced. If the error message remains, call for service. **Note:** If you just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least 5 seconds; then, turn on the server. If the error message goes away, replace the device.
One long and one short	POST encountered an error on a video adapter. If you are using the integrated video controller, call for service. If you are using an optional video adapter, replace the failing video adapter.
One long and two short	A video I/O adapter ROM is not readable, or the video subsystem is defective. If you hear this beep combination twice, both the system board and an optional video adapter have failed the test. This beep combination might also indicate that the system board contains a failing component. If the problem persists, 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. This beep combination occurs when you install a video adapter that is incompatible with your server. Replace the optional video adapter with one that the server supports, 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; then, restart the server. If the problem remains, call for service.

Table 2. 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 "Solving Problems" section in the *User's Reference* on the *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.
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 code update needed	Download and install the latest system BIOS code 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 code level.
01298200	Microprocessor speed mismatch	Install microprocessors with identical speeds.
I9990305	POST could not find an operating system.	Install your operating system.

Table 3. Abbreviated list of POST error messages.

ServerGuide error symptoms

This section provides ServerGuide error symptoms and probable solutions.

Setup and Installation CD	Action
Setup and Installation CD will not start.	• Ensure that the system is a supported server model with a startable (bootable) CD-ROM drive. • If the startup (boot) sequence settings have been altered, be sure that the CD-ROM is first in the startup sequence. • If more than one CD-ROM drive is installed, be sure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID program cannot view all installed drives or cannot install NOS.	• Ensure that there are no duplicate SCSI IDs or IRQ assignments. • Ensure that the hard disk drive is connected properly.
The operating system installation program continuously loops.	Free up more space on the hard disk.
ServerGuide will not start your NOS CD.	Ensure that the NOS CD is supported by ServerGuide. See the *Setup and Installation* CD label for a list of supported NOS versions.
Cannot install NOS.	Ensure that the NOS is supported on your server. If the NOS is supported, either there is no logical drive defined (ServeRAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide setup and configuration program and ensure that the setup is complete.

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

Troubleshooting chart

Notes:

1. See the "Solving Problems" section in the *User's Reference* on the *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.

Device	Suggested action
CD-ROM drive CD-ROM drive is not recognized.	Verify that: 1. The primary IDE channel is enabled in the Configuration/Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
Diskette drive Diskette drive in-use light stays on, or the system bypasses the diskette drive.	If there is a diskette in the drive, verify that: 1. The diskette drive is enabled in the Configuration/Setup Utility program. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the server. 4. Your software program is working properly. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.
General problems Problems such as broken cover locks or indicator lights not working.	Call for service.
Intermittent problems A problem occurs only occasionally and is difficult to detect.	Verify that: 1. All cables and cords are connected securely to the rear of the server and attached options. 2. When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no air flow, the fan is not working. This causes the server to overheat and shut down. 3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly. If the items above are correct, call for service.
Keyboard, mouse, or pointing-device problems. All or some keys on the keyboard do not work.	1. Make sure that the keyboard cable is properly connected to the server. 2. Make sure that the server and the monitor are turned on. 3. Try using another keyboard. If the items above are correct, call for service.
The mouse or pointing device does not work.	1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device. If the problem remains, call for service.

Table 4. Troubleshooting charts.

Device	Suggested action
Memory problems	Verify that:
The amount of memory displayed is less than the amount of memory installed.	1. The memory modules are seated properly. 2. Each pair of DIMMs are the same size (DIMM 1 and DIMM 4 must match and DIMM 2 and DIMM 3 must match. The two pairs do not need to match each other.). 3. You have installed the correct type of memory. 4. If you changed the memory, you updated the memory configuration using the Configuration/Setup Utility program. 5. All banks of memory on the DIMMs are enabled. The server might have detected a problem and automatically disabled a DIMM bank, or a DIMM bank could have been manually disabled. 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.
Microprocessor problems	The startup (boot) microprocessor is not working properly.
The server emits a continuous tone during POST.	Verify that the startup microprocessor is seated properly. If it is, call for service.
Monitor	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.
Testing the monitor.	If you still cannot find the problem, call for service.
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.
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.	If the monitor self-tests show the monitor is working properly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm. (12 in.) apart. Turn on the monitor. **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.

Table 4. Troubleshooting charts.

Device	Suggested action
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. If the problem remains, call for service.
Option problems	Verify that:
An IBM option that was just installed does not work.	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.
An IBM option that used to work does not work now.	Verify that all of the option hardware and cable connections are secure. If the option comes with its own test instructions, use those instructions to test the option. If the failing option is a SCSI option, 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. If the problem remains, call for service.
Power problems	Verify that:
The server does not power on.	1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of memory 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.
Serial port problems	Verify that:
The number of serial ports identified by the operating system is less than the number of serial ports installed.	1. Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports are disabled. **Note:** The management C connector is the same as a serial port connector, but it is used only by the Integrated System Management Processor, and is not available for use by the operating system. This port does not appear in the Configuration/Setup Utility program menus; it can be configured using xSeries Manager. 2. The serial-port adapter, if you installed one, is seated properly. If the problem still exists, call for service.

Table 4. Troubleshooting charts.

Device	Suggested action
A serial device does not work.	Verify that: 1. The device is compatible with the server. 2. The serial port is enabled and is assigned a unique address. 3. Make sure that the device is not connected to the management port C. **Note:** The management C connector is the same as a serial port connector, but it is used only by the Integrated System Management Processor and is not available for use by the operating system. This port does not appear in the Configuration/Setup Utility program menus; it can be configured using xSeries Manager. If the problem still exists, call for service.
Software problem Suspected software problem.	To determine if problems are caused by the software, verify that: 1. Your server has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. **Note:** If you have just installed an adapter or memory, you might have a memory address conflict. 2. The software is designed to operate on your server. 3. Other software works on your server. 4. The software that you are using works on another system. If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem. If the items above are correct and the problem remains, contact your place of purchase.
Universal Serial Bus (USB) port problems A USB device does not work.	Verify that: 1. You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port. **Note:** If a standard (non-USB) keyboard is attached to the keyboard port, then the USB is disabled and no USB device will work during POST. 2. The correct USB device driver is installed. 3. Your operating system supports USB devices. If the problem still exists, call for service.

Table 4. Troubleshooting charts.

Appendix A. Product warranties and notices

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

Warranty Information

This section contains the warranty period for your product and the IBM Statement of Limited Warranty.

Warranty Period

> **Machine** - IBM @server xSeries 232
>
> **Warranty Period*** - Parts - 3 years, labor - 3 years
>
> ** Contact your place of purchase for warranty service information. Some IBM Machines are eligible for On-site warranty service depending on the country where service is performed.*

IBM Statement of Limited Warranty

Z125-4753-06 8/2000

Part 1 - General Terms

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

The IBM Warranty for Machines

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

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

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not

responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

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

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

Warranty Service

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

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

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

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

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

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:

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

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

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

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and

2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

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

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Governing Law

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

Part 2 - Country-unique Terms
AMERICAS

BRAZIL

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

NORTH AMERICA

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

CANADA

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

UNITED STATES

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

ASIA PACIFIC

AUSTRALIA

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

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

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

CAMBODIA, LAOS, AND VIETNAM

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

The following is added to this Section:
Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own

competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

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

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

HONG KONG AND MACAU

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

INDIA

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

JAPAN

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

NEW ZEALAND

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

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

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

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

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

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

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

EUROPE, MIDDLE EAST, AFRICA (EMEA)

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

Warranty Service:

If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

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

Governing Law:

The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania,

Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

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

The following paragraphs are added to this Section:

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

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

Warranty Service: *The following is added to this Section:*
During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

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

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

EGYPT

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

Applicability of suppliers and resellers (unchanged).

FRANCE

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

IRELAND

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

Limitation of Liability: *The following replaces items one and two of the first paragraph of this Section:*
1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and
2. the amount of any other actual direct damages, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:
IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY

Limitation of Liability: *The following replaces the second sentence in the first paragraph:*
In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than:
1. *(unchanged)*
2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.
Applicability of suppliers and resellers (unchanged).

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

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

UNITED KINGDOM

Limitation of Liability: *The following replaces items 1 and 2 of the first paragraph of this Section:*

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

The following item is added to this paragraph:
3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:
IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

Notices

This publication was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

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IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Edition notice

Processing date data

This IBM hardware product and IBM software products that might be packaged with it have been designed, when used in accordance with their associated documentation, to process date data correctly within and between the 20th and 21st centuries, provided all other products (for example, software, hardware, and firmware) used with these products properly exchange accurate date data with them.

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Important notes

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

When referring to hard disk drive capacity, MB stands for 1 000 000 bytes and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

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

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Electronic emission notices

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by 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
種情況下，使用者會被要
求採取某些適當的對策。

Japanese Voluntary Control Council for Interference (VCCI) statement

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基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
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Power cords

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

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

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

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

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

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

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