IBM

@server

xSeries 365
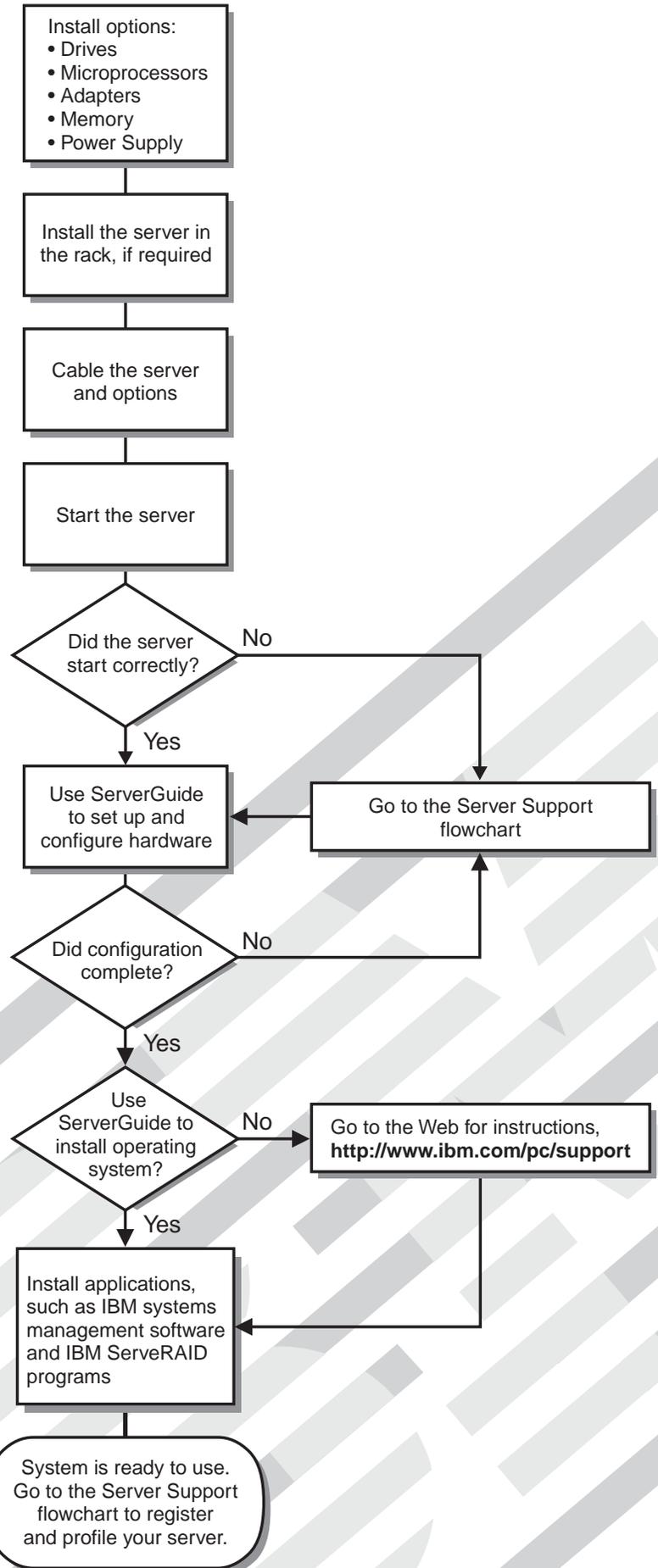## Types 8861 and 8862

Installation Guide

Welcome. . .

Thank you for buying an IBM xSeries server. Your server is based on the X-Architecture technology, and it features superior performance, availability, and scalability.
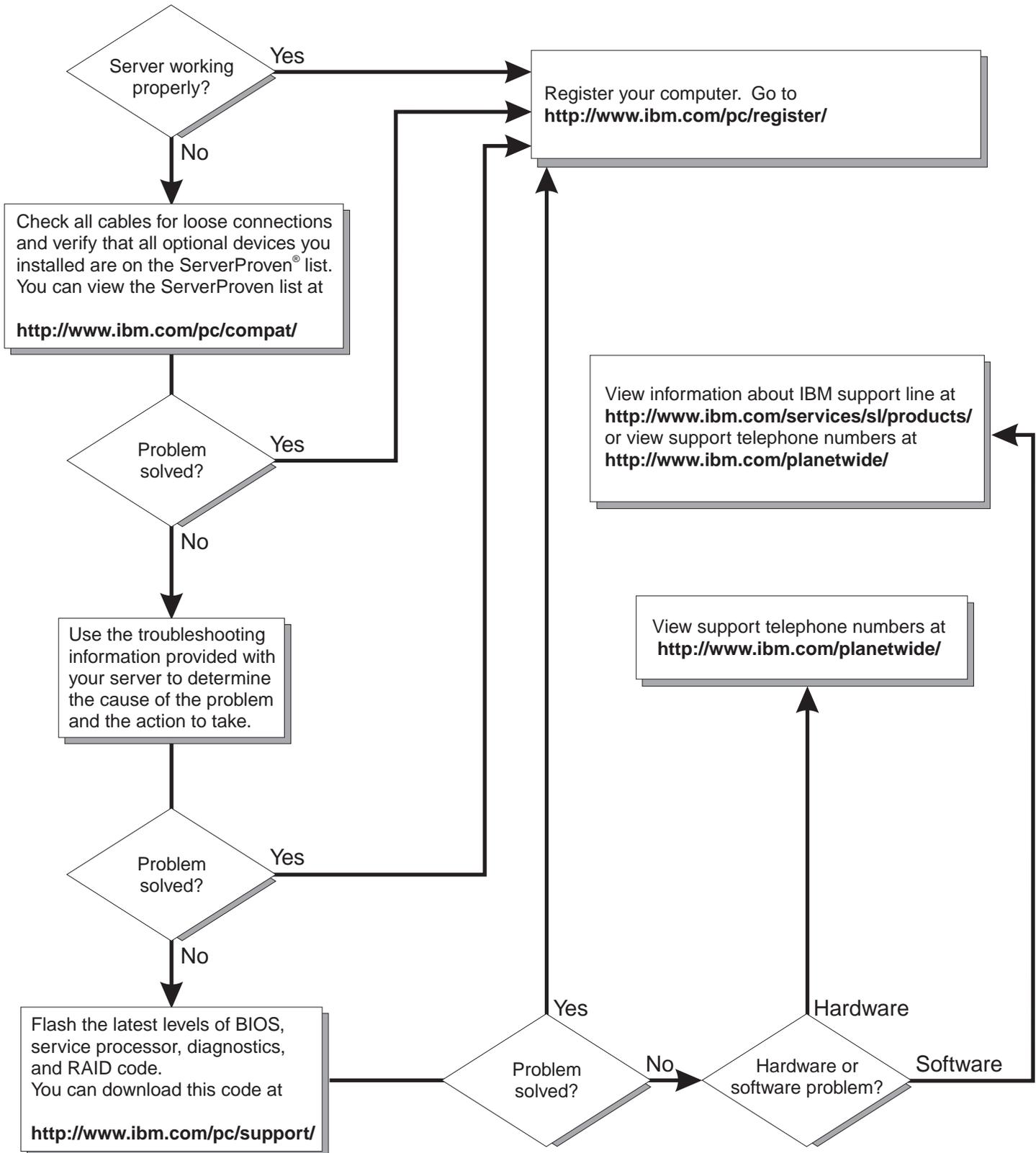
This server *Installation Guide* contains information for setting up and configuring your server.
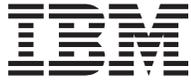
For detailed information about your server, view the publications on the Documentation CD.

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

---

Install options:
• Drives
• Microprocessors
• Adapters
• Memory
• Power Supply

↓

Install the server in the rack, if required

↓

Cable the server and options

↓

Start the server

↓

Did the server start correctly? — No → Go to the Server Support flowchart

Yes ↓

Use ServerGuide to set up and configure hardware ← Go to the Server Support flowchart

↓

Did configuration complete? — No → Go to the Server Support flowchart

Yes ↓

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

Yes ↓

Install applications, such as IBM systems management software and IBM ServeRAID programs

↓

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

Server Support

Server working properly? —**Yes**→ Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

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

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

↓

Problem solved? —**Yes**→ (to Register your computer)

No

↓

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

↓

Problem solved? —**Yes**→ (to Register your computer)

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? —**Yes**↑ (to Register your computer)

No→ Hardware or software problem?

—**Hardware**↑→ View support telephone numbers at **http://www.ibm.com/planetwide/**

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

IBM

@server

IBM xSeries 365
Type 8861 and 8862

Installation Guide

IBM

Note:

Before using this information and the product it supports, read the general information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-07 11/2002," on page 61 and Appendix C, "Notices," on page 79.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

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

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

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

Statement 1:

DANGER

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

To avoid a shock hazard:

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

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

Statement 2:

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

Do not:

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

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

Statement 3:

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

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

DANGER

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

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

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

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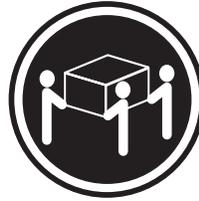
≥ 18 kg (39.7 lb)　　　　≥ 32 kg (70.5 lb)　　　　≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
**The power control button on the device and the power switch on the power
supply do not turn off the electrical current supplied to the device. The device
also might have more than one power cord. To remove all electrical current
from the device, ensure that all power cords are disconnected from the power
source.**
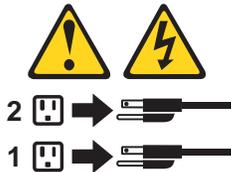
Statement 8:

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

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

Statement 10:

CAUTION:
Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.

>82 kg (180 lb)

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® @server xSeries® 365 Type 8861 or Type 8862 server and basic instructions for installing some options. More detailed instructions for installing options are in the *Option Installation Guide* on the IBM *xSeries Documentation* CD, which comes with your server. This document contains information about:

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

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

1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the ″Online publications″ page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **xSeries 365**.
5. Click **Continue**.

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

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

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

Product name	IBM @server xSeries 365 server
Machine type	8861 or 8862
Model number	_____
Serial number	_____

The model number and serial number are on the ID labels, one located on the lower-right front of the bezel and the other at the rear of the right side, as shown in the following illustration.

Note: This illustration might differ slightly from your hardware.

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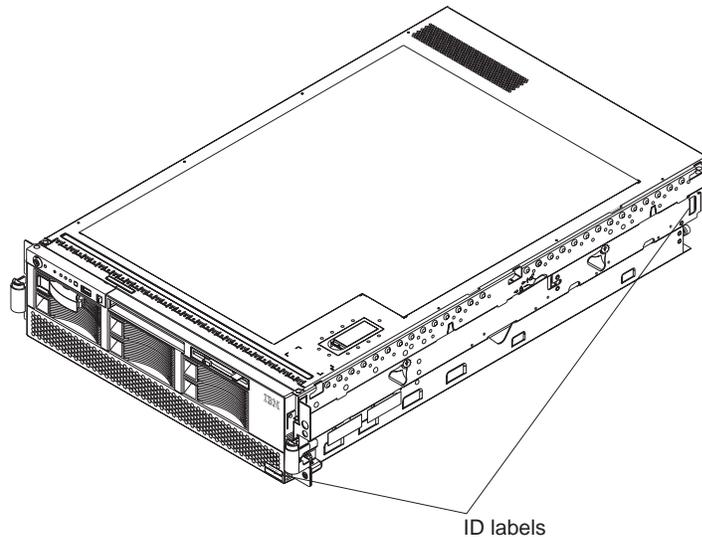
See the *Rack Installation Instructions* for complete rack installation and removal instructions.

For a list of supported options for your server, go to the ServerProven® list at http://www.ibm.com/pc/compat/.

The IBM xSeries Documentation CD

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

Hardware and software requirements

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

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

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

Using the Documentation Browser

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

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

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

    `e:\win32.bat`

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

    `sh runLinux.sh`

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

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

To search all the books, type a word or word string in the **Search** field and click **Search**. The books in which the word or word string appears are listed in order of the most occurrences. Click a book to view it, and press Crtl+F to use the Acrobat search function or Alt+F to use the xpdf search function within the book.

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

Notices and statements used in this document

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

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

Features and specifications

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

Microprocessor:
- Intel Xeon™ Processor MP (frequency varies with server model, each MP processor functions as two logical processors)
  - Minimum: One
  - Maximum: Four
- Level-3 cache size varies with model
- 400 MHz front-side bus (FSB)

Memory:
- Type: error correcting code (ECC), double-data rate (DDR) SDRAM, PC2100 registered DIMMs with Chipkill™
- Supports 512 MB, 1 GB, and 2 GB DIMMs
- Capacity and features depend on server model:
  - Memory cassette with 8-DIMM-connector memory board
    - Minimum: 1 GB
    - Maximum: 16 GB
    - Interleaved
  - Memory cassette with 16-DIMM-connector memory board
    - Minimum: 1 GB
    - Maximum: 32 GB
    - Interleaved
    - Memory mirroring
    - Memory ProteXion™
    - Redundant bit steering

Drives standard:
- Slim diskette: 1.44 MB
- Slim CD-ROM: IDE (upgradable to DVD-ROM)

Hard disk drives:
- Slim-high Ultra320 hot-swap SCSI drives
- Maximum: Six

Active™ PCI-X expansion slots:
- One 33 MHz/64-bit PCI
- One 100 MHz/64-bit PCI-X
- Four 133 MHZ/64-bit PCI-X

Hot-swap cooling:

Six hot-swap fans

Hot-swap power supplies:

950 W (100-240 V ac)
- Minimum: One or two, depending on the server model
- Maximum: Two, for redundant power

Video:
- ATI RageXL video controller on I/O board, disabled when Remote Supervisor Adapter II is installed
- Compatible with SVGA 4
- 8 MB SDRAM video memory

Size (3 U)
- Height: 129 mm (5.07 in.)
- Depth: 715 mm (28.14 in.)
- Width: 444 mm (17.46 in.)
- Weight: 29 kg (63 lb) to 38 kg (83 lb) depending upon configuration

Integrated functions:
- IBM XA-32™ Chipset with integrated memory, I/O controller, and remote I/O controller.
- Service processor with support for Remote Supervisor Adapter II
- Light Path Diagnostics
- LSI Ultra320 SCSI controller with RAID level-1 capability
- Two Broadcom 1GB Ethernet controllers with Wake on LAN® and Alert Standard Format support
- Three universal serial bus (USB) ports
- RXE Expansion Port
- RXE Management Port
- Serial port
- Keyboard port
- Mouse port
- SCSI port

Remote Supervisor Adapter II:
- ATI Radeon RV-100 video controller
- ASM port
- Ethernet port
- Serial port
- Video port

Acoustical noise emissions:
- Sound power, idling: 6.6 bel maximum
- Sound power, operating: 6.6 bel maximum
- Sound pressure, operating: 50 dBa maximum

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft)
  - Server on: 10° to 32°C (50° to 89.6°F). Altitude: 914 m (3000 ft) to 2133 m (7000 ft)
  - Server off: 10° to 43°C (50° to 110°F). Maximum altitude: 2133 m (7000 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 1262 Btu (0.37 kilowatts)
- Maximum configuration: 4053 Btu (1.188 kilowatts)

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 (ac power connected, server off)
  - Minimum: 0.38 kVA (dc power on, server idle)
  - Maximum: 1.2 kVA

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

Racks are marked in vertical increments of 1.75 inches. Each increment is referred to as a unit, or "U." A 1-U-high device is 1.75 inches tall.

Major components of the xSeries 365 server

The orange color on components and labels in the server identifies hot-swap or hot-plug components. You can install or remove these components while the system is running, provided that the system is configured to support hot-swap and hot-plug components. For information about installing hot-swap and hot-plug components, see Chapter 2, "Installing options," on page 7.

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

The following illustration shows the major components of the xSeries 365 server.

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

PCI-X divider

Remote
Supervisor
Adapter II

Hot-swap fans

Memory
cassette

Operator information
panel

SCSI
backplane

Hard disk
drive air
baffle

Hot-swap
power
supply

Hard disk
drive filler
panel

CD-ROM
drive

Hot-swap
Hard disk
drive

Heat sink

Microprocessor

Bezel

Diskette drive

Microprocessor
baffle
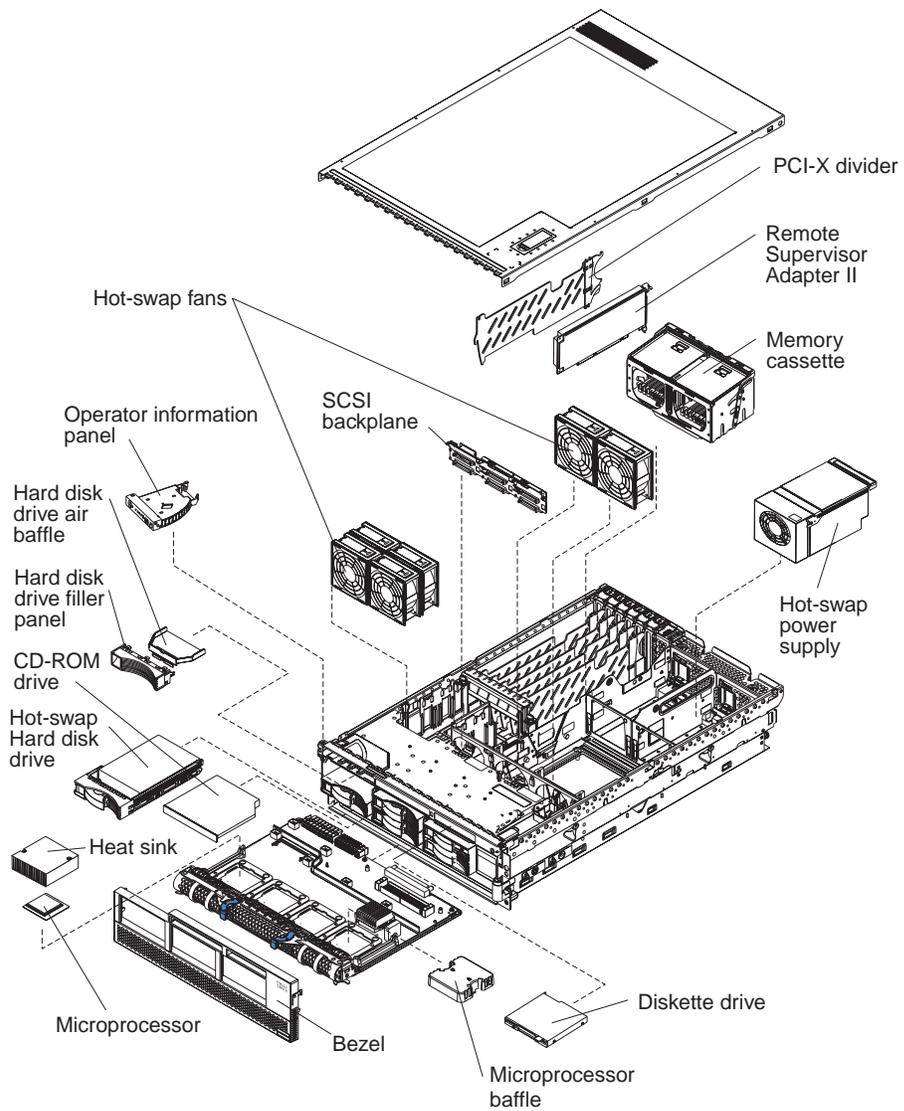
Chapter 2. Installing options

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

Installation guidelines

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

- Read the safety information beginning on page v, and the guidelines in "Handling static-sensitive devices" on page 8. This information will help you work safely with your server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and other devices that you will connect to the server.
- Back up all important data before you make changes to disk drives.
- Have a small Phillips screwdriver available.
- Have a small flat-blade screwdriver available.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices.
- The orange color on components and labels identifies hot-swap or hot-plug components. You can install or remove hot-swap and hot-plug components while the server is running, provided that the server is configured to support this capability. See the instructions in this chapter for more information about removing and installing hot-swap and hot-plug components.
- The blue color on components and labels indicates touch points, where a component can be gripped, a latch moved, and so on.
- For a list of supported options for your server, go to http://www.ibm.com/pc/compat/.

System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. See the documentation that comes with the rack.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You have replaced a hot-swap drive within 2 minutes of removal.
- Microprocessor sockets 2, 3, and 4 each contain either a microprocessor baffle or a microprocessor and heat sink at all times.
- You do not operate the server without the cover for more than 2 minutes.

Working inside a server with power on

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

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

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on your server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the cover and bezel

Complete the following steps to remove the cover and bezel:

1. Review the safety information beginning on page v, and "Installation guidelines" on page 7.

2. Lift the cover-release latch. The cover slides to the rear approximately 13 mm (0.5 in.).

Top cover

Cover release latch
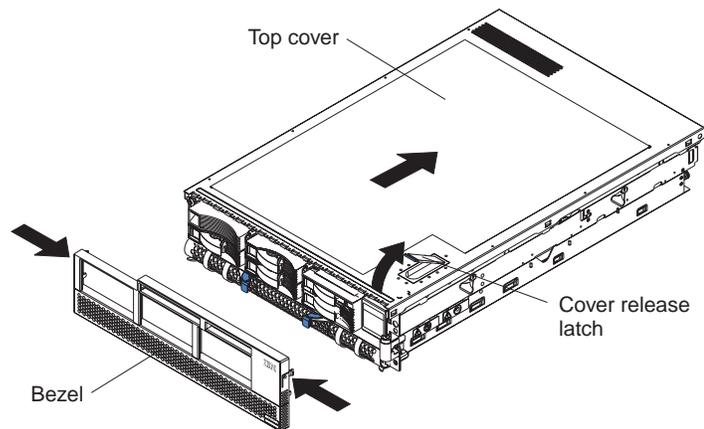
Bezel

3. Lift the cover off the server.
4. Press on the bezel retention tabs and pull the top of the bezel slightly away from the server.
5. Pull the bezel up to release the two tabs at the bottom edge of the bezel.

Attention: For proper cooling and airflow, replace the top cover before turning on the server. Operating the server for more than 2 minutes with the top cover removed might damage server components.

Installing memory modules

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

- Your server supports 2.5 V, 184-pin, error correcting code (ECC), double-data rate (DDR) SDRAM, PC2100 registered DIMMs with Chipkill memory protection.
- DIMMs can be removed and replaced through the access doors on the top of the memory cassette.
- You can increase the amount of memory in the server by replacing the DIMMs with higher-capacity DIMMs or installing additional pairs of DIMMs in open sockets. The server supports 512 MB, 1 GB, and 2 GB DIMMs. See the ServerProven list at http://www.ibm.com/pc/compat/ for an updated list of memory modules supported by the server.
- For a server with an 8-DIMM-connector memory cassette, you can increase the memory capabilities of your server by upgrading to the 16-connector memory cassette. The 16-connector memory cassette supports memory mirroring and Memory ProteXion. See the ServerProven list at http://www.ibm.com/pc/compat/ for a list of memory cassettes supported by the server.
- Your server uses interleaved DIMMs, which require that you install the DIMMs in specific configurations:
  - In the 8-DIMM-connector memory cassette, install DIMMs in pairs. Each pair must be of the same type, capacity, and speed. The DIMM connectors are arranged in two groups of four rows each; the server comes with one pair of DIMMs installed in DIMM connectors 1 and 5 in the memory cassette.
  - In the 16-DIMM-connector memory cassette, the DIMM connectors are arranged in two groups of eight rows each. In non-mirrored mode, install

DIMMs in pairs; in mirrored mode, install DIMMs in quads, or groups of 4. Each pair or quad must be of the same type, capacity, and speed.

- You must populate the DIMM connectors in the following order:

8-DIMM memory board

First pair	DIMMs 1 and 5
Second pair	DIMMs 2 and 6
Third pair	DIMMs 3 and 7
Fourth pair	DIMMs 4 and 8

16-DIMM memory board in non-mirrored mode

First pair	DIMMs 1 and 3
Second pair	DIMMs 14 and 16
Third pair	DIMMs 2 and 4
Fourth pair	DIMMs 13 and 15
Fifth pair	DIMMs 5 and 7
Sixth pair	DIMMs 10 and 12
Seventh pair	DIMMs 6 and 8
Eighth pair	DIMMs 9 and 11

16-DIMM memory board in mirrored mode

First quad	DIMMs 1, 3, 14, and 16
Second quad	DIMMs 2, 4, 13, and 15
Third quad	DIMMs 5, 7, 10 and 12
Fourth quad	DIMMs 6, 8, 9 and 11

Use the Configuration/Setup Utility program to enable or disable mirrored mode.

Memory mirroring enables you to improve the memory reliability of your server by creating a mirror of the data in memory port 1 and storing it in memory port 2. For memory mirroring to work, you must have the same amount of memory in both memory ports, and you must have DIMMs of the same size and clock speed in both memory ports.

- The DIMMs constitute the following memory banks and use the following memory ports:

8-DIMM memory board

Bank 1
Bank 2
Bank 3
Bank 4

1 3 5 7
2 4 6 8

Port 2   Port 1

16-DIMM memory board

Bank 1   Bank 3   Bank 5   Bank 7

1 3 5 7   9 11 13 15
2 4 6 8   10 12 14 16

Bank 2   Bank 4   Bank 6   Bank 8

Port 2   Port 1
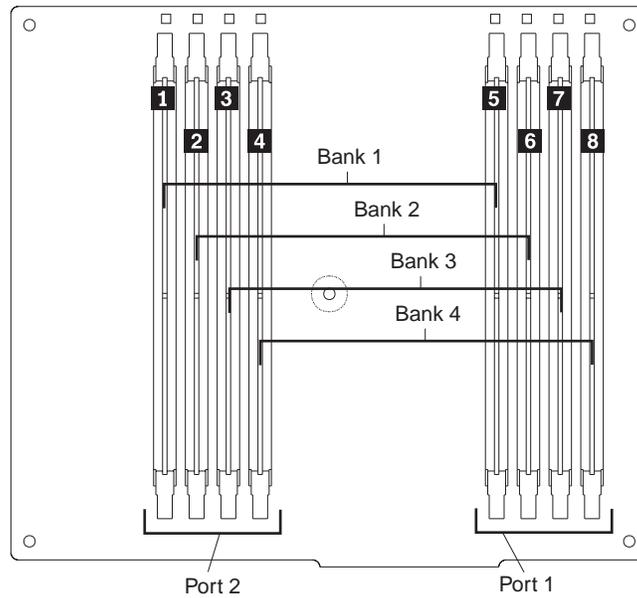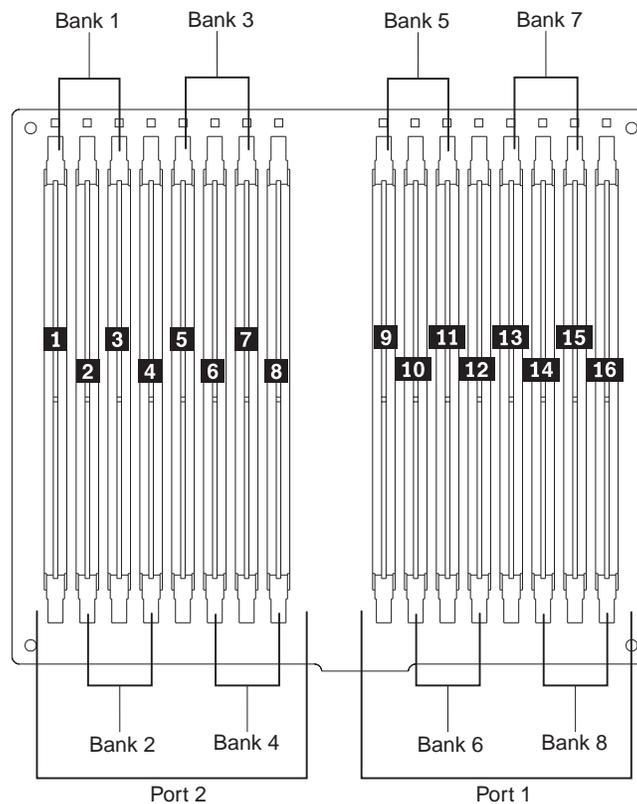
- When you restart the server after adding or removing a pair or quad of DIMMs, the server displays a message that the memory configuration has changed.

Complete the following steps to install DIMMs:

1. Review the safety information beginning on page v, "Installation guidelines" on page 7, and the documentation that comes with the DIMMs.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the top cover (see "Removing the cover and bezel" on page 8).
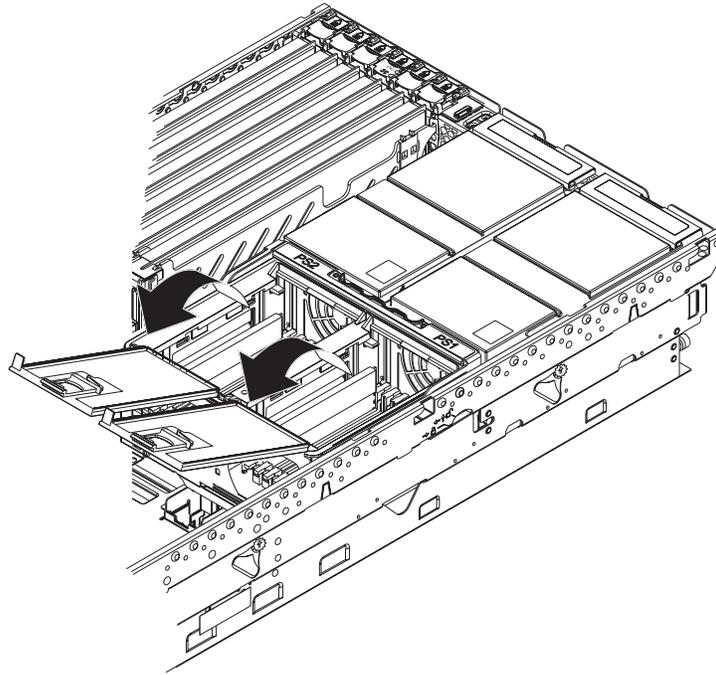
3. Open the two DIMM access doors on the top of the memory cassette.
4. Open the retaining clip on each end of the DIMM connector.

Note: The following illustration shows installing DIMMs in an 8-DIMM-connector memory board.
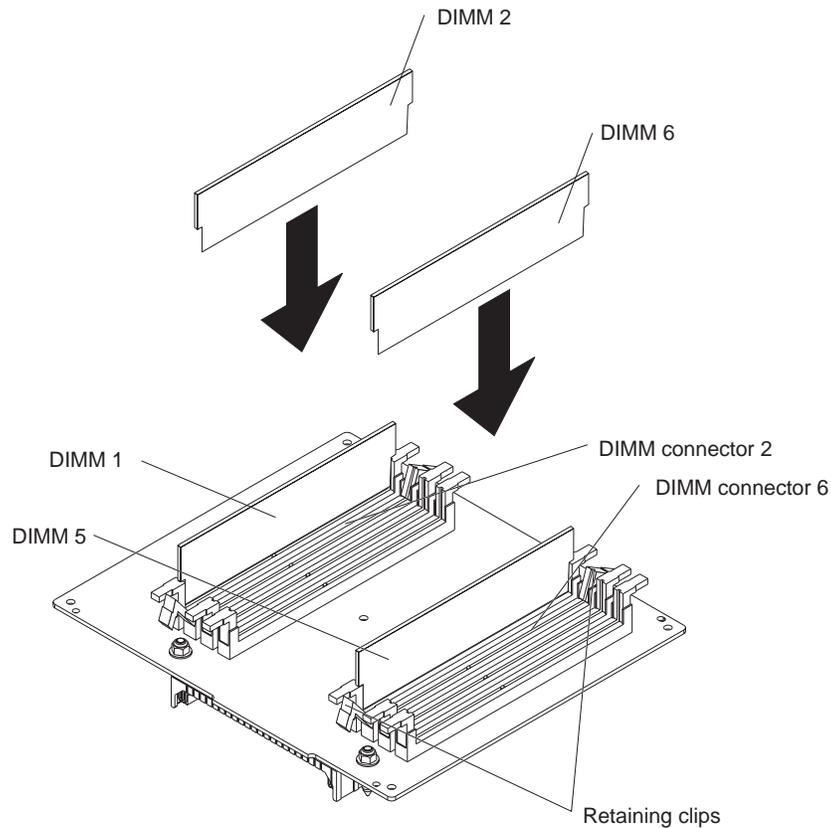
5. Insert the DIMM into the connector.
6. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 26.

Installing a hot-swap hard disk drive

The following notes describe the types of hard disk drives that your server supports and other information that you must consider when installing a hard disk drive:

- The server supports up to six 26 mm (1-inch), 3.5-inch, hot-swap hard disk drives in the hot-swap bays.
- Each hot-swap drive is in a tray, which has a green activity LED and an amber status LED in the upper-right corner. The activity LED flashes when the drive is active; the status LED is lit if the drive has an error. Each hot-swap drive has a single-connector-attached (SCA) connector, which connects directly into the hot-swap SCSI hard disk drive backplane. The backplane controls the SCSI IDs for the hot-swap drives.
- Before you install a hot-swap hard disk drive, take the following actions:
  – Inspect the drive tray for any signs of damage.
  – Make sure that the drive is installed in the tray correctly.
  – If your server has an optional RAID adapter installed, see the documentation that comes with the adapter for information about installing a hard disk drive.

Complete the following steps to install a hard disk drive:

1. Review the safety information beginning on page v, and "Installation guidelines" on page 7.

2. Remove the filler panel and air baffle from one of the empty hot-swap bays, if present.

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

Drive-tray assembly

Drive handle
(in open position)

Air baffle

Filler panel
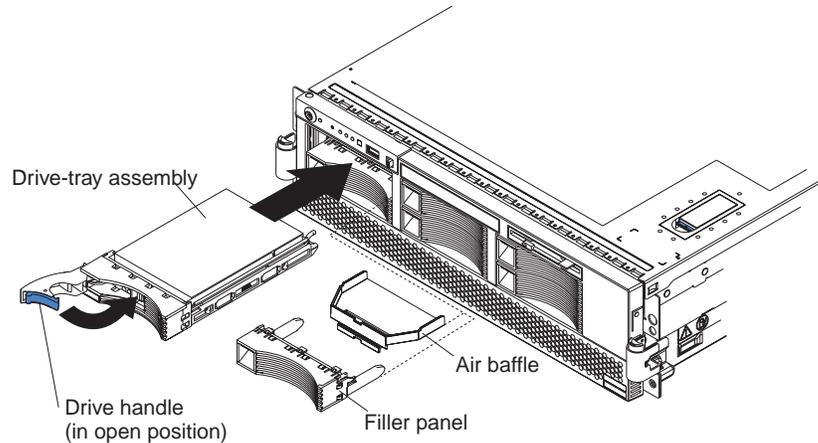
3. Install the hard disk drive in the hot-swap bay.

4. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 26.

   Note: If the server has a RAID controller or adapter installed, you might need to reconfigure the disk arrays after installing hard disk drives. See the documentation that comes with the adapter for more information.

Installing a PCI or PCI-X adapter

Attention: The Remote Supervisor Adapter II, which is in PCI slot 1, is *not hot-pluggable*. Turn off the server before removing or replacing the Remote Supervisor Adapter II.

The following notes describe the types of adapters that your server supports and other information that you must consider when installing a PCI or PCI-X adapter:

• The server supports 3.3 V and universal PCI and PCI-X adapters; it does not support 5.0-V-only adapters.

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

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

Attention LED

Power LED

PCI slot 1
33 MHz 64-bit

PCI-X slot 2
100 MHz 64-bit

PCI-X slot 3
133 MHz 64-bit

PCI-X slot 4
133 MHz 64-bit

PCI-X slot 5
133 MHz 64-bit

PCI-X slot 6
133 MHz 64-bit

SCSI internal
cable connector (J17)
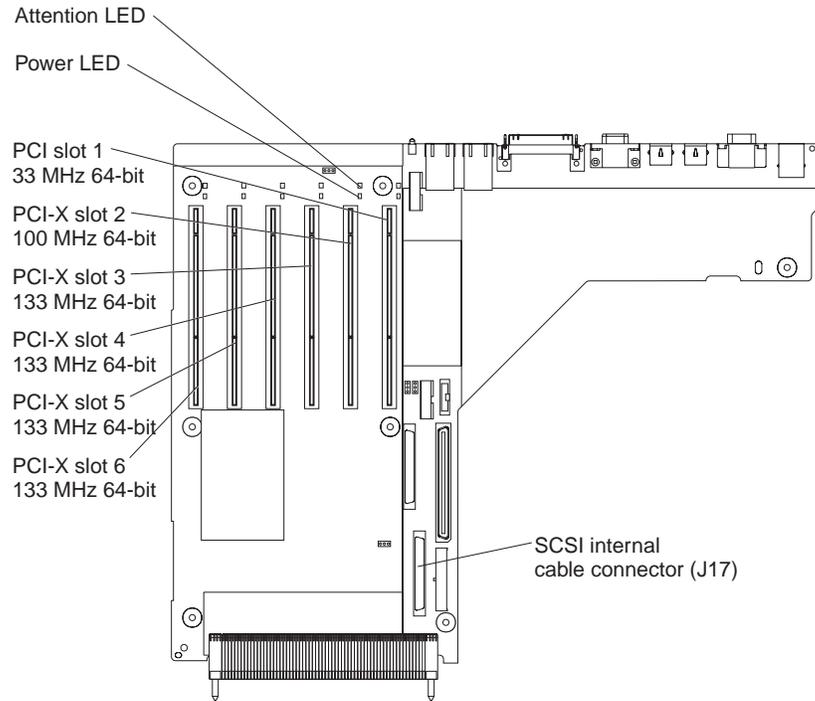
- Slot 1 is a PCI slot and is dedicated to the Remote Supervisor Adapter II. The adapter will operate in PCI mode only. The bus speed is 33 MHz only. The adapter is *not hot-swappable*; turn off the server when removing and installing the adapter.
- Slot 2 supports hot-plugging only for an adapter with a speed of 100 MHz or higher. You can install an adapter with a speed less than 100 MHz in this slot only while the server is turned off; the bus speed will be set to the speed of the adapter.
- For slots 3 through 6, the bus speed will be set to the speed of the adapter; if a PCI adapter is installed, the bus will run in PCI mode.
- If you install a ServeRAID 6i adapter, it must be installed in slot 2.
- If you install an IXA adapter, it must be installed in slot 3 and you must set the IXA jumper. Instructions for setting the IXA jumper are provided in the *Option Installation Guide*.
- Each PCI/PCI-X slot is on a separate PCI bus.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter.
- If you need to change switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- Your server scans devices and PCI-X slots to assign system resources in the following order: CD-ROM drive; disk drives; integrated Ethernet controller; integrated SCSI devices; and PCI-X slots 1, 2, 3, 4, 5, and 6. If an RXE-100 enclosure is attached to the server, the scan continues in sequence with PCI-X slots 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18.

   Note: You can use the Configuration/Setup Utility program to change the sequence and have the server scan one of the first six PCI-X slots before it scans the integrated devices. You cannot change the scan sequence of the PCI-X slots in an RXE-100 enclosure.

- The PCI-X slot numbers in an RXE-100 enclosure are assigned in the following order:

Slots in RXE-100 enclosure	Slot numbers assigned to A side	Slot numbers assigned to B side
6 slots on A side only	7 - 12* (A1 - A6)	none
6 slots on B side only	none	7 - 12* (B1 - B6)
12 slots	7 - 12 (A1 - A6)	13 - 18 (B1 - B6)
* Both sides are numbered 7 - 12 when an RXE-100 enclosure is shared		

- If you install a RAID adapter other than a ServeRAID 6i adapter to control internal hot-swap hard disk drives, you might need to disconnect the internal channel cable from the SCSI RAID cable connector (J17) on the I/O board and connect it to the RAID adapter. No recabling is needed for a ServeRAID 6i adapter. See the information that comes with your RAID adapter.
- If you install a RAID adapter to control external hard disk drives, connect one end of the RAID external channel cable (separately orderable) to an external channel connector on the edge of the RAID adapter that is accessible from the rear of the server; then, route the cable to the external SCSI device and connect it to the applicable connector.

   Note: See the documentation that comes with the RAID adapter for any additional cabling instructions. That documentation also provides information about installing the RAID software and configuring the RAID adapter. For a list of supported RAID adapters, go to http://www.ibm.com/pc/us/compat/.

- Before attempting to install a new adapter, make sure that there is an available slot at the correct bus speed for it. If you need additional PCI-X slots, you can purchase a remote I/O expansion enclosure through your IBM marketing representative or authorized reseller.

Note: Before hot-swapping any PCI-X adapters, read the information in "Working inside a server with power on" on page 7.

Complete the following steps to install a PCI/PCI-X adapter.

Note: For hot-pluggable adapters, make sure that the PCI hot-plug device driver is installed. For details, see the documentation that comes with the adapter. For more detailed instructions and information about installing PCI/PCI-X adapters, see the section about installing options in the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

1. Review the safety information beginning on page v and "Installation guidelines" on page 7.
2. If the adapter is not hot-pluggable, turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Remove the server cover (see "Removing the cover and bezel" on page 8) and determine which PCI-X expansion slot you will use for the adapter.
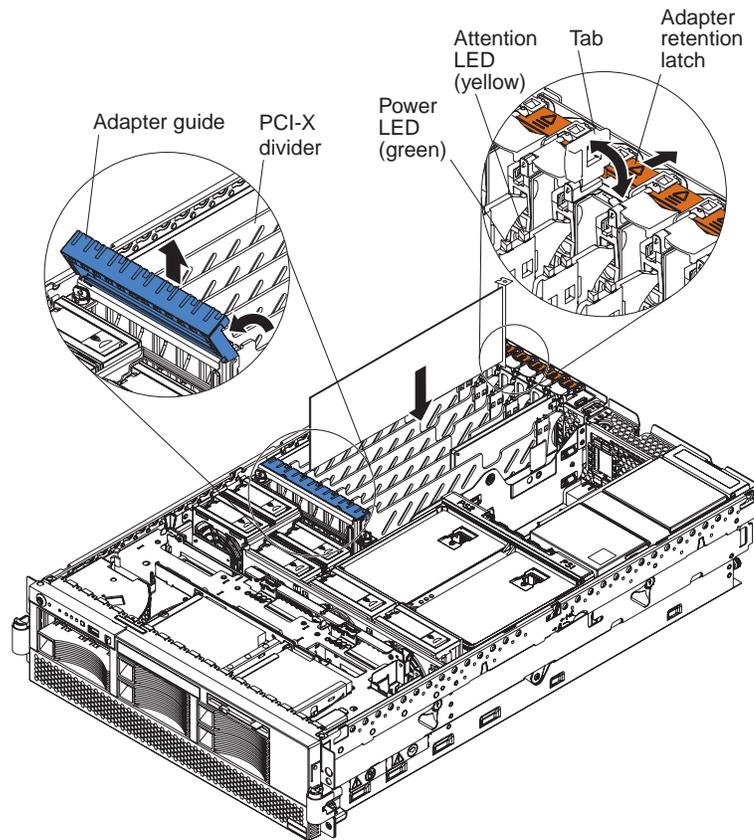
4. See the documentation that comes with your adapter for instructions for setting jumpers or switches and for cabling.

   Note: Route adapter cables before you install the adapter.
5. Install the adapter as shown in the illustration.

   Attention: When you install an adapter, avoid touching the components and gold-edge connectors on the adapter. Make sure that the adapter is correctly seated in the connector. Incorrectly seated adapters might cause damage to the I/O board or to the adapter.
6. Connect any required cables to the adapter.
7. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 26.

Installing a microprocessor

The following notes describe information that you must consider when installing a microprocessor in the server:

• The server comes with a minimum of one microprocessor installed on the microprocessor board in the microprocessor tray and supports up to four microprocessors. With more than one microprocessor, the server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications. The

following illustration shows the microprocessor connectors and the microprocessor voltage regulator module (VRM) connectors on the microprocessor board.

Note: The voltage regulators for microprocessors 1 and 2 are integrated on the microprocessor board; the VRMs for microprocessors 3 and 4 come with the microprocessor options and must be installed on the microprocessor board.
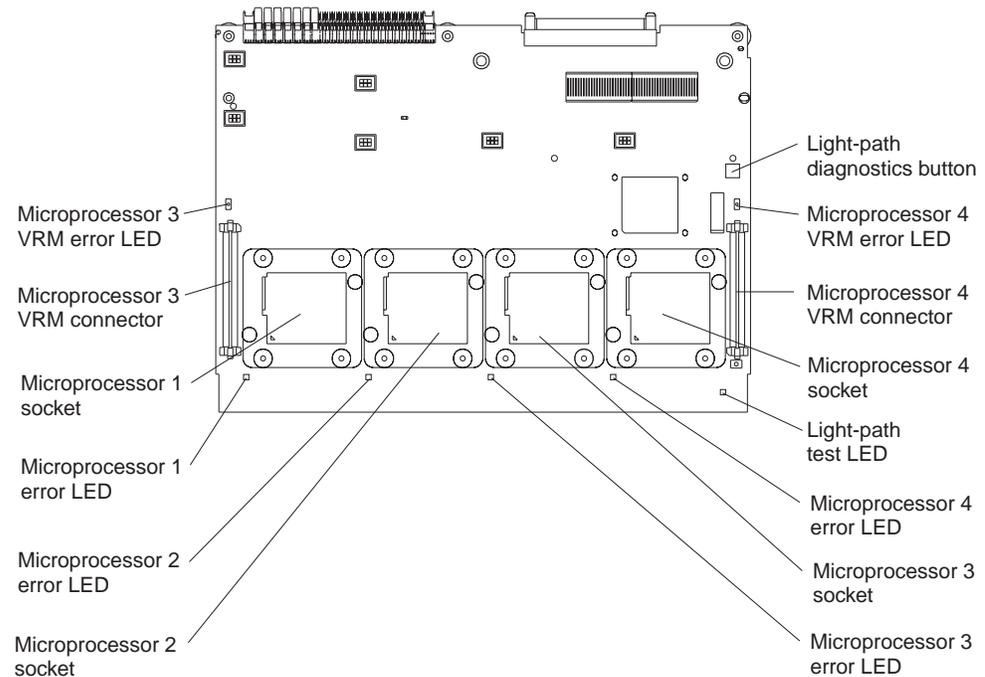
- If one microprocessor is installed:
  - The microprocessor is installed in microprocessor connector 1 (U22).
  - The microprocessor supports both the startup and application processes.
- If you install additional microprocessors in the server, microprocessor 2 is installed in microprocessor connector 2 (U23); microprocessor 3 is installed in connector 3 (U24); microprocessor 4 is installed in connector 4 (U25).
- A new microprocessor comes in a kit with a VRM and a heat sink. The VRM is used only with microprocessor 3 or 4.
- Read the documentation that comes with the microprocessor to determine whether you need to update the server basic input/output system (BIOS) code. The most current level of BIOS code for the server is available from http://www.ibm.com/pc/support.
- To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems, go to http://www.ibm.com/pc/us/compat/.

Attention: To avoid damage and to ensure proper server operation, review the following information before you install a microprocessor:

- Make sure that the microprocessors are the same type, have the same cache size, and have the same clock speed.
- Make sure that the microprocessor internal and external clock frequencies are identical.
- See the ServerProven list at http://www.ibm.com/pc/compat/ for a list of microprocessors that are supported by the server.
- When installing additional microprocessors, populate the microprocessor connectors in numeric order, starting with connector 2. If you install the microprocessors in the wrong order, the server will not turn on.
- Avoid touching the components and pins on the microprocessor. Make sure that the microprocessor is completely and correctly seated in the socket. Incomplete insertion might cause damage to the microprocessor board or to the microprocessor.

Complete the following steps to install a microprocessor:

1. Review the safety information beginning on page v and "Installation guidelines" on page 7.
2. Turn off the server and all peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server cover and bezel (see "Removing the cover and bezel" on page 8).

4. Remove the microprocessor tray:

   a. Remove the memory cassette.

b. Remove all fans.

Hot-swap fan 5

Hot-swap fan 6

Fan Error LED

Hot-swap fan 3

Hot-swap fan 4

Hot-swap fan 1

Hot-swap fan 2

c. Lift the microprocessor-tray release latch (**1**).

1

2

3

2
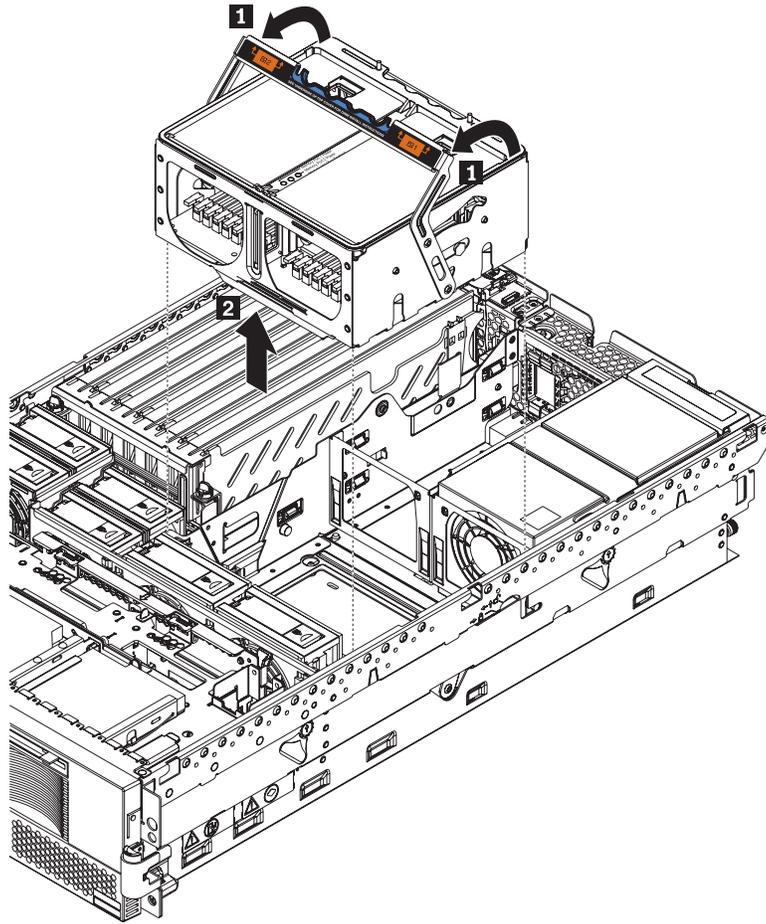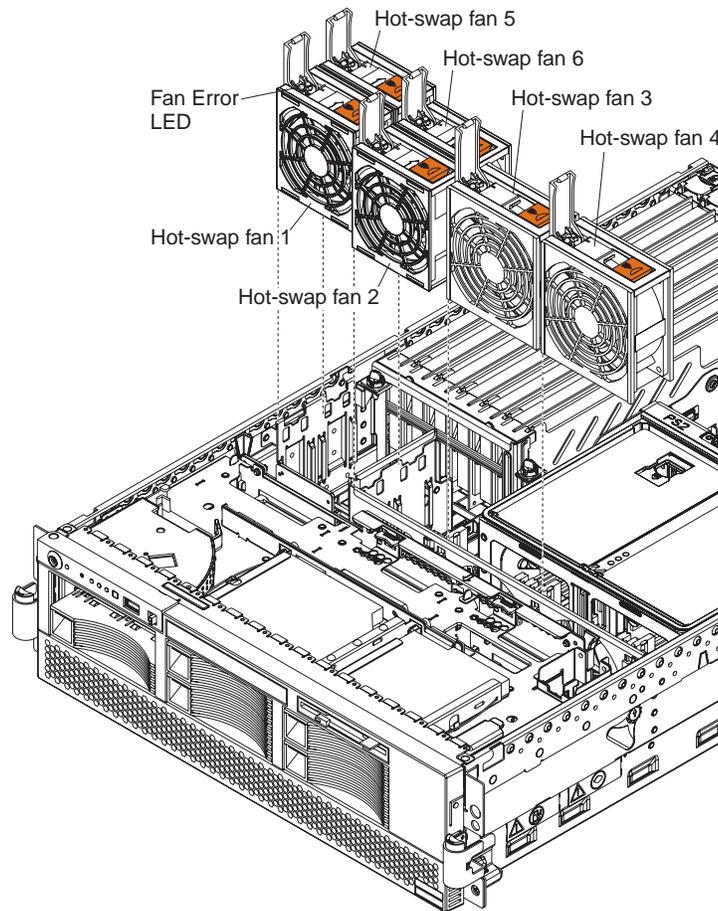
Microprocessor-tray release latch

Microprocessor-tray levers
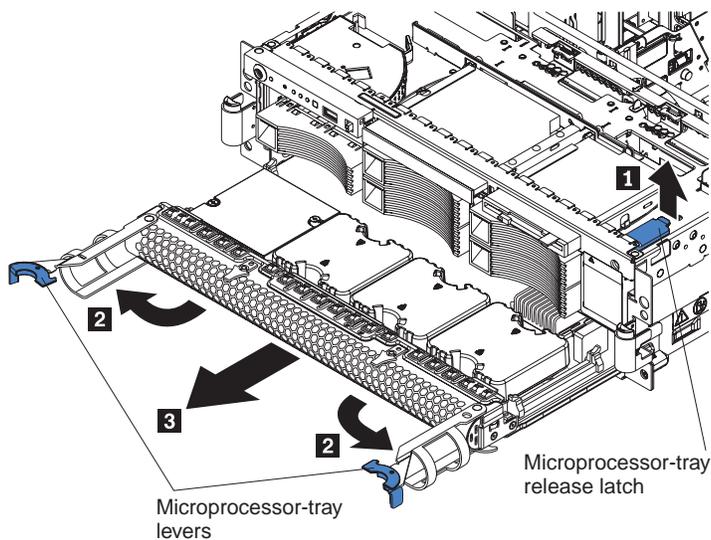
d. Open the microprocessor-tray levers (**2**).

e. Pull out the microprocessor tray (**3**).

   Attention: The microprocessor tray is heavy. Pull the tray part-way out of the server, reposition your hands to grasp the body of the tray, and then pull the tray out the rest of the way.

Captive screws

Heat sink 3

Microprocessor 3

Microprocessor baffle

Microprocessor 3 VRM

Microprocessor-tray levers
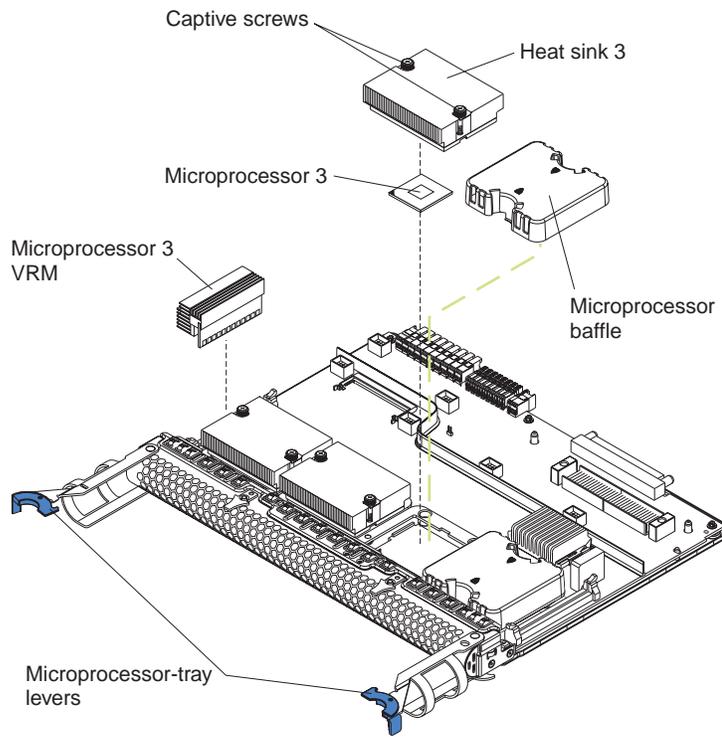
Note: The new microprocessor comes in a kit with a VRM and a heat sink. The VRM is used only with microprocessors 3 and 4.

5. Remove the microprocessor baffle from the empty microprocessor socket and store the microprocessor baffle for future use.

6. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.

7. Lift the microprocessor-release lever to the fully-open position (135°).

Lever closed

Lever fully open

Lever closed
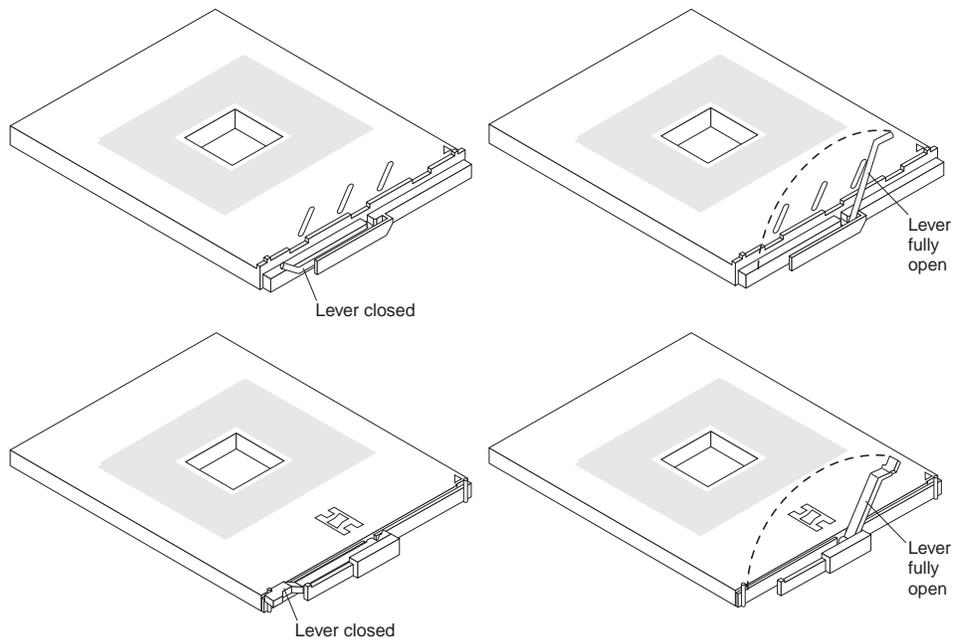
Lever fully open

Attention: You must ensure that the locking lever on the microprocessor socket is in the fully-open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.
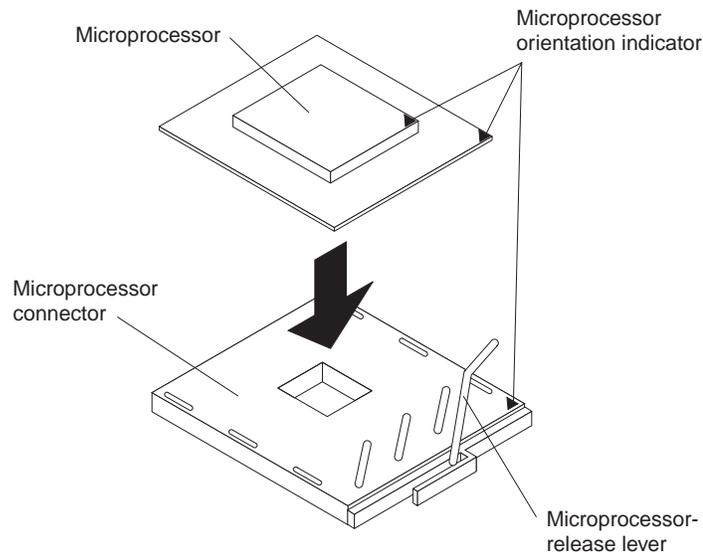
8. Install the microprocessor.
9. Close the microprocessor-release lever to secure the microprocessor.

   Attention:

   • Do not disturb or contaminate the thermal material on the bottom of the new heat sink. Doing so damages its heat-conducting capability and exposes the new microprocessor to overheating.

   • If you need to remove the heat sink after installing it, note that the thermal material might have formed a strong bond between the heat sink and the microprocessor. Do not force the heat sink and microprocessor apart; doing so can damage the microprocessor pins. Loosening one captive screw fully before loosening the other captive screw helps break the bond between the components without damaging them.

10. Remove the heat sink from its package and remove the cover from the bottom of the heat sink. Make sure that the thermal material is still on the bottom of the heat sink. Remove the release liner and orient the heat sink above the microprocessor; then, press the heat sink into place. Press firmly on the captive screws and tighten them, alternating between screws until they are tight. Do not overtighten the screws.

11. If you installed the microprocessor in connector 3 or 4, install the VRM in the applicable microprocessor VRM connector (VRM connector 3 for microprocessor 3, VRM connector 4 for microprocessor 4). See the illustration on page 18 for the location of the VRM connectors.

12. Reinstall the microprocessor tray in the server:

    a. Make sure the microprocessor-tray release latch is open; then, push the microprocessor tray into the server.

    b. Close the tray levers and make sure they are securely latched.

    c. Press the microprocessor-tray release latch down.

    d. Reinstall the fans and memory cassette in the server.

Note: When the memory cassette is fully seated and the handle is all the way down, two black pins protrude through the blue insert on the handle.

Indicator pins
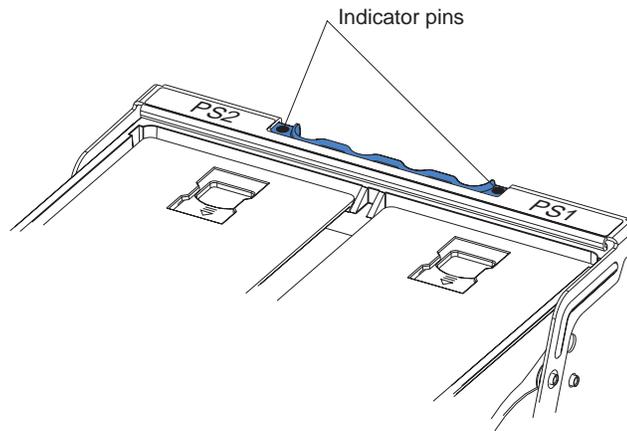
13. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 26.

Installing a hot-swap power supply

The following notes describe information that you must consider when installing a hot-swap power supply in the server:

- The server comes with a minimum of one power supply and supports up to two power supplies.

- If you install or remove a power supply, observe the following precautions:
  Statement 8:

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

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.
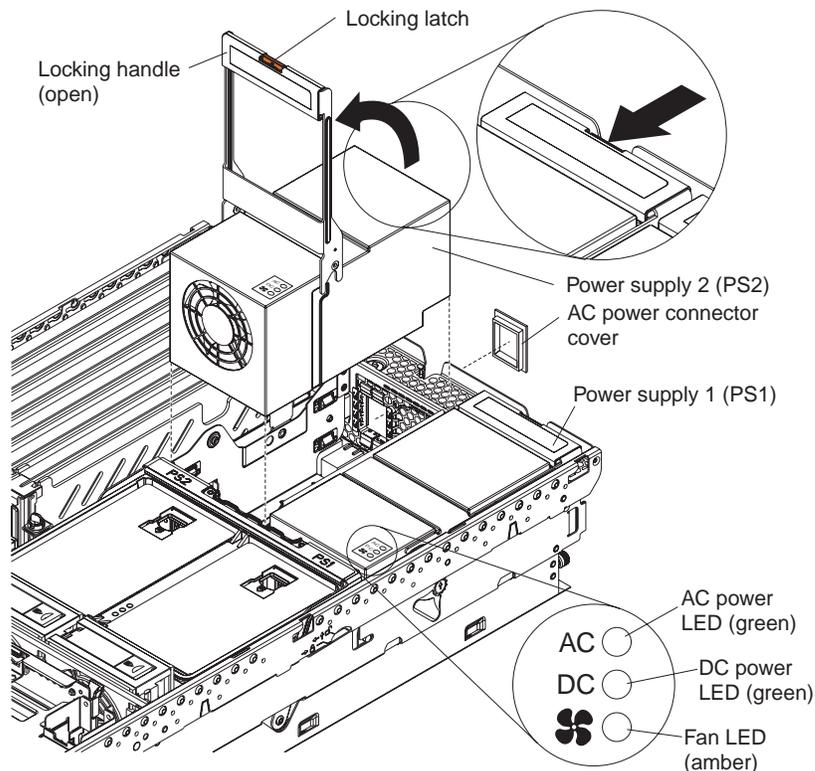
Complete the following steps to install a hot-swap power supply:

1. Review the safety information beginning on page v, and "Installation guidelines" on page 7.
2. Remove the server cover. See "Removing the cover and bezel" on page 8.
3. Remove the cover from the ac power connector opening on the rear of the server.

4. Raise the power supply handle to the open position.
5. Place the power supply into the power bay in the chassis and fully close the locking handle.

   Note: The power supplies are numbered from left to right (1 to 2) as viewed from the rear of the server. Power supplies must be installed in the following sequence: power supply 1, then power supply 2.

6. Connect one end of the power cord for the new power supply into the connector on the back of the power supply; route the power cord through the cable-management arm and connect the other end of the power cord into a properly grounded electrical outlet.
7. Make sure that the ac power LED on the rear of the power supply and the ac power LED on the top of the power supply are lit, indicating that the power supply is operating correctly. If the server is turned on, make sure that the dc power LED on the top of the power supply is lit also.
8. Continue with "Completing the installation."

Completing the installation

This section describes how to complete the installation.

Installing the cover and bezel

Complete the following steps to install the server cover and bezel:

1. Position the internal cables so that they do not interfere with the cover installation.
2. Move the cover-release latch to the open (up) position.
3. Position the cover on top of the server and press down on the cover-release latch. The cover slides forward into position.
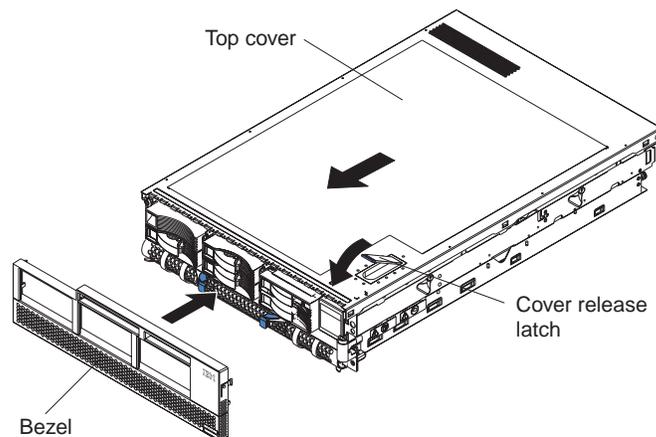
4. Insert the tabs on the bottom of the bezel into the matching holes on the server chassis.
5. Push the top of the bezel toward the server until the two tabs at the top of the sides of the bezel snap into place.
6. Install the server in the rack. See the *Rack Installation Instructions* that come with the server for details.

   Note: Depending on the options that you installed, after cabling the server, you might need to run the Configuration/Setup Utility program to update the

server configuration. See "Updating the server configuration" on page 29 and the *User's Guide* for more information.

7. If you disconnected any power cords or external cables from the server, reconnect the external cables first. If you are adding any new peripheral devices (see "Connecting the cables" for details), you can connect the external cables for those devices. Then, connect the power cords to properly grounded electrical outlets.

Connecting the cables

This section provides basic information about attaching peripheral devices such as a monitor, keyboard, and pointing device to the server and connecting the server to additional servers.

Note: You can connect a USB keyboard to the server using one of the USB connectors. After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent POST error message 301 from being displayed during startup. For detailed information about the USB keyboard and how to connect it to your server, see the documentation that comes with the keyboard.

Input/output connectors
Your server has the following input/output (I/O) connectors:
- Serial (one, rear)
- Gigabit Ethernet (two, rear)
- Keyboard (one, rear)
- Mouse (one, rear)
- USB (two, rear; one, front - on operator information panel)
- RXE expansion (one, rear)
- RXE management (one, rear)
- SCSI (one, rear)

The Remote Supervisor Adapter II has the following connectors:
- Remote Supervisor Adapter II Ethernet (one, rear)
- Remote Supervisor Adapter II video (one, rear)
- Remote Supervisor Adapter II ASM (one, rear)
- Remote Supervisor Adapter II USB (reserved)

The following illustration shows the USB connector on the operator information panel on the front of the server.
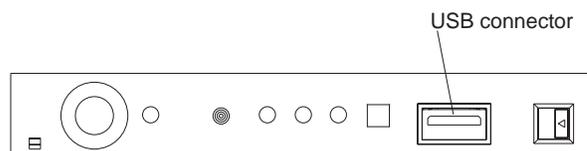
USB connector

The following illustration shows the I/O connectors on the rear of the server.
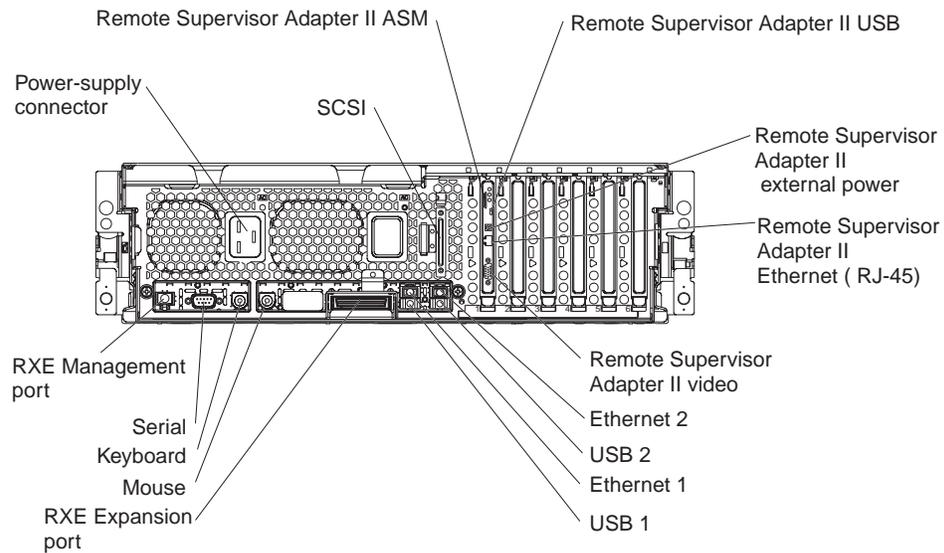
Power supply connector: Connect one end of the power-supply power cord to this connector and connect the other end into an ac power source. The server comes with one or two hot-swap power supplies, depending on the server model. If your server comes with one hot-swap power supply, you can add a second hot-swap power supply to obtain full power redundancy. Connect the power supplies to separate ac power circuits for power redundancy.

SCSI connector: Connect an external SCSI device to this connector.

Remote Supervisor Adapter II ASM connector: Attach the ASM breakout cable to this connector to enable system management through the serial connectors and through the ASM RS-485 connectors.

Remote Supervisor Adapter II USB connector: This connector is not available for use.

Remote Supervisor Adapter II external power connector: Connect the optional power-supply adapter to this connector. This connection provides power to the Remote Supervisor Adapter II, independent of the server power supply.

Remote Supervisor Adapter II Ethernet connector: Use this connector to connect the Remote Supervisor Adapter II to a network to manage the server from a remote location.

Remote Supervisor Adapter II video connector: Connect your server monitor to this connector.

Ethernet connectors: Use these connectors to connect the server to a network.

USB connectors: Connect USB devices to these connectors.

RXE Expansion Port: Connect the RXE Expansion Port of an optional IBM RXE-100 Remote Expansion Enclosure to this connector. See the information about RXE cabling in the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

Mouse connector: Connect a mouse or other pointing device to this connector.

Keyboard connector: Connect a PS/2 (non-USB) keyboard to this connector.

Serial connector: Connect a serial device to this connector.

RXE Management Port: Connect the RXE Management A (In) Port of an optional IBM RXE-100 Remote Expansion Enclosure to this connector. See the information about RXE cabling in the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

For information about configuring and cabling the Remote Supervisor Adapter II to manage the server remotely or to interconnect to another device, see the server *User's Guide*. For information about using the Remote Supervisor Adapter II, see the *Remote Supervisor Adapter II User's Guide*. Both documents are on the *IBM Documentation* CD.

Routing the cables

The following illustration shows the cable routing for a typical server configuration. Detailed cabling instructions, including the use of the cable-management arm (which comes with the server) are in the *Rack Installation Instructions* that come with the server.

Notes:

1. See the documentation that comes with the option for additional cabling instructions. It might be easier for you to route cables before you install certain options.
2. If you have just connected the power cords of the server to an electrical outlet, wait approximately 20 seconds before pressing the power-control button.
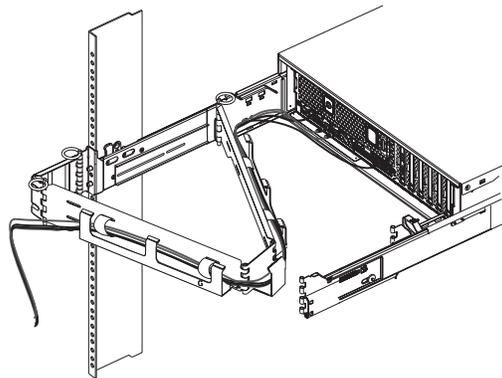
After you have installed the server in the rack and connected all the required cables, go to "Turning on the server" on page 35.

Updating the server configuration

When you start the server for the first time after you add or remove an internal option or external SCSI device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see the section about configuring the server in the *User's Guide* on the IBM *xSeries Documentation* CD.

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

The server comes with at least one microprocessor on the microprocessor board. If more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see the section about using the *ServerGuide Setup and Installation* CD in the *User's Guide* and the operating-system documentation.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

For information about setting up, configuring, and using the Remote Supervisor Adapter II, see the *Remote Supervisor Adapter II User's Guide* on the IBM *xSeries Documentation* CD.

For information about configuring the integrated Gigabit Ethernet controller, see the IBM xSeries 365 *User's Guide* on the IBM *xSeries Documentation* CD, which comes with your server.

Chapter 3. Server controls, LEDs, and power

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

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the server.
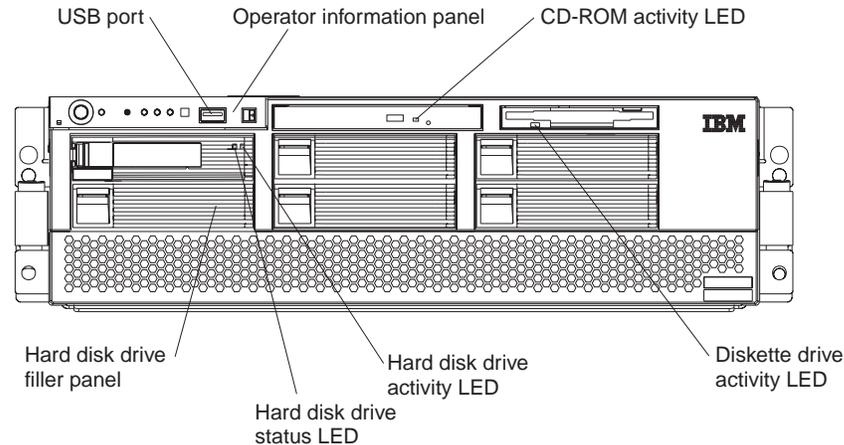
Operator information panel: This panel contains controls, indicators, and a USB port. Swing it open to see the light path diagnostics LEDs on the side of the panel. See "Operator information panel" on page 33 for details.

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

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

Hard disk drive filler panels: A filler panel and air baffle are used to cover empty hard disk drive bays. A filler panel and air baffle must be installed in each empty bay to ensure proper system cooling. Your server comes with five filler panels and air baffles installed, and one completely empty bay.

Hard disk drive activity LED: When this LED is flashing, it indicates that the associated hard disk drive is in use.

Hard disk drive status LED: When this LED is lit continuously, it indicates that the associated hard disk drive has failed. The interpretation of a flashing status LED depends on the SCSI controller that is connected to the hot-swap drive, as follows:

- When the drive is connected to the integrated SCSI controller with RAID capabilities, a flashing status LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized.
- When the drive is connected to an optional ServeRAID controller, a slowly flashing (one flash per second) status LED indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

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USB port: You can connect a USB device to this connector.

Rear view

The following illustration shows the LEDs on the rear of the server.
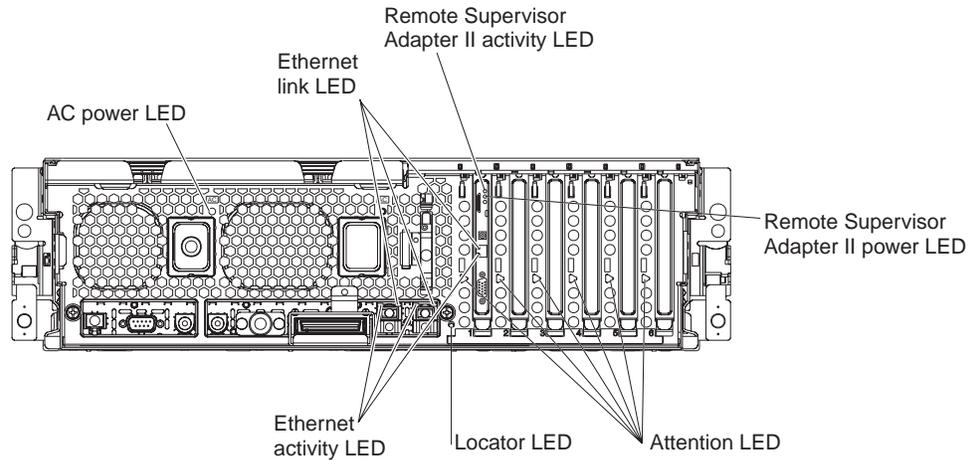
AC power LED: Each hot-swap power supply has an ac power LED that is visible from the rear of the server. The power supply also has an ac power LED and a dc power LED on the top of the power supply, visible when the server cover is removed. When the ac power LED is lit, ac input to the power module is present and within specifications. During typical operation, both the ac and dc power LEDs on the top of the power supply are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Ethernet link LEDs: When these LEDs (one for the Remote Supervisor Adapter II, two for the network) are lit, they indicate that the related Ethernet link is operational.

Remote Supervisor Adapter II activity LED: When this LED is flashing, the Remote Supervisor Adapter II is functioning normally. When the LED is lit continuously, there is a problem with the Remote Supervisor Adapter II. When the LED is off, the Remote Supervisor Adapter II is not functioning. This LED is the topmost LED on the Remote Supervisor Adapter II.

Remote Supervisor Adapter II power LED: When this LED is lit, it indicates that power is being supplied to the Remote Supervisor Adapter II.

Attention LED: When this LED is on steady, it indicates that the adapter in the corresponding slot is ready to be removed (hot-pluggable adapter only) or there is a problem with the adapter. When this LED is flashing, it indicates that an operation is in progress or that the adapter requires attention, depending on the operating system. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for troubleshooting information.

Locator LED: Use this blue LED to visually locate the server if it is in a location with numerous other servers. A locator LED is also on the operation information panel on the front of the server. You can use the Management Processor Assistant (MPA) in IBM Director to cause this LED to be lit, off, or flashing. If the server is connected to an RXE-100 Remote Expansion Enclosure, pressing the Locate button on the enclosure causes this LED to be lit.

Note: This LED flashes while the server is being turned on or restarted, and turns off when POST is complete.

Ethernet activity LEDs: When these LEDs (one for the Remote Supervisor Adapter II, two for the network) are lit, they indicate that activity is taking place on the related network.

Operator information panel

The following illustration shows the controls, indicators, and USB connector on the operator information panel.
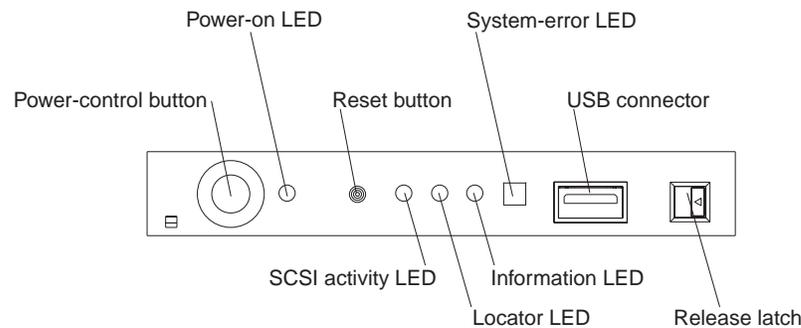
Power-control button: Press this button to turn the server on and off manually. A power-control-button shield comes with your server. You can install this disk-shaped shield to prevent the server from being turned off accidentally.

Power-on LED: When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A power LED is also on the rear of the server.

Note: If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cord from the electrical outlet.

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

SCSI activity LED: When this LED is lit, it indicates that there is activity on the SCSI bus.

Locator LED: Use this blue LED to visually locate the server if it is in a location with numerous other servers. A locator LED is also on the rear of the server. You can use the Management Processor Assistant (MPA) in IBM Director to cause this LED to be lit, off, or flashing. If the server is connected to an RXE-100 Remote Expansion Enclosure, pressing the Locate button on the enclosure causes this LED to be lit.

Note: This LED flashes while the server is being turned on or restarted, and turns off when POST is complete.

Information LED: When this LED is lit, it indicates that a noncritical event has occurred.

System-error LED: When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel on the side of the operator information panel is also lit to help isolate the error. For details, see the section about the light path diagnostics panel and internal LED locations in the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

USB connector: You can connect a USB device to this connector.

Release latch: Press this latch to release the operator information panel to access the light path diagnostics LED panel.

Light path diagnostics LED panel

Swing the operator information panel out to see the light path LED panel on the side of the operator information panel. The following illustration shows the LEDs on the light path LED panel.
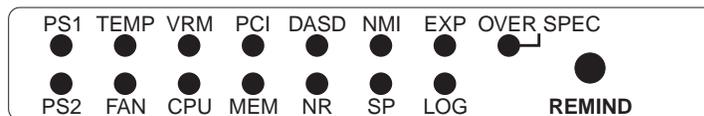
PS1 LED: When this LED is lit, it indicates that power supply 1 has failed.

PS2 LED: When this LED is lit, it indicates that power supply 2 has failed.

TEMP LED: When this LED is lit, it indicates that the system temperature has exceeded a threshold level.

FAN LED: When this LED is lit, it indicates that a fan has failed or is operating too slowly. A failing fan can also cause the OVER TEMP LED to be lit.

VRM LED: When this LED is lit, it indicates that a VRM on the microprocessor tray has failed.

CPU LED: When this LED is lit, it indicates that a microprocessor has failed.

PCI LED: When this LED is lit, it indicates that an error has occurred on a PCI bus.

MEM LED: When this LED is lit, it indicates that a memory error has occurred.

DASD LED: When this LED is lit, it indicates that a hot-swap hard disk drive has failed.

NR LED: When this LED is lit, it indicates that two power supplies are present but the power supplies are not redundant.

NMI LED: When this LED is lit, it indicates that there has been a nonmaskable interrupt (NMI).

SP LED: When this LED is lit, it indicates that the service processor has encountered an error.

EXP LED: When this LED is lit, it indicates that an attached I/O expansion unit has failed.

LOG LED: When this LED is lit, it indicates that you should view the event log or the Remote Supervisor Adapter II log for information about a non-optimal condition.

OVER SPEC LED: When this LED is lit, it indicates that there is greater demand on the power supplies than they are specified to deliver.

Remind button: Press this button to reset the system-error LED on the operator information panel and place the server in remind mode. In remind mode, the fault has not been cleared but the system-error LED is flashing (once every 2 seconds) instead of lit; the system-error LED will be lit if another system error occurs.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- You can turn on the server through the Remote Supervisor Adapter or Remote Supervisor Adapter II user interface.
- The system-management software for the Remote Supervisor Adapter II can turn on the server.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
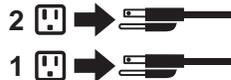
The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 5 seconds to turn off the server.
- The server can be turned off from the Remote Supervisor Adapter II user interface.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- The service processor can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the service processor.

Chapter 4. Configuring the server

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

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:
- Configuration/Setup Utility program
- IBM *ServerGuide Setup and Installation* CD
- Preboot Execution Environment (PXE) boot agent utility program
- RAID configuration programs
  - LSI Logic Configuration utility program
  - ServeRAID Manager
- SCSISelect utility program
- Service processor firmware update utility

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides state-of-the-art programs to detect the server model and installed hardware options, configure the server hardware, provide device drivers, and help you install your operating system. For information about the supported operating-system versions, see the label on the CD.

Complete the following steps to start the *ServerGuide Setup and Installation* CD:
1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide problems" on page 49.
2. Follow the instructions on the screen to:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips about your operating system and adapter.
   e. Start the setup and hardware configuration programs.
   f. Start the operating-system installation. You will need your operating-system CD.

Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS code. You can use it to:
- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View and clear error logs

- Change interrupt request (IRQ) settings
- Enable USB keyboard and mouse support
- Resolve configuration conflicts

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

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

Using the RAID configuration programs

Use the LSI Logic Configuration Utility program and ServeRAID Manager to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use these programs as described in this book.

- Use the LSI Logic Configuration Utility program to:
  - Perform a low-level format on a SCSI hard disk drive
  - View or change SCSI IDs for attached devices
  - Set SCSI protocol parameters on SCSI hard disk drives
- Use ServeRAID Manager to:
  - Configure arrays
  - View your RAID configuration and associated devices
  - Monitor operation of your RAID controllers

In addition, an LSI command-line configuration program (CFG1030) is available from http://www.ibm.com/pc/support/.

Consider the following information when using the LSI Logic Configuration Utility program and ServeRAID Manager to configure and manage arrays:

- Use the ServeRAID Manager program to configure your arrays before you install your operating system. Do not use the LSI Logic Configuration Utility program to configure arrays.
- The integrated SCSI controller with RAID capabilities in your server supports only RAID level-1 with a hot-spare drive installed. Installing an optional ServeRAID controller provides additional RAID levels.
- If your server has a ServeRAID controller installed, you can use ServeRAID Manager to configure the integrated SCSI controller with RAID capabilities for other supported RAID levels.
- You cannot use the *ServerGuide Setup and Installation* CD to configure the integrated SCSI controller with RAID capabilities.
- When you create a RAID level-1 (mirrored) pair, all drives must be on the same channel.
- To update the firmware and BIOS codes for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the controller.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing SCSI settings for attached devices.

Using the LSI Logic Configuration Utility program

Complete the following steps to start the LSI Logic Configuration Utility program:

1. Turn on the server and watch the monitor screen.

2. When the message `<<< Press <CTRL><C> to start LSI Logic Configuration Utility >>>` appears, press Ctrl+C. If an administrator password has been set, you are prompted to type the password.

3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.

4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter. If you select **Device Properties** or **Mirroring Properties**, additional screens are displayed.

Using ServeRAID Manager

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

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

Configuring the controller

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

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the CD into the CD-ROM drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts, and a window similar to that shown in the following illustration opens.
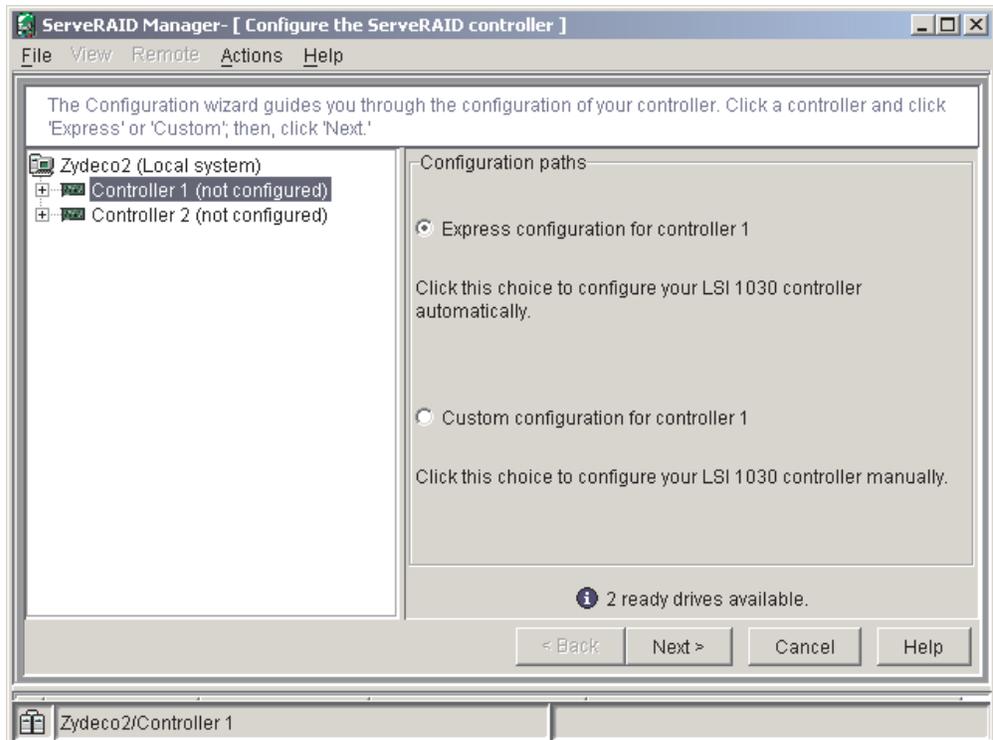
In the Configuration wizard, you can select express configuration or custom configuration. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the two physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration: Complete the following steps to use express configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click Next. The "Configuration summary" window opens.
4. Review the information in the "Configuration summary" window. To change the configuration, click **Modify arrays**.
5. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.
6. Exit from ServeRAID Manager and remove the CD from the CD-ROM drive.
7. Restart the server.

Using custom configuration: Complete the following steps to use custom configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**. The "Create arrays" window opens.
4. From the list of ready drives, select the two drives that you want to group into the array.

5. Click the icon to add the drives to the array.
6. If you want to configure a hot-spare drive, complete the following steps:
   a. Click the Spares tab.
   b. Select the physical drive that you want to designate as the hot-spare drive, and click the icon to add the drive.
7. Click **Next**. The "Configuration summary" window opens.
8. Review the information in the "Configuration summary" window. To change the configuration, click **Back**.
9. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.
10. Exit from ServeRAID Manager and remove the CD from the CD-ROM drive.
11. Restart the server.

Viewing the configuration

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

Updating the Remote Supervisor Adapter II and integrated service processor

See the *User's Guide* on the IBM *xSeries Documentation* CD for information and instructions for updating the software and firmware on the Remote Supervisor Adapter II and on the server integrated service processor.

Chapter 5. Updating IBM Director

If you plan to use IBM Director to manage your server, you must install the applicable IBM Director updates, which could include a Service Pack for your release of IBM Director, interim fixes, and a Director System Support Package (DSSP) for this server.

Note: For Automatic Server Restart (ASR) support and environmental-sensor support, you must install version 4.1 of IBM Director.

To install the IBM Director updates, complete the following steps, in order:

1. If you plan to enable the Automatic Server Restart (ASR) feature, install the ASR device driver, which is available from the IBM Web site:
   a. Go to http://www.ibm.com.
   b. Click **Support & downloads**.
   c. Click **All downloads & drivers**.
   d. In the **Enter search terms** field, type `advanced system management x365` and click **Submit**.
   e. Select the applicable IBM Advanced System Management device driver for your server and operating system.
   f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the device driver.

2. Install the IBM Director application.

3. If the IBM Director CD that comes with your server includes the IBM Director Service Pack, install the Service Pack. If the CD does not contain the Service Pack, check the IBM Web site to see whether a Service Pack is available. If it is, download and install the Service Pack according to the instructions in its readme file.

4. Install any applicable interim fixes, DSSPs, and additional updates for your server from the IBM Web site:
   a. Go to http://www.ibm.com.
   b. Click **Support & downloads**.
   c. Click **All downloads & drivers**.
   d. In the **Enter search terms** field, type `director x365` and click **Submit**.
   e. Select the interim fix, DSSP, or update that you want to download.
   f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update.

Chapter 6. Solving problems

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

If you cannot locate and correct the problem using the information in this chapter, see Appendix A, "Getting help and technical assistance," on page 59, the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD, and the "Server Support" flowchart in the front of this document.

Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST beep codes**

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

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

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

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

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See "Troubleshooting charts" on page 50 for more information.

- **Diagnostic programs and error messages**

  The system diagnostic programs are provided in ROM. These programs test the major components of your server. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information.

- **Light path diagnostics**

  Use light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 55 for more information.

POST beep codes

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

Note: See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information about the POST beep codes.

Beep code	Description	Suggested action
None	Undetermined error.	Call for service.
1 beep	POST was completed successfully. One beep also occurs after POST if you type an incorrect password.	None required.
2 beeps	Undetermined error.	Follow the instructions on the screen.

Repeating beeps	The I/O board or other internal boards might contain a failing component.	• Make sure that the keyboard and pointing devices are connected properly. • Make sure that nothing is resting on the keyboard. • Disconnect the pointing device; then, restart the server. If the problem is corrected, replace the pointing device. If the problem remains, call for service.
1-1-2	Microprocessor register test has failed.	Call for service.
1-1-3	CMOS write/read test has failed.	
1-1-4	BIOS ROM checksum has failed.	
1-2-1	Programmable Interval Timer test has failed.	
1-2-2	DMA initialization has failed.	
1-2-3	DMA page register write/read test has failed.	
1-2-4	RAM refresh verification has failed.	Reseat the memory modules or install a memory module. If the problem remains, call for service.
1-3-1	First 64 Kb RAM test has failed.	
1-3-2	First 64 Kb RAM parity test has failed.	
1-4-3	Interrupt vector loading test has failed.	Call for service.
2-1-1	Secondary DMA register test has failed.	
2-1-2	Primary DMA register test has failed.	
2-1-3	Primary interrupt mask register test has failed.	
2-1-4	Secondary interrupt mask register test has failed.	
2-2-1	Interrupt vector loading has failed.	
2-2-2	Keyboard controller test has failed.	
2-2-3	CMOS power failure and checksum checks have failed.	
2-2-4	CMOS configuration information validation has failed.	
2-3-1	Screen initialization has failed.	Turn off the server, disconnect all power cords, and reconnect all power cords; then, restart the server. If the problem remains, call for service.
2-3-2	Screen memory test has failed.	Call for service.
2-3-3	Screen retrace tests have failed.	
2-3-4	Search for video ROM has failed.	
2-4-1	Screen test indicates the screen is operable.	
3-1-1	Timer tick interrupt test has failed.	
3-1-2	Interval timer channel 2 test has failed.	
3-1-3	RAM test has failed above address hex 0FFFF.	
3-1-4	Time-of-Day clock test has failed.	
3-2-1	Serial port test has failed.	
3-2-2	Parallel port test has failed.	
3-2-4	Comparison of CMOS memory size against actual has failed.	
3-3-1	A memory size mismatch has occurred.	Reseat the memory modules or install a memory module. If the problem remains, call for service.

3-3-2	I^{2}C bus has failed.	Turn off the server, disconnect all power cords, and reconnect all power cords; then, restart the server. If the problem remains, call for service.
3-3-3	No memory has been detected in the server.	Reseat the memory modules or install a memory module. If the problem remains, call for service. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is enabled (its default setting), you must restart the server three times to force the BIOS to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled).

POST error messages

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

POST message	Failing device or problem found	Suggested action
162	The device configuration has changed.	• Run the Configuration/Setup Utility program; then, exit, saving the configuration settings. • Make sure that your optional devices are turned on and installed correctly.
163	The time of day has not been set.	Set the date and time.
289	A failing DIMM was disabled.	Make sure that all installed DIMMs are supported by your server and that they are installed correctly.
301 303	Keyboard and keyboard controller	Make sure that the keyboard cable is connected and that nothing is resting on the keyboard keys.
00019*xxx*	Microprocessor *x* is not functioning or failed the built-in self-test	Make sure that microprocessor *x* is installed correctly. If the problem remains, replace microprocessor *x*.
00180*xxx*	A PCI adapter requested a resource that is not available.	Run the Configuration/Setup Utility program and make sure that the resources needed by the PCI adapter are available.
012980*xx* 012981*xx*	Data for microprocessor *x*	Download and install the latest level of BIOS code.
I9990305	POST could not find an operating system.	Install an operating system.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 1. ServerGuide Setup and Installation CD

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

Troubleshooting charts

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

CD-ROM drive problems

Symptom	Suggested action
The CD-ROM drive is not recognized.	Make sure that: • The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. If the server has a single IDE channel, only the primary channel can be used. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD-ROM drive.

Diskette drive problems

Symptom	Suggested action
The diskette drive activity LED stays lit, or the server bypasses the diskette drive.	If there is a diskette in the drive, make sure that: • The diskette drive cables are correctly and securely connected. • The diskette drive is enabled in the Configuration/Setup Utility program. • The diskette is good and not damaged. (Try another diskette if you have one.) • The diskette contains the necessary files to start the server. • Your software program is working properly. If the problem remains, call for service.

General problems

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

Hard disk drive problems

Symptom	Suggested action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	1. Remove the first drive that is not recognized and run the hard disk drive diagnostic test again. 2. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	1. Remove the hard disk drive that was being tested when the server stopped responding and try the diagnostic test again. 2. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
The hard disk drives are not detected while loading the operating system.	1. Make sure that the SCSI backplane is enabled in the Configuration/Setup Utility program. 2. Make sure that the LSI device driver is loaded.

Intermittent problems

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

I/O expansion enclosure problems

Symptom	Suggested action
The RXE-100 expansion enclosure is not recognized or does not work as expected.	See the server *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or see your RXE-100 expansion enclosure documentation.

Keyboard, mouse, or pointing-device problems

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

Memory problems

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

Microprocessor problems

Symptom	Suggested action
The server emits a continuous tone during POST.	The startup (boot) microprocessor is not working correctly. Make sure that the startup microprocessor is seated correctly in socket 1. If it is, replace the startup microprocessor. If the problem remains, call for service.

Monitor problems

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

Symptom	Suggested action
The screen is blank.	Make sure that: • The server power cord is connected to the server and a working electrical outlet. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is enabled (its default setting), you must restart the server three times to force the BIOS to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled). If the problem remains, call for service.
Only the cursor appears.	Call for service.

Symptom	Suggested action
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	Make sure that: • The primary monitor cable is connected to the Remote Supervisor Adapter II or to the optional C2T breakout cable. • You have installed the necessary device drivers for the application programs. If the problem remains, call for service.
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 300 mm (12 in.) apart, and turn on the monitor. **Notes:** 1. To prevent diskette drive read/write errors, make sure that the distance between the monitor and diskette drives is at least 75 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM marketing representative or authorized reseller. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. If the problem remains, call for service.

Option problems

Symptom	Suggested action
An IBM option that was just installed does not work.	Make sure that: • The option is designed for the server. See the "Server Support" flowchart for information about obtaining ServerProven compatibility information from the World Wide Web. • You followed the installation instructions that come with the option. • The option is installed correctly. • You have not loosened any other installed options or cables. • You have 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.	• Make sure that all of the option hardware and cable connections are secure.
	• If the option comes with test instructions, use those instructions to test the option.
	• If the failing option is a SCSI device, make sure that:
	  – The cables for all external SCSI options are connected correctly.
	  – The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.
	  – Any external SCSI devices are turned on. You must turn on external SCSI devices before turning on the server.
	
	If the problem remains, call for service.

Power problems

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

Serial port problems

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

Symptom	Suggested action
The number of serial ports identified by the operating system is less than the number of serial ports that are installed.	Make sure that: • Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled. • The serial port adapter, if you installed one, is seated correctly. If the problem remains, call for service.

A serial device does not work.	Make sure that:
	• The device is compatible with the server.
	• The serial port is enabled and is assigned a unique address.
	• The device is connected to one of the following serial connectors:
	  – The serial connector on the server chassis.
	  – A serial port on the Remote Supervisor Adapter II breakout cable and the breakout cable is connected to the ASM port on the REmote Supervisor Adapter II.
	
	If the problem remains, call for service.

Software problems

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

Storage expansion enclosure problems

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

Universal Serial Bus device problems

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

Light path diagnostics

Use the light path diagnostics to diagnose system errors. The light path diagnostics panel is on the side surface of the operator information panel. To access the light path diagnostics panel, move the latch on the right front of the operator information panel and pivot the panel. For LED locations, see the illustration on page 34.

Light path diagnostics LEDs for all components except microprocessors, DIMMs, and fans are visible from outside the server. Light path diagnostics LEDs for DIMMs and additional LEDs for adapters and power supplies are visible after you open the server cover. Any light path diagnostics LEDs that are lit on the microprocessor tray can be lit again without ac power after you remove the microprocessor tray, so that

you can isolate a problem with the microprocessors. After ac power has been removed from the server, power remains available to these LEDs for up to 24 hours. After 24 hours, you might need to reinstall the microprocessor tray and turn on the server to supply power to the LEDs.

Complete the following steps to view the DIMM LEDs:

1. Turn off the server and all peripheral devices.
2. Slide the server out of the rack cabinet.
3. Open the top cover.
4. If necessary, open the DIMM access doors on the memory cassette to view the DIMM LEDs.
5. Close the server cover; then, slide the server into the rack cabinet and connect all external cables. See "Connecting the cables" on page 27.

Complete the following steps to view the microprocessor and VRM LEDs:

1. Turn off the server and all peripheral devices; then, disconnect all external cables from the server.
2. Slide the server out of the rack cabinet.
3. Remove the fans and memory cassette.
4. Lift the microprocessor-tray release latch and remove the microprocessor tray (see "Installing a microprocessor" on page 17 for instructions about how to remove the microprocessor tray).
5. Press and hold the light-path-diagnostics button on the microprocessor board for up to 30 seconds to light the error LEDs on the microprocessor board. The LEDs that were lit while the system was running will be lit while the button is pressed.

    Note: If the light-path-test LED on the microprocessor tray is not lit when the button is pressed, the light-path capacitor has insufficient charge to light the error LEDs.

6. Reinstall the microprocessor tray, memory cassette, and fans.
7. Close the microprocessor-tray release latch.
8. Close the server cover; then, slide the server into the rack cabinet and connect all external cables. See "Connecting the cables" on page 27.

Diagnosing problems using the light path diagnostics

LEDs in three locations on the server are available to help you diagnose problems that might occur during installation. Use them in the following order:

1. **Operator information panel** - Look at this panel first. If an error has occurred, the information LED or the system-error LED is lit.
2. **Light path diagnostics panel** - Move the latch on the right front of the operator information panel and pivot the panel to access the light path diagnostics panel. Note any LEDs that are lit, and then close the panel. For LED locations, see the illustration on page 34.
3. **LEDs on the rear of the server, in the memory cassette, or in the microprocessor tray** - To identify the component that is causing the error, note the lit LED on the rear of the server or beside the component.

The following example illustrates how to use the light path diagnostics to diagnose a system error:

1. The system-error LED on the operator information panel is lit.

2. Note that the MEM LED on the light path diagnostics panel is lit; one of the DIMMs in the memory cassette is defective.

3. Open the cover and locate the lit LED beside the defective DIMM.

   Note: The lit LEDs light the connector retaining clips; look for a lit retaining clip to identify a failed DIMM.

4. Follow the instructions in "Installing memory modules" on page 9 to remove and replace the DIMM.

Light path diagnostics panel

The following illustration shows the LEDs on the Level 2 Light Path Diagnostics panel, which is on the side of the operator information panel.

PS1 TEMP VRM PCI DASD NMI EXP OVER SPEC

PS2 FAN CPU MEM NR SP LOG **REMIND**
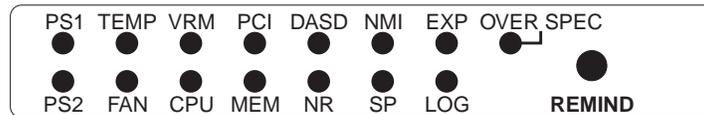
For more information about the Light Path Diagnostics feature, see the *Hardware Maintenance Manual and Troubleshooting Guide.* The following table describes the LEDs on the Light Path Diagnostics panel.

Light Path Diagnostics panel LED	Description
PS1	Power supply number 1 failure
PS2	Power supply number 2 failure
TEMP	System over temperature condition
FAN	Fan failure
VRM	VRM failure
CPU	Microprocessor failure
PCI	PCI failure
MEM	Memory failure
DASD	Hard disk drive failure
NR	Nonredundant power mode
NMI	Nonmaskable interrupt
SP	Remote Supervisor Adapter II failure
EXP	Attached expansion I/O failure
LOG	See event log or Remote Supervisor Adapter II log for non-optimal condition information
OVER SPEC	Power supplies being overdriven
REMIND button	Press to invoke remind mode

Notes:

1. The server requires replaceable voltage regulator modules (VRMs) with microprocessors 3 and 4.

2. The server supports a maximum of two power supplies.

3. The NR LED is lit only when two power supplies are installed and one is not functioning.

Remind button

You can use the Remind button to place the system-error LED on the front panel into the remind mode (flashes every 2 seconds). By pressing the button, you acknowledge the failure but indicate that you will not take immediate action. If a new failure occurs, the system-error LED turns on again.

The system-error LED stays in Remind mode until one of the following conditions occurs:

- All known problems are resolved
- The system is restarted
- A new problem occurs

You can use the Remind button to delay server maintenance until a later time.

The Light Path Diagnostics feature might direct you to look for an LED that identifies the specific failing component on the internal boards. See the *Option Installation Guide* for illustrations that identify the LEDs on the boards.

See the solving problems section in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more information.

Appendix A. Getting help and technical assistance

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

Before you call

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

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

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

Using the documentation

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

Getting help and information from the World Wide Web

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

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

Software service and support

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

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

Hardware service and support

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

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

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

Part 1 - General Terms

Part 1 - General Terms

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

What this Warranty Covers

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

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

What this Warranty Does not Cover

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

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

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

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

How to Obtain Warranty Service

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

What IBM Will Do to Correct Problems

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

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

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

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

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

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

Exchange of a Machine or Part

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

Your Additional Responsibilities

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

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

Limitation of Liability

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

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

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

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

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

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

Governing Law

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

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

Jurisdiction

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

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

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

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

BRAZIL

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

PERU

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

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

NORTH AMERICA

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

CANADA

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

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

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

UNITED STATES

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

ASIA PACIFIC

AUSTRALIA

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

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

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

CAMBODIA, LAOS, AND VIETNAM

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

CAMBODIA, INDONESIA, LAOS, AND VIETNAM

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

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

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

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

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

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

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

INDIA

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

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

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

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

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

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

JAPAN

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

MALAYSIA

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

NEW ZEALAND

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

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

PEOPLE'S REPUBLIC OF CHINA (PRC)

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

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

PHILIPPINES

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

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

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

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

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

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

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

SINGAPORE

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

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

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

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

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

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

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

Governing Law:

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

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

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

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

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

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

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

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

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

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

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

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

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

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

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

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

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

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

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

FRANCE AND BELGIUM

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

Except as otherwise provided by mandatory law:

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

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

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

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

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

The following paragraphs are added to this section:

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

The second paragraph does not apply.

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

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

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

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

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

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

EGYPT

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

Applicability of suppliers and resellers (unchanged).

FRANCE

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

GERMANY

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

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

The following paragraphs are added to this section:

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

The second paragraph does not apply.

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

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

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

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

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

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

HUNGARY

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

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

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

IRELAND

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

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

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

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

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

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

Items for Which IBM is Not Liable

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

SLOVAKIA

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

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

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

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

UNITED KINGDOM

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

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

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

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

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

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

Items for Which IBM is Not Liable

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

Part 3 - Warranty Information

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

Warranty Period

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

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

Machine - IBM @server **xSeries 365 Type 8861**

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	1 year	1 and 2
* See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

Machine - IBM @server **xSeries 365 Type 8862**

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	3 years	1 and 2
* See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:
1. parts and labor during the first year of the warranty period; and
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to

perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.

1. **Customer Replaceable Unit ("CRU") Service**

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

2. **On-site Service**

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

3. **Courier or Depot Service***

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

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

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

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

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

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

EU Country Telephone List

Phone numbers are subject to change without notice.

Austria -- 43-1-24592-5901	Italy -- 39-02-482-9202
Belgium -- 02-718-4339	Luxembourg -- 352-360385-1
Denmark -- 4520-8200	Netherlands -- 020-514-5770
Finland -- 358-9-4591	Portugal -- 351-21-7915-147

France -- 0238-557-450	Spain -- 34-91-662-4916
Germany -- 07032-15-4920	Sweden -- 46-8-477-4420
Greece -- 30-210-688-1220	United Kingdom -- 01475-555-055
Ireland -- 353-1-815-4000	

Appendix C. Notices

This information 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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EtherJet	ThinkPad
e-business logo	Tivoli
@server	Tivoli Enterprise
FlashCopy	Update Connector
IBM	Wake on LAN
IBM (logo)	XA-32
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Important notes

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

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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

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

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

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

Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.

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

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

In the Netherlands, the following applies.

Electronic emission notices

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. 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 causedby using other than recommended cables and connectors or by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

Taiwanese Class A warning statement

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

Chinese Class A warning statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラス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
されることがあります。

Power cords

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

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

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 14 AWG, Type 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 14 AWG, Type 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.

Power cord rating	IBM power cord part number (2.5 m)	Used in these countries and regions
15 A/125 V ac	12J5112	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Columbia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States, Venezuela
15 A/250 V ac	12J5120	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Columbia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States, Venezuela

Power cord rating	IBM power cord part number (2.5 m)	Used in these countries and regions
16 A/250 V ac	55H6643	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Gabon, Georgia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Korea (Democratic Peoples Republic of), Korea (Republic of), Kyrgyzstan, Laos (Peoples Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Replublic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
16 A/250 V ac	36L8822	Denmark, Liechtenstein, Switzerland
16 A/250 V ac	12J5122	Israel
16 A/250 V ac	12J5126	Chile, Italy, Libyan Arab Jamahiriya
16 A/250 V ac	12J5124	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
13 A/250 V ac	12J5987	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, Cyprus, Dominica, Gambia, Ghana, Grenada, Guyana, Hong Kong, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Qatar, Saint Kitts & Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad & Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
15 A/250 V ac	12J5128	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
15 A/250 V ac	01K9851	China
15 A/250 V ac	49P2114	Brazil
15 A/250 V ac	49P2082	India
15 A/250 V ac	36L8884	Argentina, Paraguay, Uruguay
15 A/125 V ac	01K9853	Japan

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