IBM

@server

xSeries 382
# Type 8834

Installation Guide

Welcome. . .

Thank you for buying an
IBM xSeries server.

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

For detailed information
about your server, view the
User's Guide on the
Documentation CD.

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

Install the server in
the rack, if required

↓

Cable the server
and options

↓

Start the server

↓

Did the server
start correctly? —— No —→ Go to the Server Support flow chart inside this cover.

Yes ↓

Complete setup and
configure hardware ←——

↓

Did configuration
complete? —— No ——→

Yes ↓

Install the operating system
and device drivers.
Go to the Web for instructions,
http://www.ibm.com/pc/support/

↓

System is ready to use.
Go to the Server Support
flow chart to register
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 → Register your computer. Go to **http://www.ibm.com/pc/register/**

— No ↓

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

↓

Problem solved?

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

— 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 → Register your computer. Go to **http://www.ibm.com/pc/register/**

— No → **Hardware or software problem?**

— Hardware → 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/**

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

IBM eServer xSeries 382
Type 8834

IBM

Installation Guide

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 49 and Appendix C, "Notices", on page 65.

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.

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. |

Statement 4
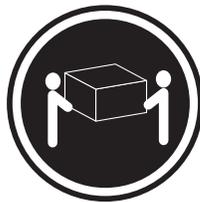
≥18 kg (39.7 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)
CAUTION:
**Use safe practices when lifting.**
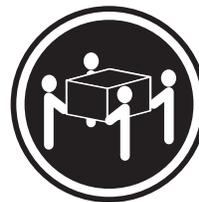
Statement 5

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 12

CAUTION:
The following label indicates a hot surface nearby.

Statement 13

DANGER:

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed the branch circuit protection requirements. Refer to the information that is provided with your IBM device for electrical specifications.

Statement 15

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 23

CAUTION:
Do not place any object weighing more than 50 kg (110 lb) on top of rack-mounted devices.

>50 kg (110 lb)

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. ***Lávese las manos después de usar el producto.***

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® @server xSeries 382 Type 8834 server and basic instructions for installing some options. More detailed instructions for installing options are in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD, which comes with your server. This publication contains information about:

- Setting up and cabling your server
- Starting and configuring your server
- Installing some options
- Installing your operating system
- 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 382**.
5. Click **Display documents**.

Your server comes with a *Resource CD* to help you configure the hardware, install device drivers, and diagnose problems with your server.

Your server comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your 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 server
Machine type	8834
Model number	
Serial number	

Your server serial number and model number are on labels on the server bezel. The information label containing the serial number, machine type, model number, and agency marks for your server is on the right side of the server.

For a list of supported options for your server, see 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.
- 100 MHz Intel Pentium microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 or later. 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. 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, 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**.

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. If you selected more than one book, all the selected books are opened in Acrobat Reader.

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 within the book.

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

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.

Use the Configuration/Setup Utility program to determine the type and speed of the microprocessor that is in your server.

Table 1. Features and specifications

Microprocessor:	Cooling:	Electrical input:

• Intel Itanium 2 processor
• Level-3 cache
• 400 MHz front-side bus (FSB)
• Support for two microprocessors
 	
Memory:
• Minimum: 1 GB
• Maximum: 16 GB
• Type: PC2100, double-data-rate (DDR)
• Connectors: eight dual inline memory module (DIMM) connectors, four-way interleaved
 	
Drives standard:
• DVD/CD-RW combo: EIDE
• One or two hot-swap SCSI hard disk drives, depending on server model
 	
Expansion bays:
• Two open hot-swap, slim-high, 3.5-inch drive bays (one or two SCSI drives installed, depending on server model)
 	
PCI expansion slots:
• Two PCI-X 100 MHz/64-bit, full-length
• One PCI-X 133 MHz/64-bit, full-length
	Six speed-controlled fans
	
	Upgradeable microcode:
	BIOS upgrades (when available) can update EEPROMs on the system board
	
	Integrated functions:
	• Dual Gigabit Ethernet controller on the system board with two RJ-45 Ethernet ports
	• One serial port (RJ-45)
	• Integrated SCSI controller with one external Ultra320 SCSI port
	• Four Universal Serial Bus (USB) v1.1 ports (two on front and two on rear of enclosure)
	• ATA-100 single-channel IDE controller
	• Two VGA video connectors (one on front and one on rear of enclosure)
	• USB keyboard and mouse support
	
	Failure LEDs:
	• System status/fault
	• Power
	• Disk drive
	• Fans
	
	Power supplies:
	• Two non-redundant hot-swap 350-watt output (115-230 V ac) for 700-watt total output
	• Some server models come with a third 350-watt hot-swap power supply that provides 2+1 redundancy
		• Sine-wave input (50 or 60 Hz) required
		• Input voltage and frequency ranges automatically selected
		• 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: 0.15 kVA (all models)
		  – Maximum: 0.80 kVA with two power supplies, 0.62 kVA with three redundant power supplies
		
		Heat output:
		Approximate heat output is 2259 British thermal units (Btu) per hour (662 watts) for the maximum server configuration.
		
		Environment:
		• Air temperature (operating): 10° to 35°C (50° to 95°F)
		• Humidity (storage): 50% to 90% non-condensing
		
		Acoustical noise emissions:
		• Sound power, idle: 7.0 bel maximum
		• Sound power, operating: 7.0 bel maximum
		
		Size:
		• Height: 87 mm (3.4 in.)
		• Depth: 747 mm (29.4 in.)
		• Width: 449 mm (17.7 in.)
		• Weight: 30 kg (65 lb) when fully configured

Notices and statements used in this book

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

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.

Major components of your server

The orange color on components and labels in your server identifies hot-swap or hot-plug components. You can install or remove these components while the server is running, provided that the server is configured to support hot-swap and hot-plug features. For complete details about installing or removing a hot-swap or hot-plug component, see the information in 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 in the server.

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

Cover

Air baffle

PCI riser card assembly

Fans

DIMM

Hard disk drive

Power supply blank cover

Hot-swap power supply

Bezel
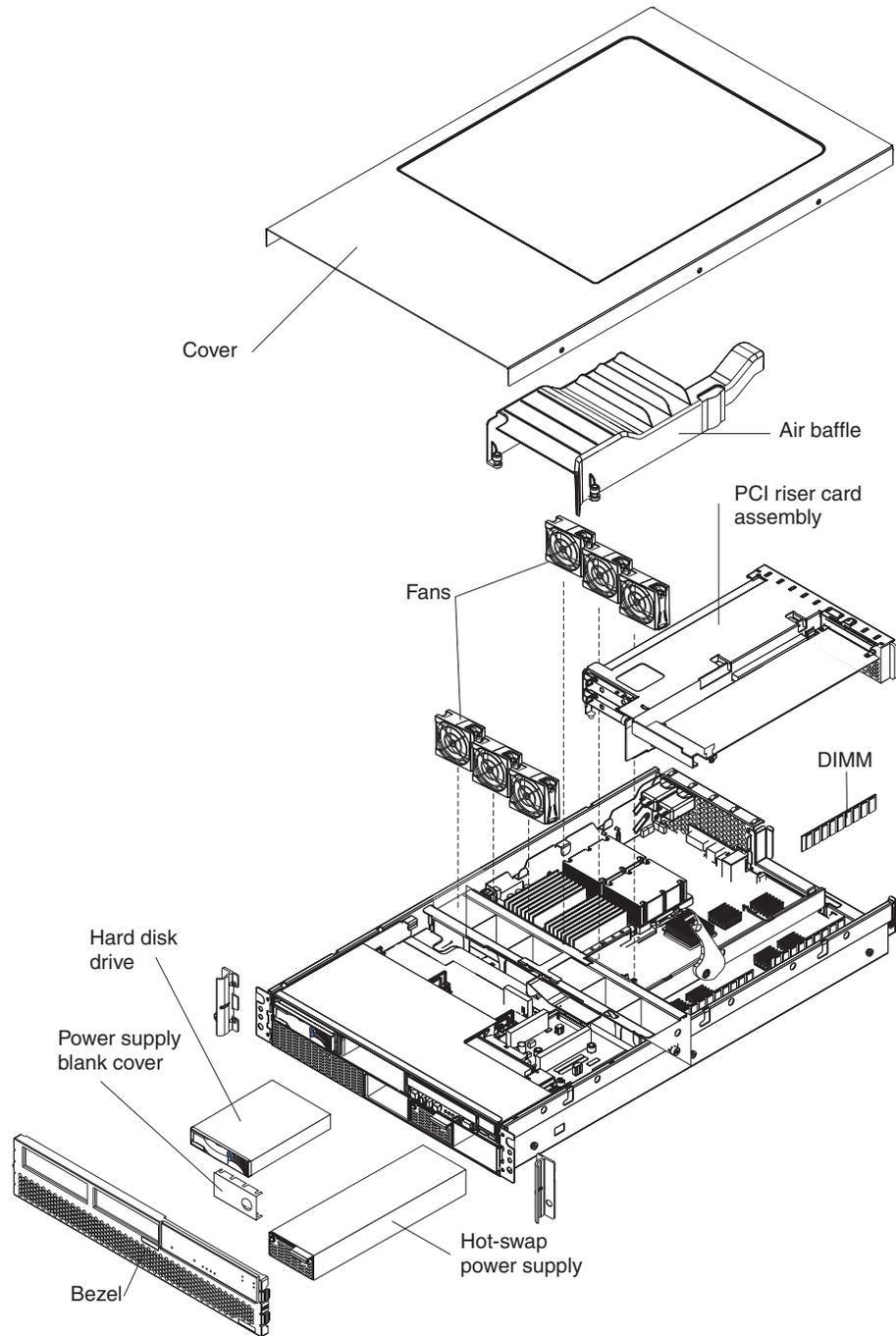
Chapter 2. Installing options

This chapter provides basic instructions for installing a limited number of 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 *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Attention: All components inside the server must be removed or replaced by a service technician.

Installation guidelines

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

- Review 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.
- You do not need to turn off the server to install or replace hot-swap drives or hot-plug Universal Serial Bus (USB) devices. For servers with redundant power (three power supplies), you do not need to turn off the server to install or replace a hot-swap power supply.
- The blue color on components and labels identifies touch points, where you can grip a component, move a latch, 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 cooling and system reliability, make sure that:

- Each of the hot-swap drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- Each of the two hot-swap power supply bays on the right has a power supply installed in it. The third (left) power supply bay must have a power supply or filler panel installed in it.
- For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the server cover removed might damage server components.
- After installing the server in a rack, make sure that space is available around the server to enable the server cooling system to work properly. See the documentation that comes with the rack for additional information.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- For servers with redundant power (three power supplies), you have replaced a hot-swap power supply as soon as possible. For servers with non-redundant power (two power supplies), a power supply should not be removed while the server is turned on.
- You replace a hot-swap drive within 2 minutes of its removal.

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 electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you. Wearing an anti-static wrist strap attached to an unpainted metal part of the server can provide some electrostatic discharge protection when handling server components.
- 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 bezel

You must remove the bezel to access the hot-swap power supplies and view the power status LEDs.

Note: The bezel does not come pre-installed on your server. See "Installing the bezel" on page 16 for bezel installation instructions.

Complete the following steps to remove the bezel:

1. Firmly pull the left side of the bezel away from the front of the server; then, remove the bezel.
2. Store the bezel in a safe place.
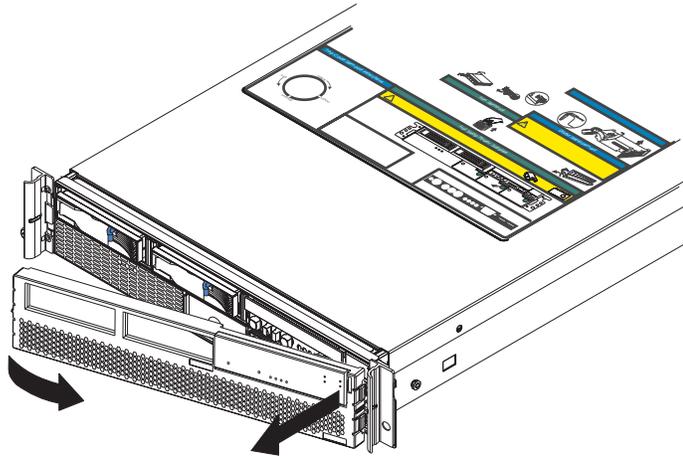
Installing an adapter

Attention: All components inside the server must be removed or replaced by a service technician.

See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for adapter installation instructions. For a list of supported options for your server, go to http://www.ibm.com/pc/support/.

Your server comes with adapter connectors or *slots* on a PCI riser that is connected to the system board. You can install up to three additional optional adapters in PCI-X slots 1 through 3 (PCI 1 through PCI 3).

The following notes describe the types of adapters that your server supports and other information that you must consider when installing an adapter:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you need to change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter. Also, read the documentation that comes with your operating system.
- The total power consumption of all adapters installed in the server must not exceed 45 watts.
- You can install full-length adapters in expansion slots PCI 1, PCI 2 and PCI 3. None of the expansion slots are hot-plug.
- The 64-bit PCI-X slots support 3.3 V signaling PCI or PCI-X adapters; they do not support 5.0 V signaling adapters.
- The PCI bus configuration is as follows:
  - The dual-channel integrated Ethernet controller is on PCI-X bus 2, channel A.
  - The dual-channel integrated SCSI controller is on PCI-X bus 2, channel B.
  - The 64-bit, 133 MHz PCI-X slot 3 is on PCI-X bus 1, channel A.
  - The 64-bit, 100 MHz PCI-X slots 1 and 2 are on PCI-X bus 1, channel B.
- If you have not changed the default startup sequence, the server scans the PCI devices in the following order: PCI slot 3, PCI slots 1 and 2; then, the dual-channel integrated Ethernet controller and the dual-channel integrated SCSI controller.

Installing internal drives

Your server comes with an EIDE DVD/CD-RW combo drive and one or two hot-swap SCSI hard disk drives.

Drive bay 1

Drive bay 2

DVD/CDR/W drive
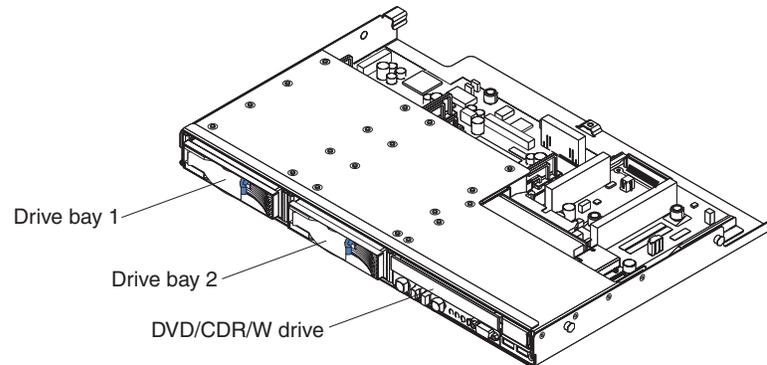
The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.

For a complete list of supported options for your server, go to http://www.ibm.com/pc/support/.

Your server supports a maximum of two 1-inch (26 mm) slim-high, 3.5-inch, hot-swap hard disk drives in the standard hot-swap bays. The hot-swap bays are next to each other on the front of the server, and can be accessed without removing the bezel. All hot-swap drives being used in the server should have the same speed rating; mixing speed ratings will cause all drives to operate at the lower speed. You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.

The following illustration shows how to install a hot-swap hard disk drive.

Drive bay 1

Drive bay 2

Hard disk drive

Drive tray

Drive tray handle
(in open position)
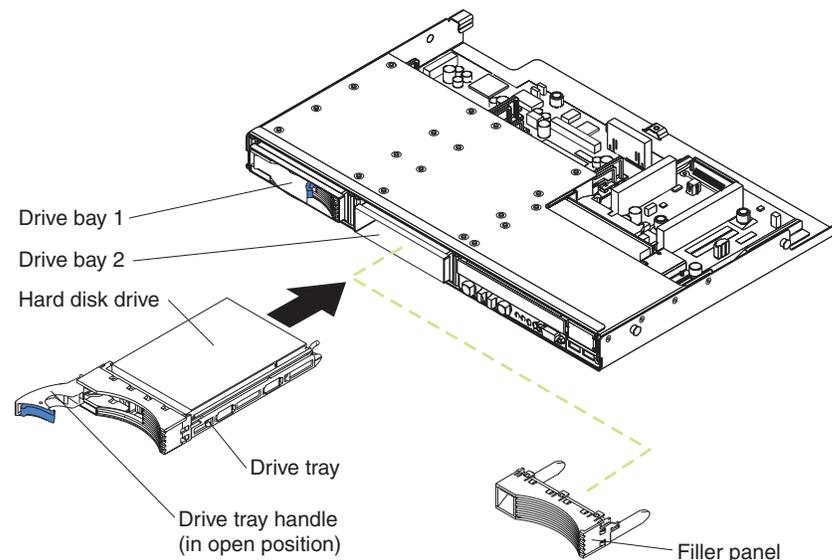
Filler panel

Complete the following steps to install a drive in a hot-swap bay.

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

1. Review the "Installation guidelines" on page 7, and "Handling static-sensitive devices" on page 8.

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

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

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

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

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

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

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

       When the amber hard disk drive status LED is lit continuously, it indicates that the drive is faulty and needs to be replaced. When the green hard disk drive activity LED is flashing, it indicates that the drive is being accessed.

4. If you are installing additional hot-swap hard disk drives, do so now.

5. If you have a power supply to install or remove, do so now; otherwise go to "Completing the installation" on page 16.

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. Table 2 lists the SCSI IDs for the hard disk drives that are connected to the secondary SCSI channel.

Table 2. SCSI IDs for hot-swap hard disk drives

Device	SCSI ID
Drive bay 1	0
Drive bay 2	1

Installing a memory module

Attention: All components inside the server must be removed or replaced by a service technician.

See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for memory installation instructions. For a list of supported options for your server, go to http://www.ibm.com/pc/support/.

The amount of memory in your server can be increased by 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 industry-standard PC2100 double-data-rate (DDR) dual inline memory modules (DIMMs). The system board contains eight DIMM connectors and supports four-way memory interleaving.
- The DIMM options available for your server are 256 MB, 512 MB, 1 GB, and 2 GB. Your server supports a minimum of 1 GB and a maximum of 16 GB of system memory.
- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.
- Your server comes with one of the following memory configurations:
  - Four 512 MB DIMMs (for a total of 2 GB) installed in DIMM 1 through DIMM 4 memory connectors. If you install additional DIMMs for this configuration, install them as a matched set of four in DIMM connectors 5 through 8.
  - Eight 512 MB DIMMs (for a total of 4 GB) installed in DIMM 1 through DIMM 8 memory connectors.
- DIMMs must be installed in matched sets of four. The first set of four DIMMs installed in DIMM 1 through DIMM 4 memory connectors must be the same size, speed, type, and technology. Compatible DIMMs from various manufacturers can be mixed. If a second matched set of four DIMMs is installed in DIMM 5 through DIMM 8 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs installed in DIMM 1 through DIMM 4 memory connectors. However, the size, speed, type, and technology of the DIMMs installed in DIMM 5 through DIMM 8 memory connectors must match each other.
- Install only 133 MHz (memory bus), 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM Registered DIMM specification. For a list of supported options for your server, go to http://www.ibm.com/pc/compat/.
- Your server supports Chipkill™ memory if all DIMMs are type x4. The use of any DIMMs that are not type x4 in your server disables Chipkill memory.
- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

Replacing a hot-swap power supply

Your server comes with two or three hot-swap power supplies. For servers with two power supplies, you must turn off the server before replacing a power supply. For servers with three power supplies, you do not need to turn off the server to replace a hot-swap power supply, but you must replace only one power supply at a time.

Attention: Your server has hot-swap power supply capability only when three power supplies are installed. In addition, your server has redundant power capability only when three power supplies are installed.

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.

Statement 12

CAUTION:
**The following label indicates a hot surface nearby.**

Complete the following steps to replace a hot-swap power supply:

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

2. Remove the server bezel (see "Removing the bezel" on page 9).

3. If your server has only two power supplies installed, turn off the server (see "Turning off the server" on page 28).

4. Press the orange release lever on the selected power supply; then, pull the power supply out of the bay and set it aside.
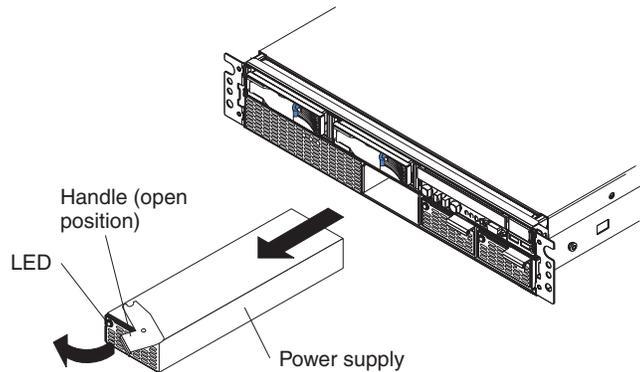
5. Make sure the power-supply handle is in the open position; then, slide the power supply all the way into the chassis before placing the power-supply handle into the locked position.
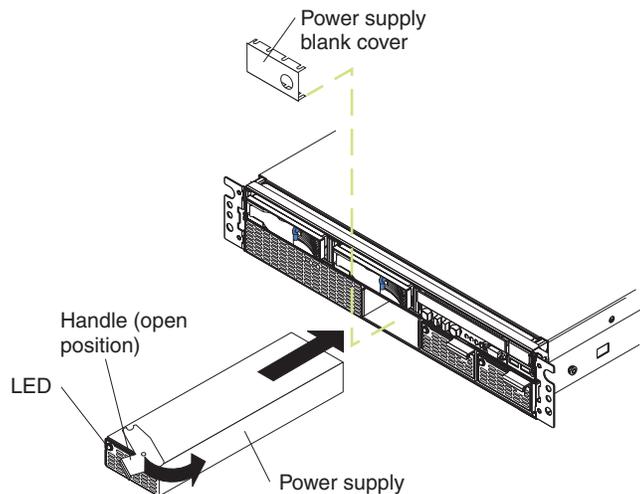
6. If the server is not turned on, turn on the server (see "Turning on the server" on page 27).

7. Verify that the ac power LEDs on the server and the PS dc power LEDs on each power supply are lit, indicating that power supplies are installed and operating properly.

8. Replace the server bezel (see "Installing the bezel" on page 16).

Completing the installation

To complete your installation, you must install the bezel; then, connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

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

Note: If you have just connected the power cords of your server into electrical outlets, you will have to wait approximately 20 seconds before pressing the power-control button.

Installing the bezel

Before installing the bezel on the server for the first time, you must install the handles on the server.

The following illustration shows how to install the handles on the server.
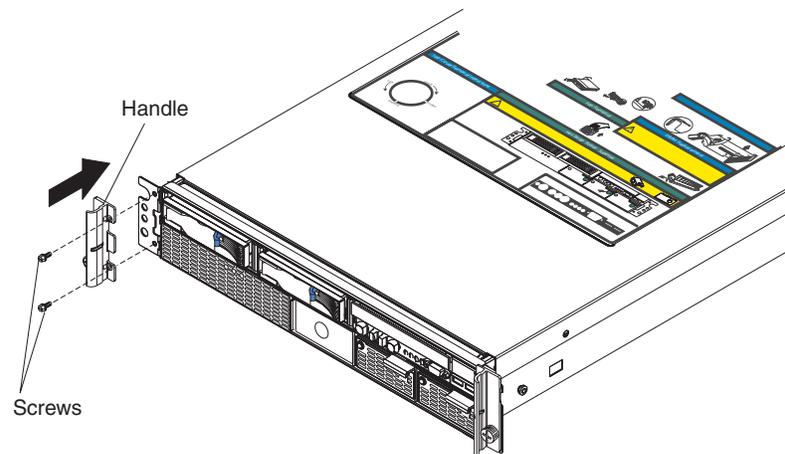
Complete the following steps to install the handles on the server:

1. Install the left handle on the server as shown in the above illustration, securing the handle to the chassis using two screws.

   Note: When installed on the correct sides of the server, the handles will have their captive rack mounting screws closer to the bottom of the handle.

2. Install the right handle on the server, securing the handle to the chassis using two screws.

The following illustration shows how to install the bezel on the server.
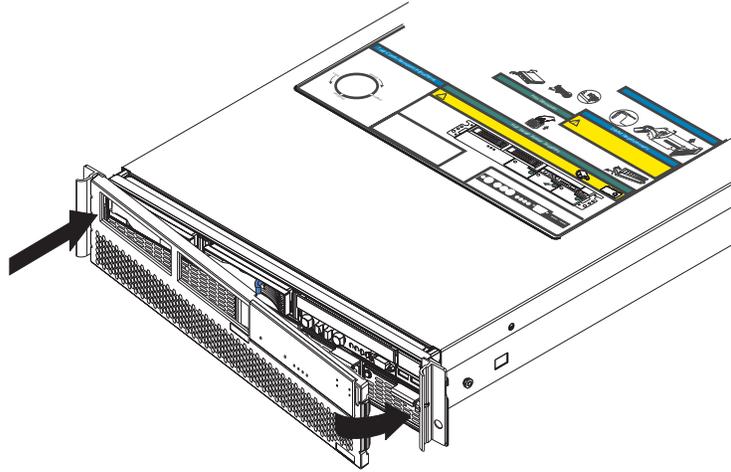

Complete the following steps to replace the bezel:

1. Insert the tabs on the left side of the bezel into the slot on the left server handle.

2. Rotate the right side of the bezel toward the server; then, push the bezel until the tabs on the right side of the bezel lock into the right server handle.

Cabling the server

If your server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

Attention: To prevent damage to equipment, connect the power cords last.

The following illustration shows the input/output (I/O) connectors on the rear of the server.
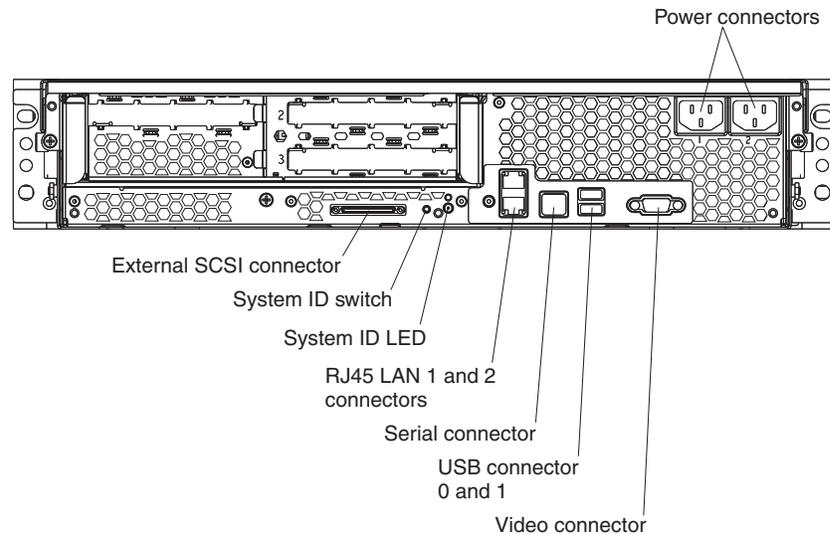
Updating your server configuration

When you start your server for the first time, you need to set the system date and time using the Configuration/Setup Utility program.

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

Your server comes with two microprocessors installed on the system board and can operate as a symmetric multiprocessing (SMP) server. However, you might need to upgrade your operating system to support SMP. See your operating-system documentation for additional information.

If any of the optional external hard disk drives connected to your server have a RAID configuration using a ServeRAID controller and you have installed or removed a hard disk drive, see the ServeRAID documentation for information about reconfiguring your disk arrays. ServeRAID documentation is on the *IBM ServeRAID Support* CD and is available for download from http://www.ibm.com/pc/support/.

Connecting external options

You can attach additional external options to the input/output (I/O) connectors on the front and rear of your server. (See Chapter 3, "Input/output ports", on page 21 for more information.)

Complete the following steps to attach an external device:

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

   Note: You do not need to turn off the server to connect a hot-swap USB device.

2. Turn off the server and all attached devices.

3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

Note: If you are attaching an external SCSI device, see "Ultra320 SCSI connector" on page 22 for information about SCSI cabling and SCSI IDs.

Installing the server in a rack

Detailed cabling instructions for a typical rack server configuration are provided in the *Rack Installation Instructions* that are on the IBM *xSeries Documentation* CD.

Chapter 3. Input/output ports

Connect optional external devices to the connectors on the front and rear of the server.

Your server has the following input/output (I/O) connectors:
- Two Ethernet (RJ-45)
- One serial (RJ-45)
- One Ultra320 SCSI
- Four Universal Serial Bus (USB) v 1.1
- Two video

The following illustrations show the locations of these connectors.

Server front
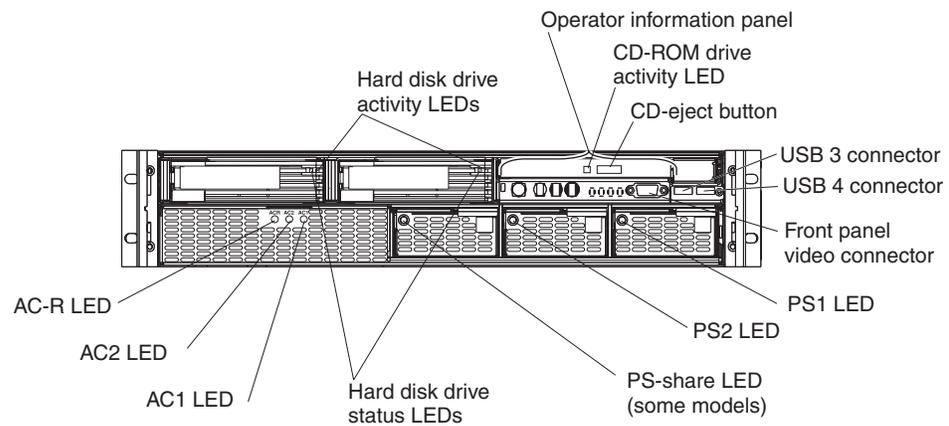
Server rear
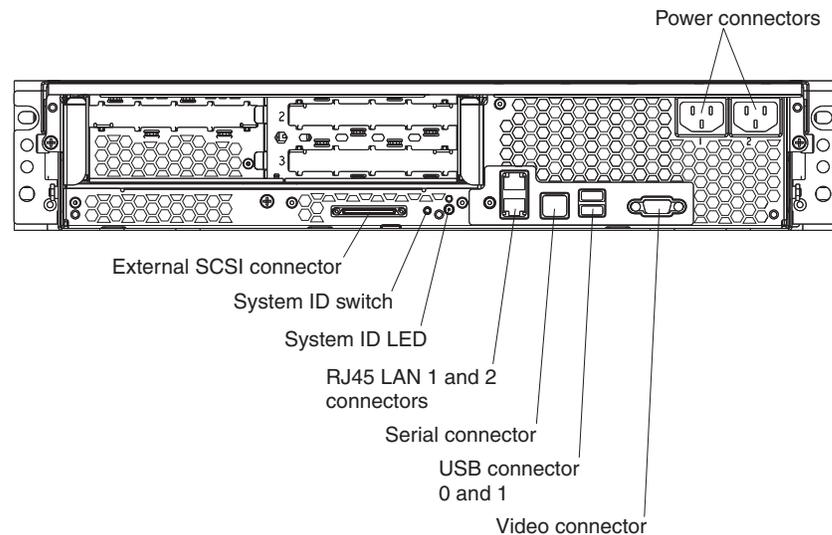
The following sections describe these connectors.

Ethernet (RJ-45) connector

The following illustration shows an Ethernet connector.

Activity LED (green)   Link LED (green)

8   1
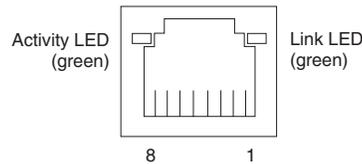
Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

For more information about the Ethernet controller, see the *User's Guide* on the IBM *xSeries Documentation* CD.

Serial connectors

Use the serial connectors to connect serial devices. The following illustration shows a serial connector.
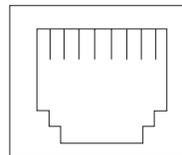
Ultra320 SCSI connector

You can attach external SCSI devices to the SCSI connector on the rear of the server. This connector is controlled by the primary channel of the SCSI controller integrated on the system board. It supports both Low Voltage Differential (LVD) signaling and single-ended (SE) signaling and connection of up to 15 SCSI devices.

The following illustration shows the SCSI standard 68-pin, female D-shell SCSI connector.

34   1

68   35
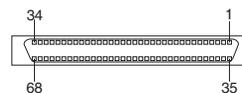
Your server has an integrated SCSI controller with RAID capabilities. This dual-channel controller supports two independent, Ultra320 SCSI channels. The secondary channel of the integrated SCSI controller is connected to the internal SCSI backplane and controls up to two LVD hot-swap SCSI hard disk drives. This controller has the following features:

- Double-transition clocking to achieve up to 320 MBps (megabytes per second) data-transfer rates
- Domain name validation to negotiate compatible data-transfer speeds with each device
- Cyclic-redundancy checking (CRC), instead of the usual parity checking, to improve data reliability
- An active terminator for SCSI bus termination

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs.

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach an external SCSI device, you must set a unique ID for the device. See the information that comes with the device for instructions to set its SCSI ID.

To select and order the correct cables for use with external devices, contact your IBM marketing representative or authorized reseller. For information about the maximum length of SCSI cable, see the American National Standards Institute (ANSI) SCSI standards on the ANSI Web site at http://www.ansi.org/. Adhering to these standards will help to ensure that your server operates properly.

Universal Serial Bus connectors

There are two Universal Serial Bus (USB) connectors on the front of the server and two on the rear of the server. Use a USB connector to connect a USB keyboard, a USB pointing device, and other USB devices to your server. USB technology transfers data at up to 12 Mb per second (Mbps) with a maximum of 127 devices and a maximum signal distance of 5 meters (16 ft) per segment. Using Plug and Play technology, USB devices are configured automatically. The following illustration shows a USB connector.
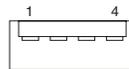
Use a 4-pin cable to connect a device to a USB connector. If you need to connect more USB devices than the server has USB connectors for, use a USB hub to connect additional devices.

Video connector

There is one video connector on the front of the server and one on the rear of the server. Use one of these video connectors to connect a monitor or other display. The following illustration shows the industry-standard 15-pin analog video connectors that are on your server.
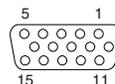

The front video connector supports video modes with screen resolutions of up to 800 by 600 pixels. The rear video connector supports video modes with screen resolutions of up to 1600 by 1200 pixels.

Chapter 4. Server controls, indicators, and power

This section identifies the controls and indicators on the front and rear of your server. It also describes the power features of your server.

Controls and LEDs

The following illustrations shows the controls and LEDs on the front of the server. The bezel must be removed to see the ac-power and power-supply LEDs (see "Removing the bezel" on page 9). The DVD/CD-ROM drive, front panel video and USB connectors, and all operator information panel controls and LEDs are behind the bezel door.
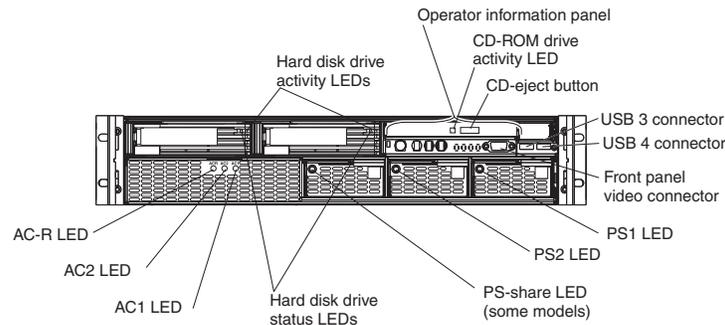
Hot-swap hard disk drive activity LED
> On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the drive is in use.

Hot-swap hard disk drive status LED
> On some server models, each hot-swap drive has a hard disk drive status LED. When this amber LED is lit, it indicates that the drive has failed.

DVD/CD-RW drive activity LED
> When this LED is lit, it indicates that the DVD/CD-RW drive is in use.

CD-eject button
> Press this button to release a CD or DVD from the DVD/CD-RW drive.

AC1 power LED
> When this LED is lit, it indicates that the AC1 power cord is connected to an ac power source.

AC2 power LED
> When this LED is lit, it indicates that the AC2 power cord is connected to an ac power source.

AC-R power LED
> When this LED is lit, it indicates that both the AC1 and AC2 power cords are connected to an ac power source and three power supplies are installed in the server. It indicates that the server is operating with redundant ac power.

PS1/PS2/PS-share power LEDs
> This LED is on each hot-swap power supply. When this LED is lit, it indicates that the power supply is installed and providing dc power to the server. During typical operation for a server with two power supplies, both the AC1 and AC2 power LEDs and both the PS1 and PS2 power LEDs are lit. During typical operation for a server with three redundant power

supplies, both the AC1 and AC2 power LEDs and the PS1, PS2, and PS-share power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

The following illustration shows the controls and LEDs on the operator information panel.
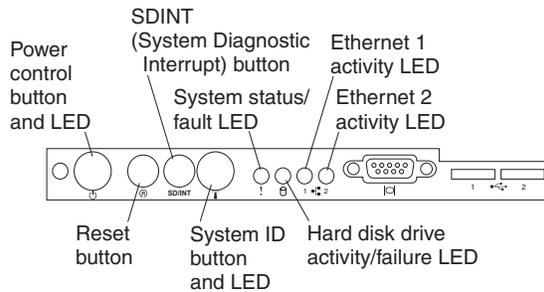
Power-control button/power-on LED

> Press this button to turn the server on and off manually. The power-on LED is in the center of the power-control button. When this LED is lit, it indicates that the server is turned on. When this LED is off, it indicates that the server is off or that the server is disconnected from its power source.

Reset button

> Press this button to perform a hardware reset of the server and run the power-on self-test (POST).

SD/INT button

> Press this button to initiate a system diagnostic interrupt. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for information.

System ID button and LED

> Press this button to turn the system ID LEDs on and off, as an aid in visually locating the server. This LED can also be turned on remotely by the system administrator. There are system ID buttons and LEDs on the front and rear of the server.

System status/fault LED

> When this LED is lit green, it indicates normal operation. When this LED is lit amber, it indicates that a system error has occurred. See Chapter 6, "Solving problems", on page 39 for additional information. Detailed troubleshooting information is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Hard disk drive activity/failure LED

> When this amber LED is flashing, it indicates that a hard disk drive is in use. When this LED is lit continuously (not flashing), it indicates a hard disk drive failure. See Chapter 6, "Solving problems", on page 39 for additional information. Detailed troubleshooting information is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Ethernet1/Ethernet2 activity LEDs

> There are two Ethernet activity LEDs, one for each Ethernet controller in your server. When each LED is flashing, it indicates that there is activity between one of the Ethernet controllers and the network. The LEDs are off if there is no Ethernet connection and are lit continuously if there is a

connection with no activity. Ethernet link status and speed LEDs are also on each Ethernet connector on the rear of the server. See "System status/failure LEDs" on page 46 for additional information.

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 is shut down; however, the server can respond to remote requests to turn on the server. The power supply LEDs flash to indicate that the server is connected to an ac power source but is not turned on (standby mode).

Turning on the server

Notes:

1. Turn on all external devices, such as the monitor, before turning on the server.
2. The power-on LED on the front of the server is lit when the server is on and while it is powering up.

Approximately 10 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. If a power failure occurs while the server is turned on, the server can be configured to restart automatically when power is restored. See the *Resource CD* for information about configuring power options using the System Maintenance Utility

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 remote requests to turn on the server. To remove all power from the server, you must disconnect it from the power source.

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.
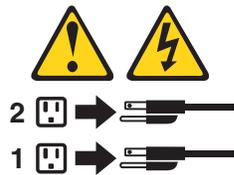
Note: After turning off the server, wait at least 5 seconds before you press the power-control button to turn on the server again.

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

- After the operating system is shut down, or if the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The server can be configured to turn itself off as an automatic response to a critical system failure.

Chapter 5. Configuring your server

The *Resource* CD provides device drivers, diagnostic programs, and utilities that are specifically designed for your IBM server. Use this CD during the initial installation of your server to configure basic hardware features and to simplify your operating system installation.

You can use the following configuration programs to customize your server hardware:

- **Configuration/Setup Utility**

  This program is part of the basic input/output system (BIOS) code that comes with your server. Use it to configure serial port assignments, view system information, change startup options, set the date and time, and set the password. For more information about how to start this utility, see "Using the Configuration/Setup Utility program".

- **LSI Logic Configuration Utility**

  With the built-in LSI Logic Configuration Utility program, you can configure the integrated SCSI controller and the devices that are attached to it. For information about how to start this utility, see "Using the LSI Logic Configuration Utility program" on page 31.

- **ServeRAID Manager**

  The ServeRAID™ programs are on the *IBM ServeRAID Support* CD and are available for download from http://www.ibm.com/pc/support/. If your server has a ServeRAID controller installed, you must use the ServeRAID Configuration program to define and configure your disk-array subsystem *before* you install your operating system. See "Using ServeRAID Manager" on page 31 for more information.

This section provides the instructions for starting the utility programs. See the *User's Guide* on the IBM *xSeries Documentation* CD for detailed instructions for using the configuration programs.

Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS code. You can use it to:

- Change the startup options
- Configure serial port assignments
- Set the date and time
- Set the password

If your server is already on, shut down the operating system, turn off the server, and wait a few seconds until all in-use lights turn off. Then, restart the server.

The prompt `Hit <F1> if you want to run SETUP` might not be displayed when you start your computer. To start the Configuration/Setup Utility program, turn on the power and immediately press and hold down the F1 key until you see either the Configuration/Setup Utility menu or a password prompt.

If you have not set an administrator password, the Configuration/Setup Utility menu opens on the screen. If you have set a password, the Configuration/Setup Utility menu will not open until you type your password.

See the *User's Guide* on the IBM *xSeries Documentation* CD for more detailed information about the Configuration/Setup Utility.

Using the RAID configuration programs

Use the following programs to configure and manage RAID arrays. Be sure to use these programs as described in this book:

- **LSI Logic Configuration Utility program**

  Use the LSI Logic Configuration Utility program to:
  - Perform a low-level format on a SCSI hard disk drive
  - Set a SCSI device scan order
  - View or change SCSI IDs for attached devices
  - Set SCSI protocol parameters on SCSI hard disk drives

- **ServeRAID Manager**

  Use the ServeRAID Manager program to:
  - Configure a redundant array of independent disks (RAID)
  - Restore a SCSI hard disk drive to factory-default settings, erasing all data from the disk
  - View your RAID configuration and associated devices
  - Monitor operation of your RAID controllers

The following notes provide information that you must consider when using the LSI Logic Configuration Utility and the ServeRAID Manager programs to configure and manage your arrays:

- The integrated SCSI controller with RAID capabilities in your server supports only RAID level 1. Installing an optional ServeRAID controller provides additional RAID levels.

- When you create a RAID 1 mirrored pair, all drives must be on the same channel.

- Hard disk capacities influence the way you create arrays. Drives in the array can be of different capacities, but the RAID controller treats them as if they all have the capacity of the smallest disk drive.

- To help ensure signal quality, do not mix drives with different speeds and data rates.

- You can set up a mirror after the operating system is installed on the primary drive only if you are using the integrated SCSI controller with RAID capabilities. You must ensure that the primary drive has the lower SCSI ID (for example 0).

  Important: If you use the integrated SCSI controller with RAID capabilities to configure a RAID level 1 (mirrored) array after you install the operating system, you will lose access to any data or applications that were previously stored on the secondary physical drive of the mirrored pair.

- To update the firmware and BIOS for an optional ServeRAID controller, you must use the *IBM ServeRAID Support* CD that comes with ServeRAID option.

- If you install a different type of RAID controller in your server, use the configuration method supplied with the RAID controller to view or change 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.

2. When a list of boot options appears, use the arrow keys to select the EFI shell; then, press Enter.

3. From the Shell prompt, type `devices -b`; then, press Enter.

   A list of devices is displayed, as in the following example:

   ```
   C  T  D
   T  Y C I
   R  P F A
   L  E G G #P #D #C Device Name
   == = = = == == == =============================================================
   3E D X -  1  1  - LSI Logic Ultra320 SCSI Controller
   3F D X -  1  1  - LSI Logic Ultra320 SCSI Controller
   ```

4. Note the CTRL number given for the integrated LSI Logic Ultra320 SCSI Controller in the displayed list. From the example, the CTRL numbers are 3E and 3F.

5. From the Shell prompt, type `drvcfg`; then, press Enter.

   A list of configurable components is displayed, as in the following example:

   ```
   Configurable Components
     Drv[67]  Ctrl[3E]  Lang[eng]
     Drv[67]  Ctrl[3F]  Lang[eng]
   ```

6. Note the DRV number associated with the CTRL numbers that were noted in step 4. From the example, the DRV number is 67.

7. To start the LSI Configuration Utility At the Shell Prompt type:

   ```
   drvcfg x y -s
   ```

   Where x is the DRV number from step 6 and y is the CTRL number from step 4. From the example, `drvcfg 67 3F -s`.

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

9. Follow the instructions on the screen to change the settings of the selected items; then, press Enter. The **Device Properties** and **Mirroring Properties**, additional screens are displayed.

See the *User's Guide* on the IBM *xSeries Documentation* CD for more detailed information about the LSI Logic Configuration Utility. In addition, an LSI Command-line configuration program (CFG1030) is available at http://www.ibm.com/pc/support/.

Using ServeRAID Manager

You can run ServeRAID Manager in startable-CD mode from the *IBM ServeRAID Support* CD or as an installed program. For information about installing ServeRAID Manager, see the documentation on the CD. In addition, the ServeRAID Manager program and documentation are available at http://www.ibm.com/pc/support/.

The following sections provide instructions for running ServeRAID Manager in startable-CD mode to configure your integrated SCSI controller with RAID capabilities and perform an initial RAID configuration on your server. 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.

Before you install your operating system, you must configure the controller that is attached to the hard disk drives. You must use the configuration program on the *IBM ServeRAID Support* CD to configure the integrated SCSI controller with RAID capabilities or to configure an optional IBM ServeRAID controller.

Notes:

1. You cannot use the *ServerGuide Setup and Installation* CD to configure the optional controllers.

2. To update the firmware and BIOS for an optional ServeRAID controller, you must use the *IBM ServeRAID Support* CD that comes with the ServeRAID option.

Using ServeRAID Manager in startable-CD mode

The information in this section focuses on using the ServeRAID Manager program in startable-CD mode to configure your controller. For information about installing ServeRAID Manager, see the documentation on the *IBM ServeRAID Support* CD.

When you run the ServeRAID Manager program from the startable *IBM ServeRAID Support* CD, you are using startable-CD mode, in which you can configure your controller *before* you install your operating system.

To run the ServeRAID Manager program in startable-CD mode, turn on the server; then, insert the *IBM ServeRAID Support* CD into the CD-ROM drive. If the ServeRAID Manager program detects an unconfigured controller and ready drives, the program automatically starts the Configuration wizard, and a window similar to that shown in Figure 1 opens.
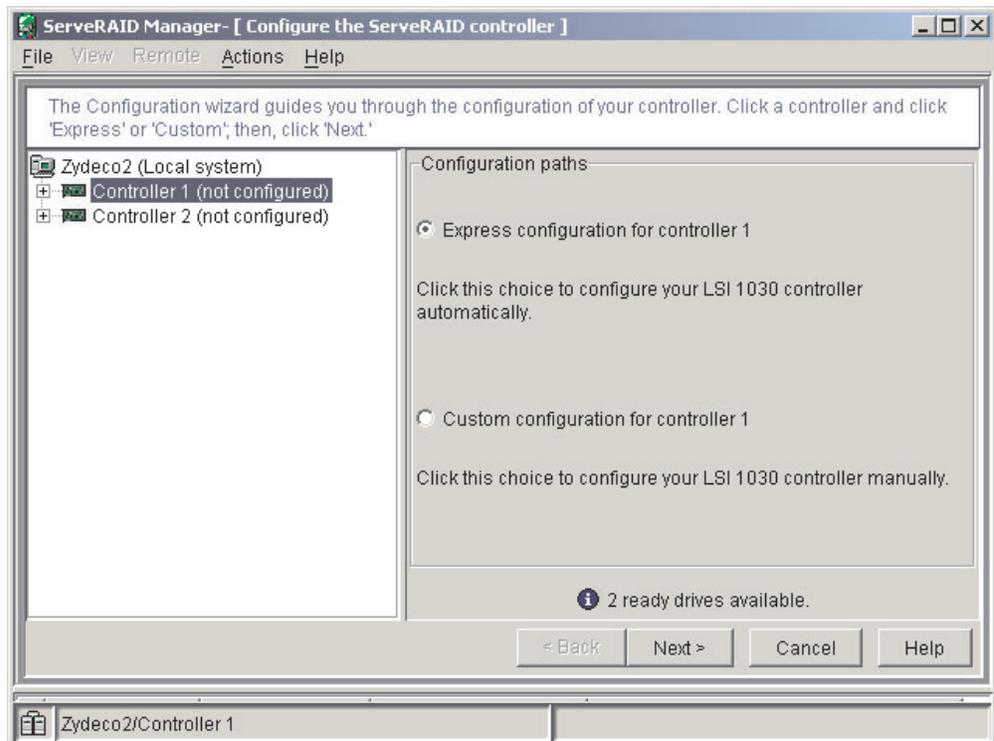
Figure 1. "Configuration wizard" window

Configuring the controller: You can use the Configuration wizard to configure your controller. The Configuration wizard provides two configuration options:

Express and Custom. Express configuration automatically configures your controller, and you can use Custom configuration to configure your controller manually.

Note: If the integrated RAID controller has two channels, it will appear in the ServeRAID Manager tree as two controller objects. However, you can configure only one array and one RAID level-1 logical drive.

Using Express configuration: Express configuration automatically configures your controller. It creates an array by grouping together the first two physical drives that appear in the ServeRAID Manager tree, and it creates a RAID level-1 logical drive.

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 that is displayed in the "Configuration summary" window. To change the configuration, click **Modify arrays**.
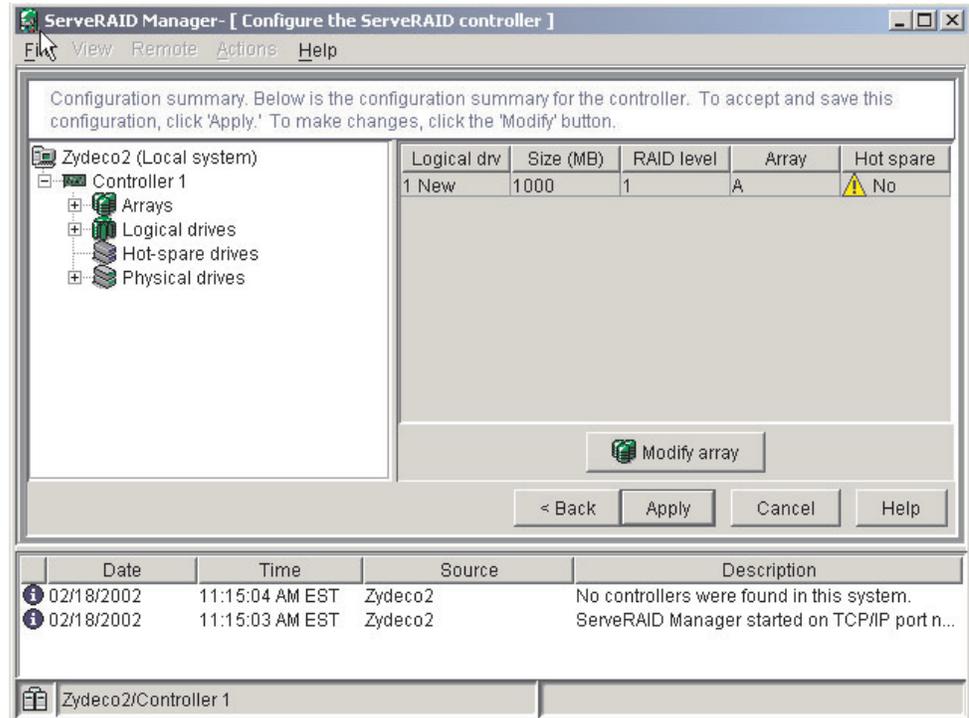
Figure 2. "Configuration summary" window

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 the ServeRAID Manager program and remove the CD from the CD-ROM drive.
7. Restart the server.

Using Custom configuration: To configure your controller manually, select Custom configuration. Using Custom configuration, you can select which two physical drives you want to configure.

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.
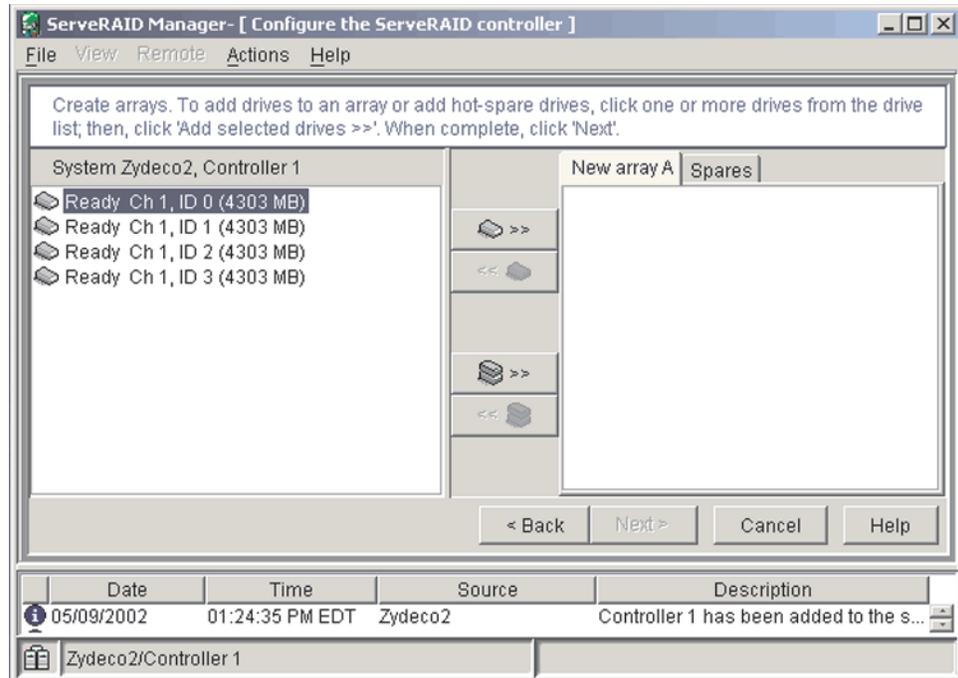
Figure 3. "Create arrays" window

4. From the list of ready drives, select the two drives you want to move to the array.
5. Click [icon] (Add selected drives) to add the drives to the array.

6. Click **Next**. The "Configuration summary" window opens.
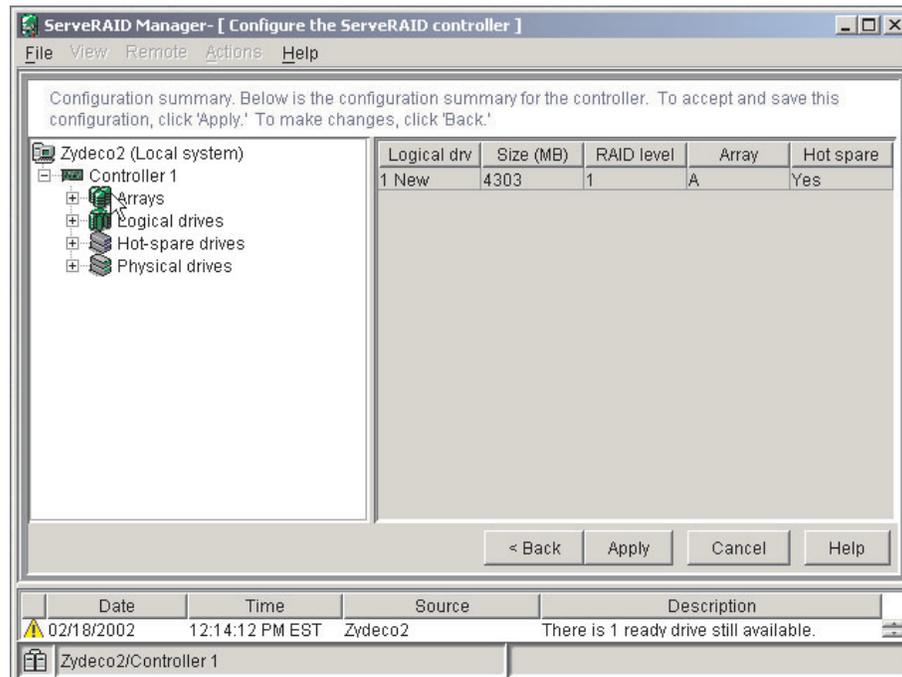
Figure 4. "Configuration summary" window

7. Review the information that is displayed in the "Configuration summary" window. To change the configuration, click **Back**.

8. 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.

9. Exit from the ServeRAID Manager program, and remove the CD from the CD-ROM drive.

10. Restart the server.

Viewing your 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).

To view information, expand the ServeRAID Manager tree; then, click the relevant tree object. Detailed information about the selected device appears in the right pane.
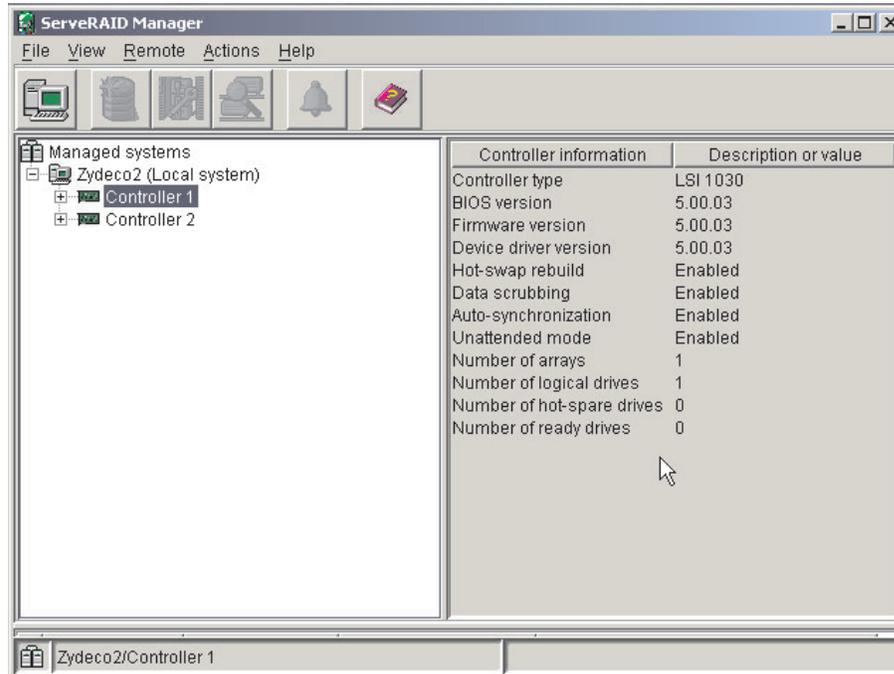
Figure 5. ServeRAID Manager window

To display available actions for an item, click the item in the ServeRAID Manager tree and click **Actions**.

Getting assistance

For more information about ServeRAID Manager, see the online help system. To start the help system, either click ![book icon] (`Information about this window`) on the toolbar or select an item from the **Help** menu.
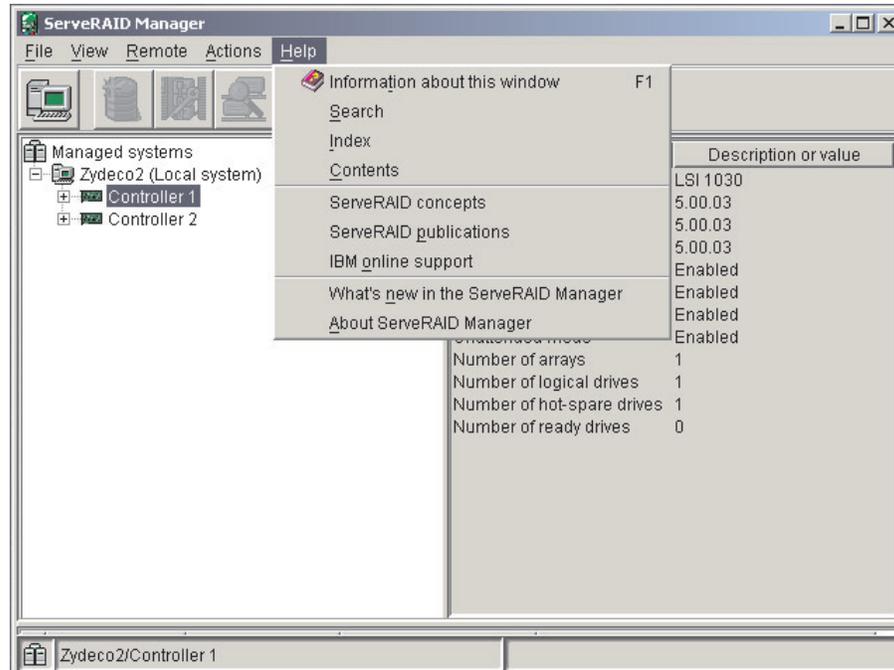
Figure 6. ServeRAID Manager help menu

The help system (ServeRAID Assist) will open within the ServeRAID Manager interface.

To learn more about the ServeRAID Manager tree objects and the actions that apply to them, select a tree object and click **Actions → Hints and tips**. ServeRAID Assist will start, and information about the tree object will appear in the right pane of ServeRAID Manager.
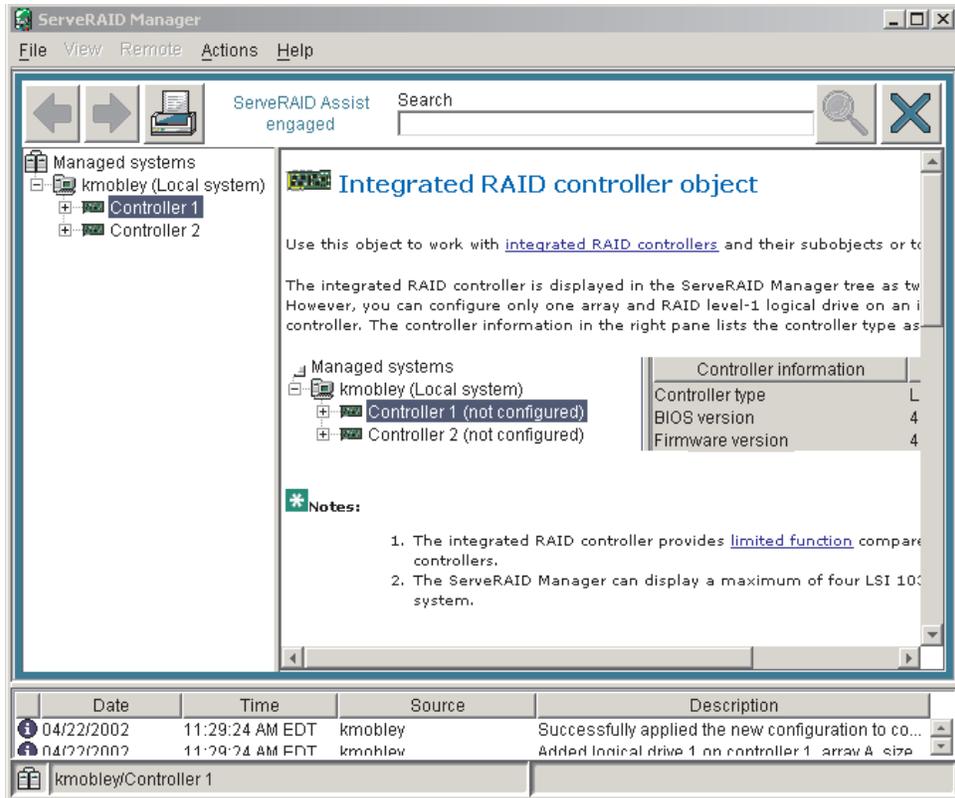
Figure 7. Hints and tips feature

Chapter 6. Solving problems

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

If you cannot locate and correct the problem using the information in this section, see Appendix A, "Getting help and technical assistance", on page 47, the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD, and the "Server Support" flowchart in the front of this book.

Diagnostic tools overview

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

- **POST beep codes and error messages**

  The power-on self-test (POST) indicates the detection of a problem. See "Power-on self-test (POST)" on page 40.

- **Diagnostic programs and error messages**

  The diagnostic programs are provided on the *Resource CD*. These programs test the major components of your server.

  Note: See "Solving problems" in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for information about the diagnostic programs.

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See the "Troubleshooting charts" on page 41 for information.

- **System status/failure LEDs**

  There are LEDs on the server that indicate server status or failure of server components. See the "System status/failure LEDs" on page 46 for more information.

Power-on self-test (POST)

When you turn on the server, the power-on self-test (POST) performs a series of tests to check the operation of system components and some of the installed options.

If POST finishes without detecting any problems, the first window of your operating system or application program appears.

If POST detects a problem, the server might emit a series of beeps or an error message might appear on your screen.

Note: A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages typically will resolve the next time you run the test.

POST beep code descriptions

If POST detects a problem during startup, the server might emit a series of beeps. You can 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.

Table 3. POST beep code descriptions

Beep code	Descriptions of the POST beep codes
Three short	POST detected a system memory error. Call for service.
Five short	Microprocessor failure. Call for service.
Eight short	Video controller failure. Call for service.
All other beep codes	Turn off the server; then, restart the server. If the problem remains, call for service.

POST error messages

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

Note: 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
103	CMOS battery failure	Call for service. (The CMOS battery must be replaced by an authorized service technician.)
104	CMOS options not set	Set CMOS options using the Configuration/Setup Utility program.
109	Keyboard - stuck key	Make sure that nothing is resting on the keyboard keys. If no keys are being pressed, replace the keyboard.

POST message	Failing device or problem found	Suggested action
11B	Time of day has not been set	Set the correct date and time.
85XX	Memory error	Make sure that the memory is correct for your server and that it is installed properly. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for more detailed information.

Troubleshooting charts

The following table lists 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 test programs, or if running the tests does not reveal the problem, call for service.

CD-ROM drive problems

Symptom	Suggested action
CD-ROM drive is not recognized.	Make sure that: • Under EFI, the CD must follow the "El Torito" bootable CD-ROM format specification. • 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. • The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
The CD is not working correctly.	Clean the CD. If the problem remains, call for service.
The CD-ROM drive tray is not working. (The server must be turned on.)	Insert the end of a straightened paper clip into the manual tray-release opening. 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.	1. Remove the first drive not recognized and try the hard disk drive diagnostic test again. 2. If the remaining drives are recognized, replace the drive you removed with a new one. If the problem remains, call for service.
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. If the problem remains, call for service.

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.

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. • 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. • Make sure that the mouse device drivers are installed correctly. • Both the server and the monitor are turned on. • 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.	1. Make sure that:
	  • You have installed the correct type of memory.
	  • DIMMs were installed in matched sets of four.
	2. Check the system event log for a memory error message.
	
	If the problem remains, call for service.

Microprocessor problems

Symptom	Suggested action
The server emits five short beeps during POST.	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.	Verify that: • The server power cords are connected to the server and to a working electrical outlets. • The monitor cables are connected properly. • The monitor is turned on and the Brightness and Contrast controls are adjusted correctly. If the problem remains, call for service.
Only the cursor appears.	Call for service.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	Make sure that you have installed the necessary device drivers for the application programs. If the problem remains, call for service.

Symptom	Suggested action
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.	Call for service.
No video.	1. Make sure the correct computer is selected, if applicable. 2. Make sure all cables are locked down. 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. 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 power cords are properly connected to the server and to working electrical outlets. • Make sure that the type of memory that is installed is supported in your server. • 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. 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 "Serial connectors" on page 22.

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: • The serial port is enabled in the Configuration/Setup Utility program. • The serial port adapter, if you installed one, is seated properly. 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 the serial port. 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.

Universal Serial Bus device problems

Symptom	Suggested action
A USB device does not work.	Make sure that: • The correct USB device driver is installed. • Your operating system supports USB devices. • The USB device is a supported option for your server. See the ServerProven list at http://www.ibm.com/pc/ompat/. If the problem remains, call for service.

System status/failure LEDs

The following table lists the status or failure LEDs of your server. You might need to refer to this table when solving problems with the server.

Table 4. System status/failure LEDs

Error LED	LED location	LED function
System status/fault LED	Front of server	• Off: not ready • Green: system normal, no alarms • Amber: system error If the system status/fault LED indicates any non-normal condition, see the other troubleshooting information in this chapter or the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for detailed troubleshooting information.
Hard disk failure LED	Front of server	• Amber (lit continuously): hard disk drive failure • Amber (flashing): drive maintenance is in progress
Hard disk status and error LEDs	Each hot-swap hard disk drive on front of server	• Green: drive in use • Amber: drive failure (lit continuously) or drive maintenance in progress (flashing)
Fan error LEDs	Each fan inside server	Fan failure
Ethernet activity LEDs	Front of server	When each LED is flashing, it indicates that there is activity between one of the Ethernet controllers and the network. The LEDs are off if there is no Ethernet connection and are lit continuously if there is a connection with no activity.
Ethernet link LEDs	Rear of server at each Ethernet connector	When each green LED is flashing, it indicates that there is activity between the Ethernet controllers and the network. The LED is off if there is no Ethernet connection and is lit continuously if there is a connection with no activity.
Ethernet speed LEDs	Rear of server at each Ethernet connector	• Off: 10-Mbps connection • Green: 100-Mbps connection • Amber: 1000-Mbps connection

See the *User's Guide* on the IBM *xSeries Documentation* CD for additional 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.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

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

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.

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 382 Type 8834**

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	Parts - 3 years, labor - 3 years	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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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.

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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. For country-specific instructions, refer to the following Web site: http://www.ibm.com/ibm/environment/products/prp.shtml.

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, contact your local waste disposal facility.

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Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

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

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

Taiwanese Class A warning statement

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

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

Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	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, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's 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 Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Maceo, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, 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 of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan

IBM power cord part number	Used in these countries and regions
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

Index

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