IBM RXE-100 Remote Expansion
Enclosure

Installation Guide

IBM

IBM RXE-100 Remote Expansion Enclosure

Installation Guide

Note: Before using this information and the product it supports, read the general information in "Appendix C. Warranty information" on page 61 and "Appendix D. Notices" on page 73.

Third Edition (April 2002)

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 4:

| ≥ 18 kg (39.7 lb) | ≥ 32 kg (70.5 lb) | ≥ 55 kg (121.2 lb) |
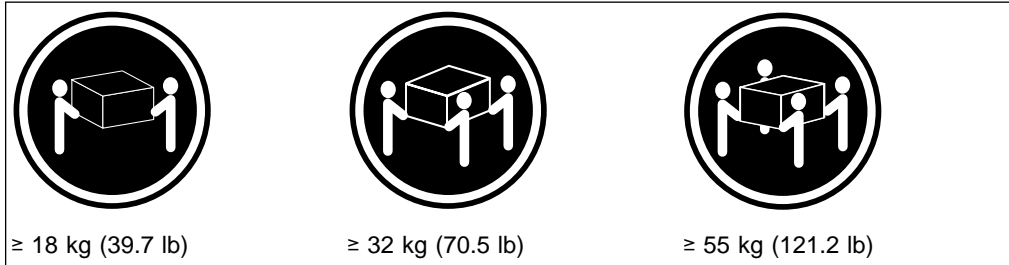
CAUTION:
Use safe practices when lifting.

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 6:

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

Statement 8:

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

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

Statement 10:

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

>82 kg (180 lb)

Chapter 1. Introducing the RXE-100 Remote Expansion Enclosure

The IBM® RXE-100 Remote Expansion Enclosure attaches to an IBM xSeries server, providing up to twelve additional PCI-X slots. The enclosure consists of one or two expansion kits. Each expansion kit contains six hot-swap Active™ PCI-X adapter slots.

Packaged with your enclosure is a 3.5 m (11 ft. 5.8 in.) interconnect management cable and a 3.5 m (11 ft. 5.8 in.) remote I/O cable. You can use these cables to connect your enclosure to a server.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of this enclosure. These design features make it possible for you to add PCI adapter capacity to meet your needs today and provide expansion capabilities for the future.

You can obtain up-to-date information about your RXE-100 Remote Expansion Enclosure and other IBM server products at http://www.ibm.com/pc/support on the World Wide Web. (Type RXE-100 in the Search field, then click the Go button).

Note: If you need help, information, or just want more information about IBM products, see "Getting information, help, and service" on page 43.

To register your IBM products and to create a profile, or to create a customized support page that is specific to your hardware, see "Customized support page" at "Diagnostic tools overview" on page 37.

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

See the *Rack Installation Instructions* that come with this enclosure for installation and removal instructions.

Record your product information in this table.	
Product name	IBM RXE-100 Remote Expansion Enclosure
Machine type	8684
Model number	_____
Serial number	_____

Features and specifications

The following table provides a summary of the features and specifications for your enclosure.

Table 1. Features and specifications

Active PCI-X expansion slots:	Acoustical noise emissions:	Electrical input:

Three pair of PCI-X slots for each system expandable to six pair of slots (each pair connected to a separate PCI bus):
• Slots standard: 6
• Slots maximum: 12
• 133 MHz/64-bit if odd-numbered slot of a pair is populated
• 100 MHz/64-bit if both slots of a pair are populated
 	
Hot-swap power supplies:
 	
370 W (115-230 V ac)
• Standard: two
• Minimum: one
 	
Hot-swap cooling:
 	
Four hot-swap fans
 	
Size (3 U)
• Height: 133 mm (5.25 in.)
• Depth: 660 mm (26 in.)
• Width: 440 mm (17.3 in.)
• Weight: 14.9 kg (40 lb) to 20.9 kg (56 lb) depending upon configuration
	• Sound power, idling: 5.9 bel maximum
	• Sound power, operating: 5.9 bel maximum
	
	Environment:
	• Air temperature:
	  – Enclosure on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft.)
	  – Enclosure on: 10° to 32°C (50° to 89.6°F). Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.)
	  – Enclosure off: 10° to 43°C (50° to 110°F). Maximum altitude: 2133 m (7000 ft.)
	• Humidity:
	  – Enclosure on: 8% to 80%
	  – Enclosure off: 8% to 80%
	
	Heat output:
	
	Approximate heat output in British thermal units (Btu) per hour
	• Minimum configuration: 119 Btu (0.03488 kilowatts)
	• Maximum configuration: 1125 Btu (0.3649 kilowatts)
		• Sine-wave input (50-60 Hz) required
		• Input voltage low range:
		  – Minimum: 100 V ac
		  – Maximum: 127 V ac
		• Input voltage high range:
		  – Minimum: 200 V ac
		  – Maximum: 240 V ac
		• Input kilovolt-amperes (kVA) approximately:
		  – Minimum: 0.01 kVA (ac power connected, enclosure off)
		  – Minimum: 0.05 kVA (dc power on, enclosure idle)
		  – Maximum: 0.53 kVA
		
		Integrated functions:
		
		• Light Path Diagnostics™
		• Drawer Management Controller (DMC)

Notices and statements in this book

The caution and danger statements used in this book also appear in the multilingual *Safety Information* book provided on the IBM Documentation CD. Each caution and danger statement is numbered for easy reference to the corresponding statements in the safety book.

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

Before you begin

Before you begin to install options in your enclosure:
- Read the handling guidelines and the safety at:
  – "Safety" on page v
  – "Working inside the enclosure with the power on" on page 4
  – "Handling static-sensitive devices" on page 4

  These guidelines will help you work safely with your enclosure or options.
- You do not need to turn off the enclosure to install or replace hot-swap power supplies, hot-swap fans, or Active PCI (hot-plug) adapters.
- The orange color on components and labels in your enclosure identifies hot-swap or hot-plug components. You can install or remove these components while the enclosure is running.
- The blue color on components and labels in your enclosure identifies touch points where you can grip a component, move a latch, and so on.
- Make sure that you have an adequate number of properly grounded electrical outlets for your enclosure, server, monitor, and other options you intend to install.

System reliability considerations

To help ensure proper cooling and system reliability, make sure that:
- Each of the power-supply bays has either a power supply or a filler panel installed.
- There is at least 50 mm (2 inches) of ventilated space at the sides of the enclosure and 100 mm (4 inches) at the rear of the enclosure.
- The top cover is in place during normal operation.
- The top cover is removed for no longer than 30 minutes while the enclosure is operating.

- Cables for optional adapters are routed according to the instructions that are provided with the adapters.
- A failed fan is replaced within 48 hours.

Working inside the enclosure with the power on

Your enclosure supports hot-plug and hot-swap components and is designed to operate safely while turned on with the cover removed. Follow these guidelines when you work inside an enclosure that is turned on:

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

Handling static-sensitive devices

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

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

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

What your RXE-100 Remote Expansion Enclosure offers

As a complement to your Enterprise X-Architecture™ server, your enclosure is designed to be cost-effective and flexible. It uses peripheral component interconnect (PCI) bus architecture to provide performance and compatibility with a wide range of existing hardware devices and software applications. Your enclosure combines:

- Active PCI™ and PCI-X (hot-plug) adapter capabilities

  Your enclosure supports up to twelve hot-plug slots for PCI and PCI-X adapters. You can replace failing PCI and PCI-X adapters or add adapters without turning off the enclosure.

- Redundant hot-swap cooling and power capabilities

  The fans in your enclosure can operate at variable speeds. If one fan fails, the remaining fans increase in speed to enable continued operation until the failing fan is replaced.

  The enclosure comes with two 370-watt power supplies to ensure redundancy and hot-swap capability for a typical configuration.

- System-management capabilities

  Your enclosure comes with a drawer-management controller installed. This controller, in conjunction with the system-management capabilities in the server, enables you to record enclosure events and monitor the enclosure for problems.

- Enterprise X-Architecture technology

  Enterprise X-Architecture technology combines industry-standard features with IBM mainframes-inspired capabilities to produce revolutionary advances in the I/O, memory and performance of Intel processor-based servers and enclosures.

  For more information about Enterprise X-Architecture technology, visit us on the Web at http://www.pc.ibm.com/us/eserver/xseries/xarchitecture/enterprise/index.html.

Your enclosure meets stringent worldwide certifications for power, electromagnetic compatibility (EMC), and safety.

Reliability, availability, and serviceability features

Three of the most important features in product design are reliability, availability, and serviceability (RAS). These factors help to ensure that the integrity of the data processed in your enclosure is preserved, that your enclosure is available when you want to use it, and that should a failure occur, you can easily diagnose and repair the failure with minimal inconvenience.

The following is an abbreviated list of the RAS features that your enclosure supports:

- Built-in temperature, fan, and voltage monitoring
- Hot-swap cooling with fan-speed-sensing capability
- Hot-swap and redundant power supplies
- Hot-plug (Active) PCI and PCI-X adapter slots
- Information LED panel and Light Path Diagnostics feature
- Cable presence detection for standard internal cables
- Vital product data (VPD) for the PCI-X expansion kit, power supplies, and power supply backplane
- Customer support center 24 hours a day, 7 days a week[1]

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1. Service availability will vary by country. Response time varies; may exclude some holidays.

Indicators and internal I/O devices

This section identifies the controls and indicators on the front and rear of your enclosure.

Front view

The following figure shows the indicators and location of internal devices on the front of your enclosure.
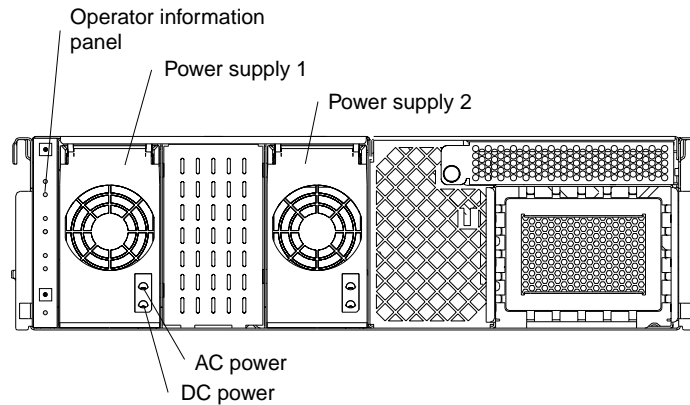
Operator information panel: This panel, also known as the front LED panel, contains controls and indicators. See "Operator information panel" on page 8 for details.

Power supplies 1 and 2: The enclosure comes with two hot-swap power supplies.

Power-supply ac power lights: Each hot-swap power supply has an ac power light to indicate that ac power is being supplied to the power supply.

Power-supply dc power lights: Each hot-swap power supply has a dc power light to indicate that the power supply is active.

Rear view

The following figure shows the location of the RXE ports on the rear of your enclosure.

RXE Management A (in) Port
RXE Management A (out) Port
RXE Management B (in) Port
RXE Management B (out) Port
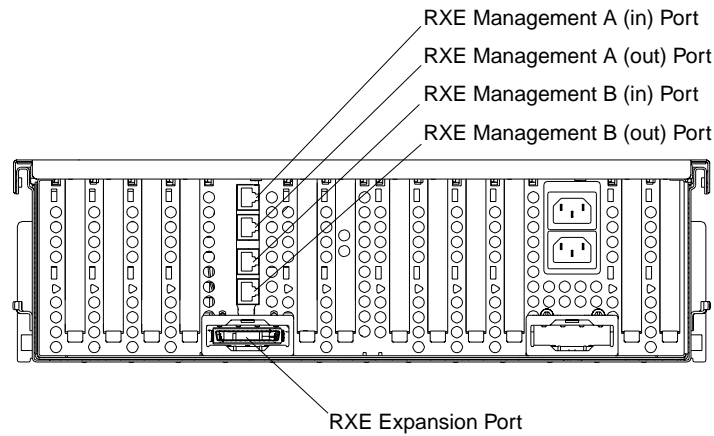
RXE Expansion Port

RXE Expansion Port: This connector enables you to attach the enclosure to the RXE Expansion Port on the server.

RXE Management Port: The RXE Management Ports enable you to connect the enclosure to the RXE Management Port on the server.

Operator information panel

The following figure shows the controls and indicators on the operator information panel.
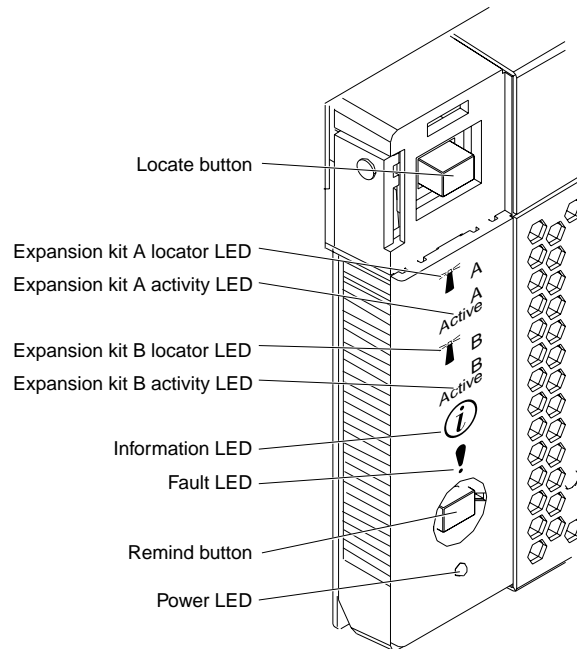
Locate button: Press this button to identify the server to which the enclosure is attached.

Note: Only some server models support this function. See the documentation that comes with your server for more information.

Expansion Kit A locator LED: This blue LED is on if the server that is controlling expansion kit A has issued an ID request.

Expansion Kit A activity LED: This green LED is on if activity is taking place in expansion kit A.

Expansion Kit B locator LED: This blue LED is on if the server that is controlling expansion kit B has issued an ID request.

Expansion Kit B activity LED: This green LED is on if activity is taking place in expansion kit B.

Information LED: This amber LED is on if the enclosure power supplies are nonredundant or if some other noncritical event has occurred. See the LEDs on the diagnostic panel or the error log on your server for specific error information. For information on the diagnostic panel LEDs, see "Diagnostic panel LEDs" on page 40.

Fault LED: This amber LED is on if an enclosure error occurs. See the lights on the diagnostic panel or the error log on your server for specific error information. For information on the diagnostic panel LEDs, see "Diagnostic panel LEDs" on page 40.

Remind button: You can use the Remind button to put the Fault light into the Remind mode (flashes every 2 seconds). By pressing the button, you acknowledge

a system error but indicate that you will not take immediate action. If a new failure occurs, the Fault light will turn to solid again.

The Fault light stays in Remind mode until one of the following conditions occurs:
*   All known problems are resolved.
*   The enclosure is powered off and then powered on.
*   A new problem occurs.

You can use the Remind button to delay enclosure maintenance until a later time. Also, resetting the Fault light enables it to indicate any subsequent error. If the light is still blinking from the first error, it is unable to indicate subsequent errors.

Power LED: This green LED is on if ac and dc power are present in the enclosure. When this light flashes, the enclosure is in standby mode (the power supply is turned off and current is present). If this light is off, either a power supply or the light has failed, or ac power is not present.

Note: If this light is off, it does not mean that there is no electrical power present in the enclosure. The light might be burned out. To remove all electrical current from the enclosure, you must unplug the enclosure power cords from the electrical outlets.

Turning on the enclosure

Turning on the enclosure refers to the act of plugging the enclosure power cord into the power source and pressing the power-control button on a server that is connected to the enclosure and configured to identify the enclosure. Typically, this causes the operating system of the server to start and causes the server to issue a power-on request to the enclosure.

Turning off the enclosure

Turning off the enclosure occurs only if all connected servers issue power-off requests, and you have disconnected the enclosure power cords from the power source. You cannot turn off the enclosure manually.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
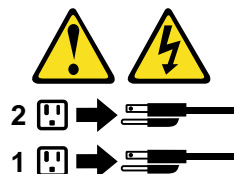
You can disconnect the enclosure power cords from the power source to shut off all power immediately without damaging the enclosure, but it may cause an unrecoverable error and loss of data on all connected servers.

Chapter 2. Installing and configuring the expansion enclosure

This chapter provides information to help you install and configure your enclosure.

Installing the enclosure

To get the most from the enclosure, arrange the installation area to suit your needs. Light sources, air circulation, and the location of electrical outlets can affect the way you arrange the installation area.

Air circulation

The enclosure produces heat. The enclosure has one or more fans that pull in fresh air and force out hot air. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the enclosure so that nothing blocks the air vents on the front and rear of the enclosure; usually, 15 cm (6 inches) of air space is sufficient. Also, make sure that the vented air is not blowing on someone else.

Electrical outlets and cable lengths

The location of electrical outlets and the length of power cords and cables that connect to the enclosure might determine the final placement of the enclosure.

When arranging the installation area:

- Avoid the use of extension cords. When possible, plug the enclosure power cords directly into electrical outlets.
- Keep power cords and cables neatly routed away from walkways and other areas where they might get kicked accidentally.

For more information about power cords, see "Power cords" on page 76.

Configuring the expansion enclosure

Use the Configuration/Setup program provided with your server to configure the expansion enclosure. This program is part of the basic input/output system (*BIOS*) code that comes with the server. Among other things, you can use this program to configure the connected I/O devices, including the enclosure. For detailed information about using this utility, see the configuration information for the server on the server *IBM xSeries Documentation* CD.

Notes:

1. You must obtain and install the latest BIOS, drawer management controller, and service processor code for your server before you can successfully attach your server to the enclosure. You can obtain the latest code versions from the IBM Support Web page at: http://www.ibm.com/pc/support on the World Wide Web.
2. If you are connecting your enclosure to an xSeries 360 server, see "Appendix A. IBM xSeries 360 configuration guidelines" on page 49 for important NOS installation and configuration guidelines.
3. If you are connecting your enclosure to an xSeries 440 server, see "Appendix B. IBM xSeries 440 configuration guidelines" on page 55 for important NOS installation and configuration guidelines.

Chapter 3. Installing options

This chapter provides instructions to help you add options to the enclosure.

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 4.

Major components of the RXE-100 Remote Expansion Enclosure

The orange color on components and labels in the enclosure identifies hot-swap components. You can install or remove these components while the enclosure is running under the control of a server. For complete information about installing or removing a hot-swap component, see the detailed information in this chapter.

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

The following figure shows the major components of the enclosure.
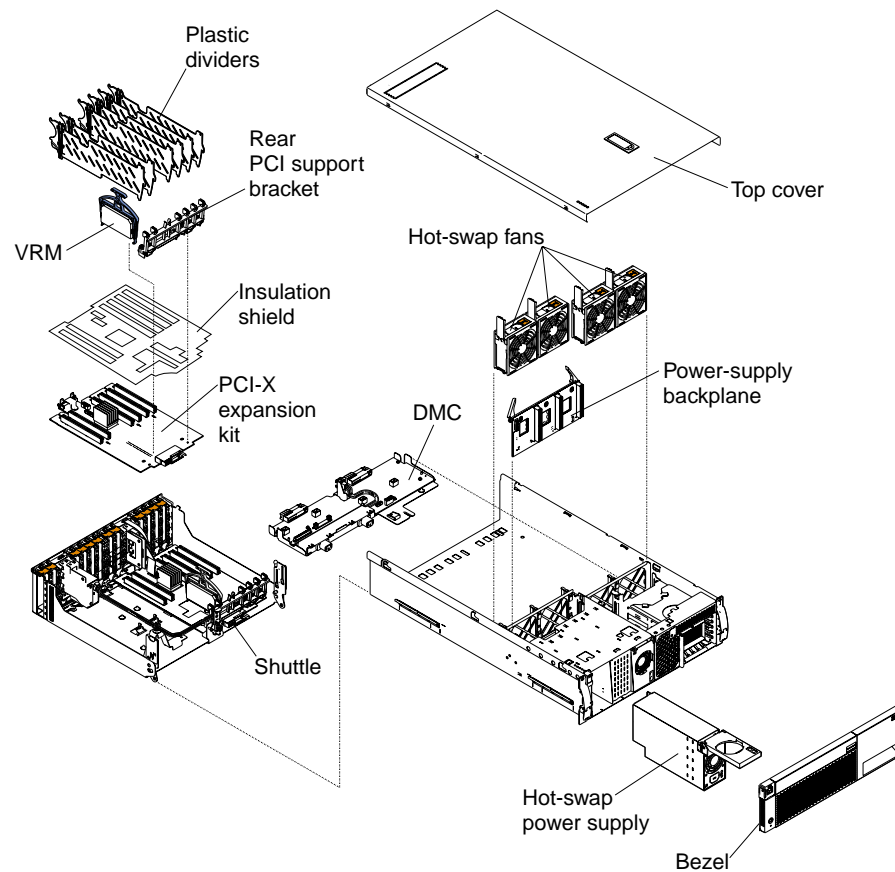
Component locations

This section shows the locations of components on the PCI-X expansion kit and drawer-management controller.

PCI-X expansion kit component locations

The following figure shows the location of the connectors on the PCI-X expansion kit for hot-pluggable PCI slots, the PCI attention LEDs, and the PCI power LEDs.

PCI-X slot 6, bus C
PCI-X slot 5, bus C
PCI-X slot 4, bus B
PCI-X slot 3, bus B
PCI-X slot 2, bus A
PCI-X slot 1, bus A

PCI attention LEDs

PCI power LEDs

VRM slot
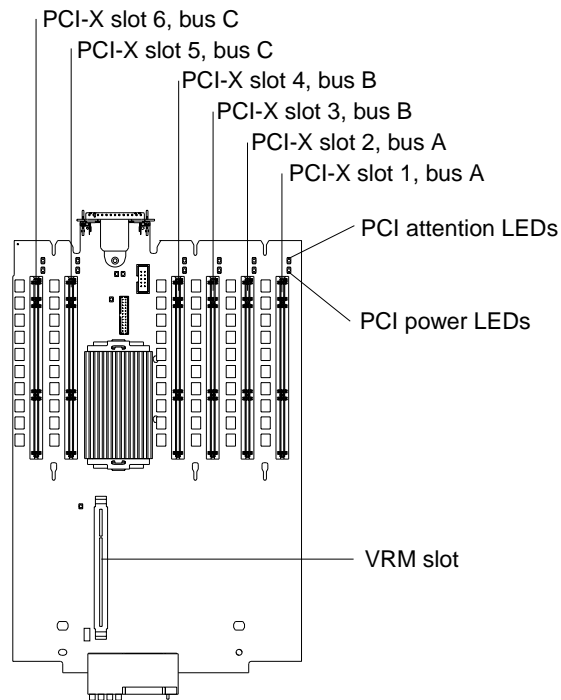
The following figure shows the location of the external and internal connectors on the PCI-X expansion kit.

RXE Expansion Port (J1)

PCI switch card cable connector (J2)

RS-485 connector (J3)

DMC card interface connector (J4)
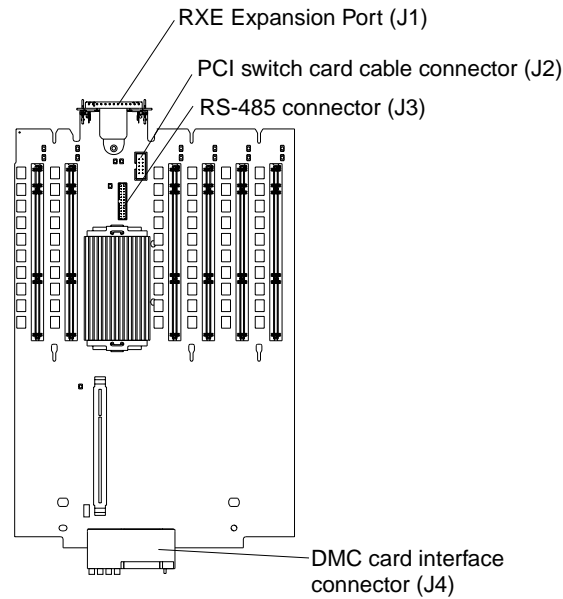
Drawer management controller component locations

The following figure shows the location of the internal connectors on the drawer-management controller (DMC) board.

DMC interface connector (expansion kit A) (J6)

DMC interface connector (expansion kit B) (J5)

Fan 4 connector (J9)

Fan 1 connector (J13)

Power backplane connector (J2)

Fan 3 connector (J10)

Power backplane connector (J1)

Fan 2 connector (J12)
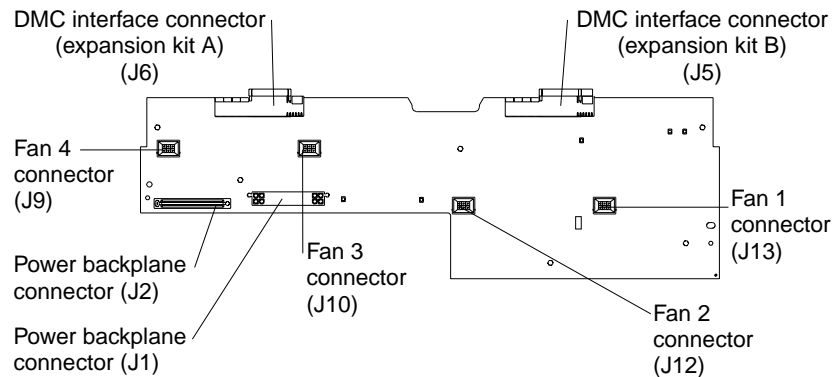
PCI-X expansion kit LED locations

The following figure shows the location of the LEDs on the PCI-X expansion kit and drawer-management controller. You might need to refer to this illustration when solving problems with the enclosure.

Note: The illustrations in this document might differ slightly from your hardware.
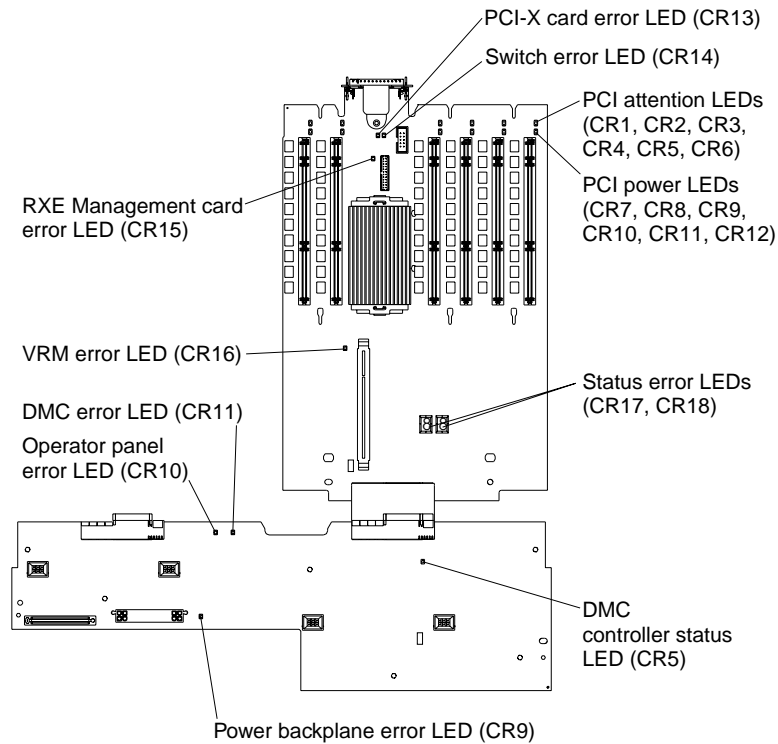
Removing the enclosure-top cover and bezel

Complete the following steps to remove the enclosure top cover and bezel:

1. Review the information in "Safety" on page v, "Before you begin" on page 3, "Working inside the enclosure with the power on" on page 4, and "Handling static-sensitive devices" on page 4.

2. Lift the plastic cover-release latch on the top cover, as shown in the following figure.

3. Slide the top cover toward the rear of the enclosure approximately 1 inch, and then lift it off the enclosure and set it aside.

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

4. Press the bezel release latches at the top edge of the bezel, and pull the top of the bezel slightly away from the enclosure.

5. Pull the bezel up to release the two tabs at the bottom edge of the bezel. Store the bezel in a safe place.
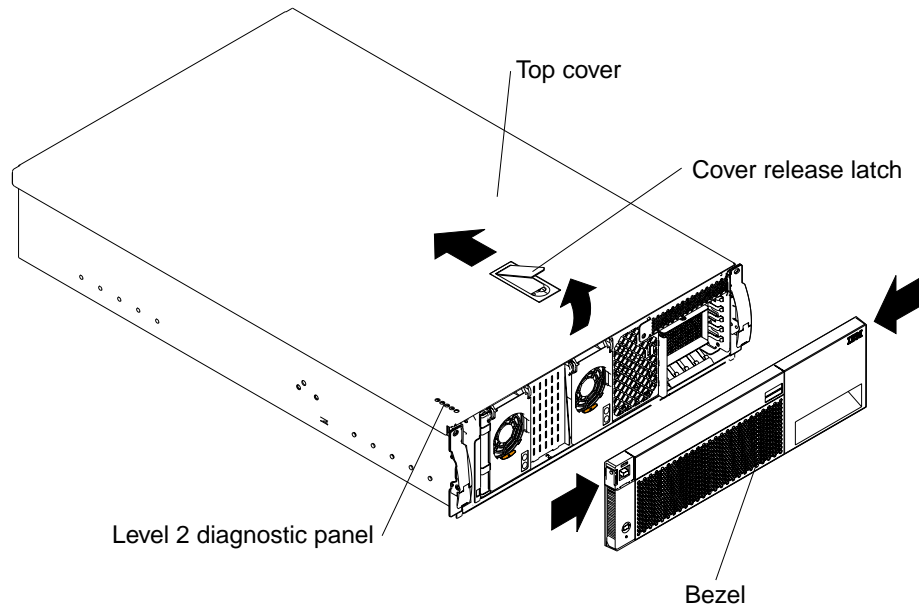
Installing a hot-plug PCI or PCI-X adapter

The following figure shows the location of the six hot-plug expansion slots and their related components on the PCI-X expansion kit. The server BIOS code identifies the adapter slots by a physical and logical identifier. Any POST messages relating to the adapter slots provide both the physical and logical identifiers to aid in isolating the cause of the message. The physical identifier used by the server BIOS code comprises the adapter slot number (1-6) prefixed by the identifier of the expansion kit (A or B). The server BIOS code assigns a logical identifier to all PCI and PCI-X devices.

Notes:

1. If you are connecting your enclosure to an xSeries 360 server, see "Appendix A. IBM xSeries 360 configuration guidelines" on page 49 for important adapter configuration guidelines.

2. If you are connecting your enclosure to an xSeries 440 server, see "Appendix B. IBM xSeries 440 configuration guidelines" on page 55 for important adapter configuration guidelines.
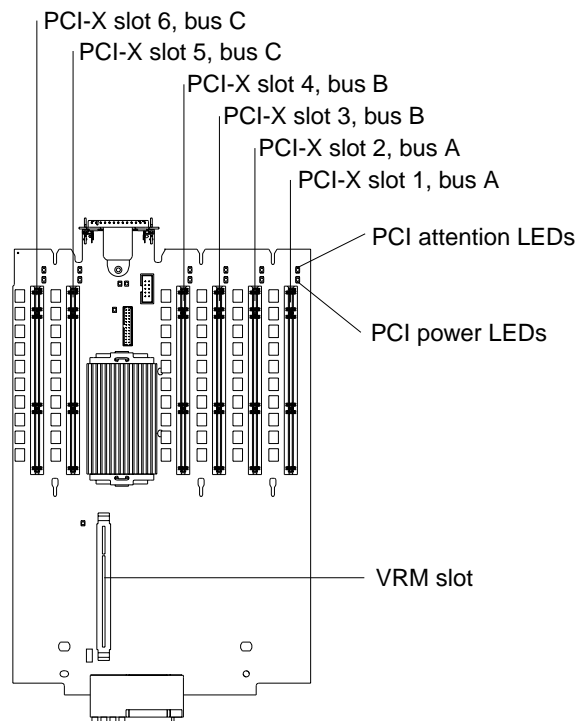
This enclosure supports the following maximum PCI bus speeds:

- Bus A (hot-plug)
    - 133 MHz 64-bit if only slot 1 is populated
    - 100 MHz 64-bit if slots 1 and 2 are populated
- Bus B (hot-plug)
    - 133 MHz 64-bit if only slot 3 is populated
    - 100 MHz 64-bit if slots 3 and 4 are populated

- Bus C (hot-plug)
  - 133 MHz 64-bit if only slot 5 is populated
  - 100 MHz 64-bit if slots 5 and 6 are populated

Notes:

1. If only the odd-numbered slot in a pair is populated, the maximum PCI bus speed is 133 MHz.
2. If only the even-numbered slot in a pair is populated, the maximum PCI bus speed is 100 MHz.
3. If both slots of a pair are populated, the maximum PCI bus speed is 100 MHz.
4. To hot add two 133 MHz adapters on the same PCI bus, install the first adapter in the even-numbered slot; then, install the second adapter in the odd-numbered slot. The maximum bus speed is 100 MHz.
5. If both slots of a pair are populated, the system will configure both adapters to the highest compatible bus speed and bus mode (PCI or PCI-X).
6. During hot-add installation, if an adapter is already configured on the same bus, the adapter being installed will configure only if it is compatible with the existing bus mode and bus speed.

The following lights are provided for monitoring adapter status:

- Internal attention lights for hot-plug PCI slots
- Power-on lights for hot-plug PCI slots

Adapter considerations

If the server operating system supports hot-plug PCI/PCI-X adapters, continue with the adapter-installation procedure. You can replace a failing hot-plug PCI/PCI-X adapter with a new adapter of the same type, without turning off power to the enclosure. If the operating system and adapter also support the hot-add feature, you can also install a new adapter without turning off the power to the enclosure.

Important: Do not install or remove a hot-plug PCI/PCI-X adapter before performing the server operating-system-defined procedure for disabling the hot-plug PCI slot that contains the adapter. Doing so might cause your system to stop responding. Refer to your server operating-system documentation.

Complete the following steps to install a hot-plug PCI/PCI-X adapter:

1. Read the documentation that comes with your adapter for any special requirements or restrictions. Also, read the documentation that comes with your server operating system.
2. Review the information in "Safety" on page v, "Before you begin" on page 3, "Working inside the enclosure with the power on" on page 4, and "Handling static-sensitive devices" on page 4.
3. Remove the top cover (see "Removing the enclosure-top cover and bezel" on page 17).

   Attention: To ensure proper system cooling, do not leave the top cover off the enclosure for more than 30 minutes.
4. Determine which PCI expansion slot you will use for the adapter.

   Note: All six PCI slots support hot-plug PCI/PCI-X adapters.
5. Disable the selected PCI slot through your server operating system. (See the documentation that comes with the server operating system for information about disabling a hot-plug PCI slot.)

Important:
- Make sure that the power-on light for the hot-plug PCI slot is off before you continue with the next step.
- If the adapter is not hot-plug enabled or the NOS does not support the hot-plug feature, you must turn off the enclosure to install the adapter.

6. Using the following figure as a reference for the rest of this procedure, slide the adapter-retention tab toward the rear of the enclosure and lift the adapter-retention latch.
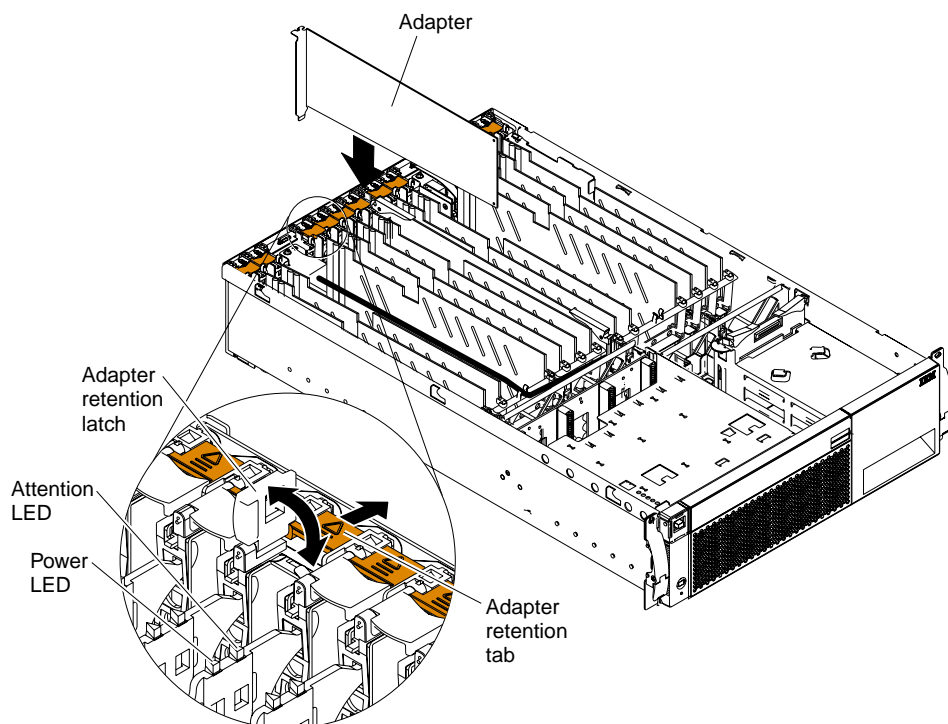
7. Slide the expansion-slot cover up and remove it from the enclosure.
8. Remove the adapter from the static-protective package.

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

9. Install the adapter:
   a. Press the adapter *firmly* into the slot.

      Attention: When you install an adapter in the enclosure, be sure that it is completely and correctly seated in the PCI slot. Incomplete insertion might cause damage to the PCI-X expansion kit, to the slot, or to the adapter.

      Note: Some full-length adapters require the removal of the plastic extender on the rear edge of the adapter. Before removing the extender, place the adapter, component-side up, on a flat, static-protective surface.

   b. Close the adapter-retention latch over the top corner of the adapter. The adapter-retention tab snaps into place.

10. Connect any needed cables to the adapter.

11. Enable the PCI slot from your server operating system. (Refer to the documentation that comes with your server operating system for information about enabling a hot-plug PCI slot.) Make sure that the power-on light for the hot-plug PCI slot comes on.

12. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 29.

Installing an xSeries Remote I/O PCI-X 6-slot Expansion Kit

You can install an xSeries Remote I/O PCI-X 6-slot Expansion Kit in your enclosure to support six additional PCI adapter slots.

Complete the following steps to install an xSeries Remote I/O PCI-X 6-slot Expansion Kit:

1. Review the information in "Safety" on page v, "Before you begin" on page 3, and "Handling static-sensitive devices" on page 4.

2. Using the procedure in "Turning off the enclosure" on page 9, turn off the enclosure. Disconnect all power cords and external cables; then, remove the top cover (see "Removing the enclosure-top cover and bezel" on page 17).

3. Install the insulation shield on the expansion kit.
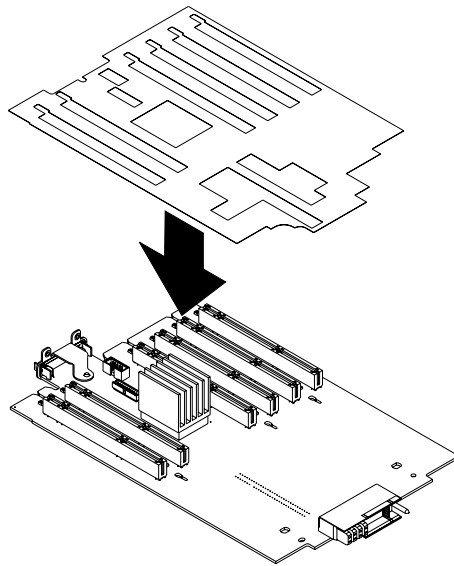
4. Lift the plastic shuttle-release levers to extend the levers; then, pull out the shuttle-release levers towards the rear of the enclosure.

Shuttle-release levers
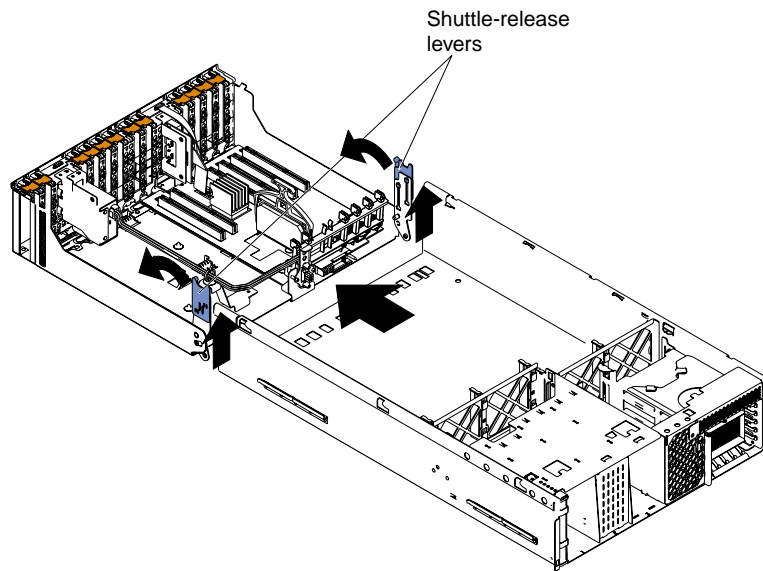
5. Remove the power cable from the cable bracket. Remove the two screws and lift the cable bracket from the shuttle. Save the cable bracket for future use.

Screws

Cable bracket
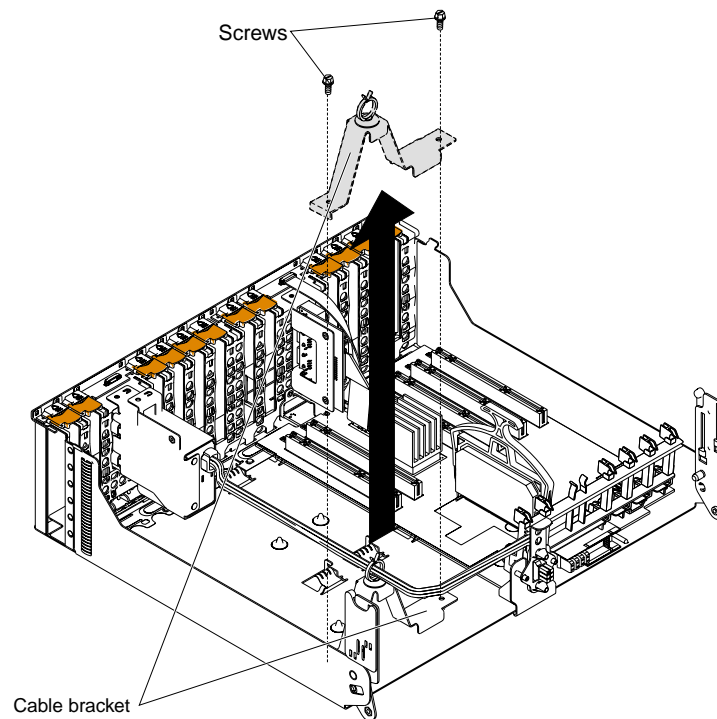
6. Remove the screws securing the filler panel covering the RXE Expansion Port from the rear of the shuttle.

RXE Expansion
Port cover
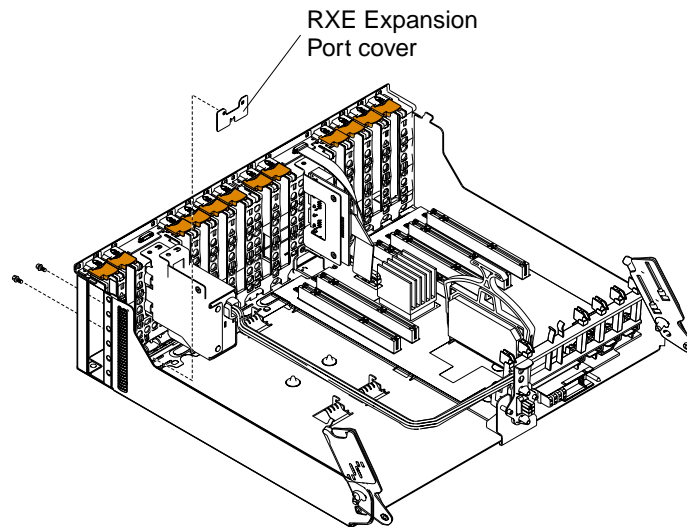
7. Install the expansion kit. Position the expansion kit under the power cable and align the expansion kit with the guide tabs of the shuttle; then, slide the expansion kit toward the rear, making sure that the tabs on the enclosure fit into the slots on the rear of the expansion kit.

    Note: Use care when inserting the expansion kit.

Slots

Guide tabs
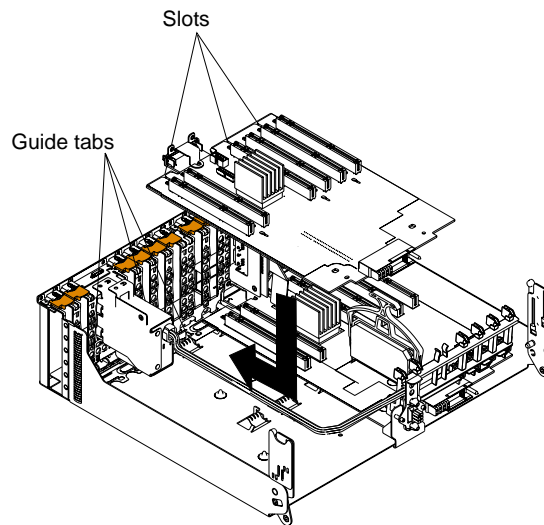
8. Secure the RXE Expansion Port connector with the two screws provided with the expansion kit; then, install the rear PCI support bracket with screws.

Captive thumb screws

Screws
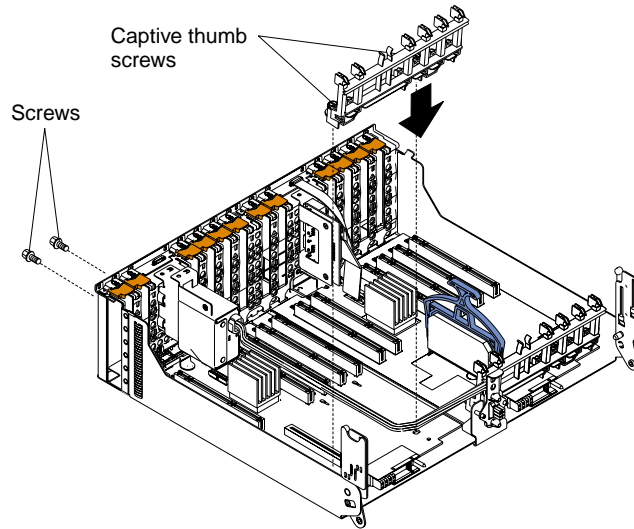
9. Slide the shuttle into the enclosure; then, push the shuttle-release levers toward the front of the enclosure and push down to lock it in place.

Shuttle-release levers
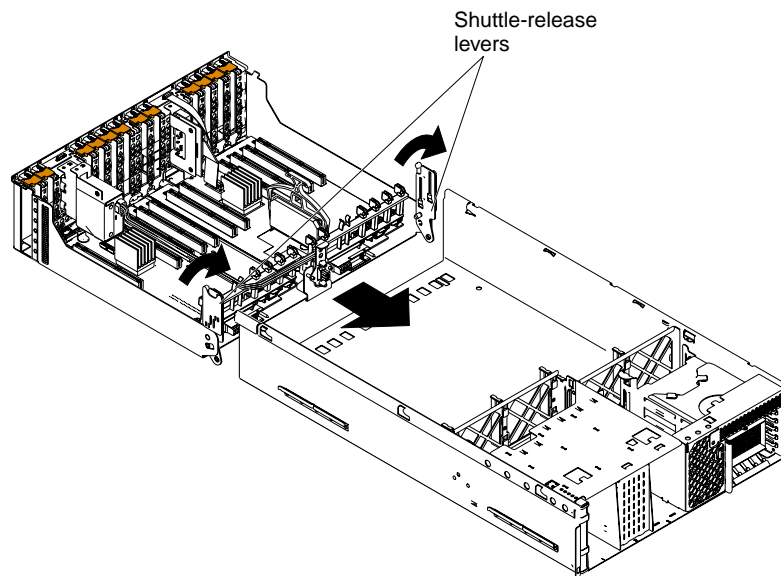
10. Attach the PCI switch card cable to the connectors. The connectors for the PCI switch card cables are different and can be connected only one way.
11. Plug the VRM *firmly* into the slot.
12. Route the power cable through the cable clip on the rear PCI support bracket.

Plastic divider

PCI switch card
cable connections

Cable clip
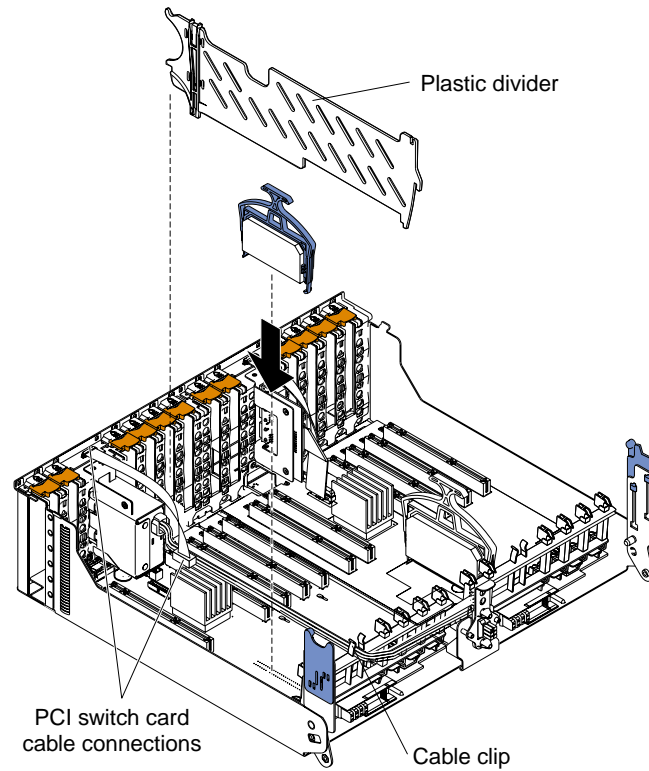
13. Install the plastic dividers between the PCI slots.
14. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 29.

Replacing a hot-swap power supply

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

Statement 6:

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

Statement 8:

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

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

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

1. Review the information in "Safety" on page v, "Before you begin" on page 3, "Working inside the enclosure with the power on" on page 4, and "Handling static-sensitive devices" on page 4.

2. Remove the front bezel. See "Removing the enclosure-top cover and bezel" on page 17.

   Note: The power supplies are numbered from left to right (1 and 2) as viewed from the front of the enclosure. Power supplies do not have to be installed in a particular sequence.

3. Press down on the locking latch and rotate the release handle to the open position.
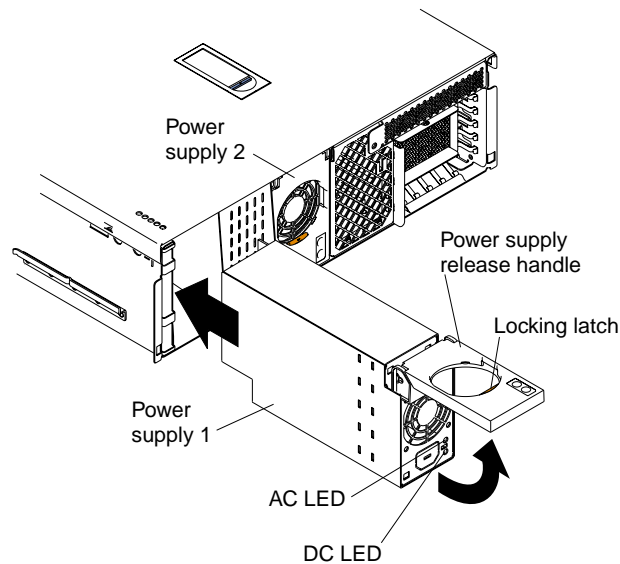
4. Slide the power supply into the chassis and fully close the handle.
5. Plug one end of the power cord for the new power supply into the corresponding connector on the back of the enclosure (connectors are numbered 1 and 2 from top to bottom). Plug the other end of the power cord into a properly grounded electrical outlet.
6. Verify that the dc power and ac power lights on the front of the power supply are lit, indicating that the power supply is operating properly.
7. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 29.

Replacing a hot-swap fan

Your enclosure comes with four hot-swap fans. You do not need to turn off the power to the enclosure to replace a hot-swap fan.

Attention: If a fan fails, replace it within 48 hours to help ensure proper cooling.

Complete the following steps to replace a hot-swap fan:
1. Review the information in "Before you begin" on page 3 and "Working inside the enclosure with the power on" on page 4.
2. Remove the top cover (see "Removing the enclosure-top cover and bezel" on page 17).
   Attention: To ensure proper system cooling, do not leave the top cover off the enclosure for more than 30 minutes.

3. Slide the latch to open the fan locking handle and pull upward on the handle to lift the fan out of the enclosure.
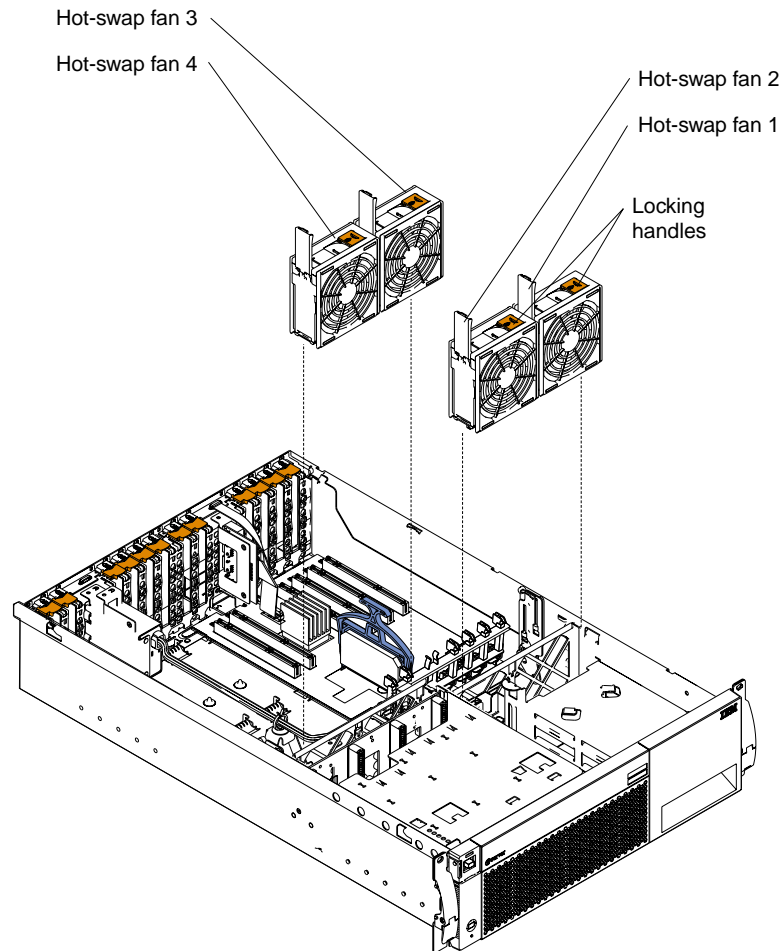
4. Open the locking handle on the replacement fan, lower the fan into its socket until it is firmly seated. Then, press the handle into the locked position.
5. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 29.

Replacing the VRM

Your enclosure comes with one pluggable voltage regulator module (VRM) for the PCI slots.

Complete the following steps to replace the PCI-slot VRM:

1. Review the information in "Safety" on page v, "Before you begin" on page 3, and "Handling static-sensitive devices" on page 4.
2. Using the procedure in "Turning off the enclosure" on page 9, turn off the enclosure. Disconnect all power cords and external cables, and remove the top cover (see "Removing the enclosure-top cover and bezel" on page 17).
3. Grasp the blue tab and lift the VRM out of its slot.

4. Holding the replacement VRM by the upper corners, plug it *firmly* into the slot.
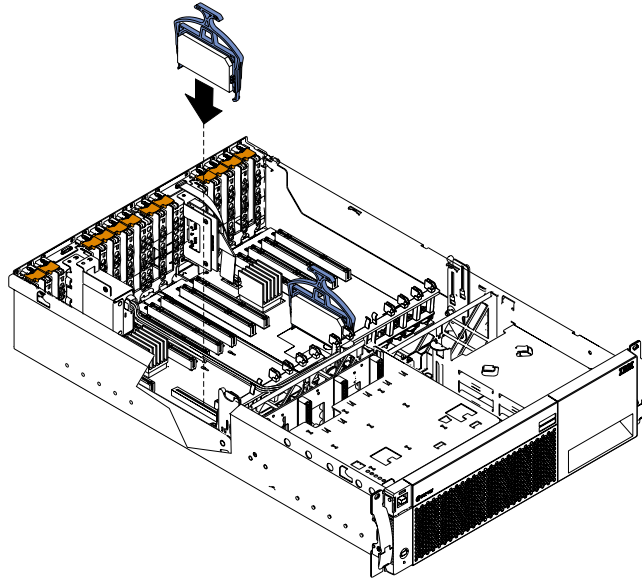
5. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation".

Completing the installation

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

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

Installing the enclosure top cover and bezel

Complete the following steps to install the enclosure top cover and bezel:

1. Before installing the cover, check that all *internal* cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the enclosure.

2. Move the cover-release latch to the open (up) position, as shown in the following figure.

Top cover

Cover release latch

Diagnostic panel

Bezel
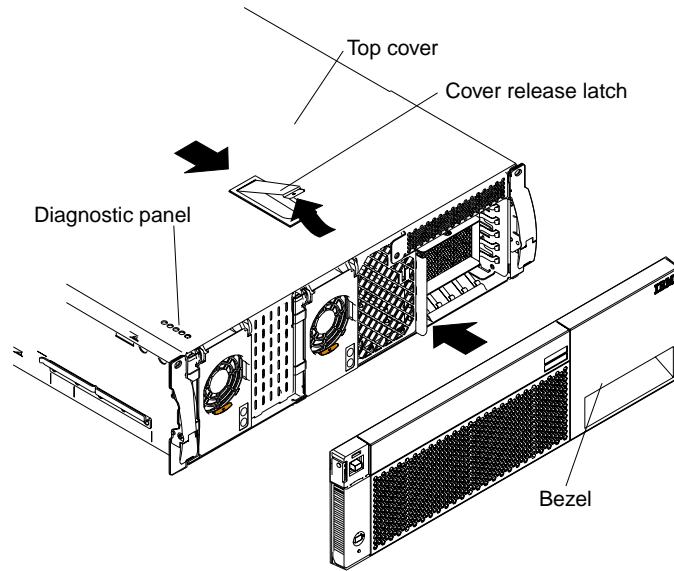
3. Position the cover on the enclosure, inserting the tabs on the top cover into the matching slots in the enclosure chassis.

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

5. Insert the two tabs on the bottom of the bezel into the matching holes on the enclosure chassis.

6. Rotate the top of the bezel toward the enclosure until the two tabs at the top of the bezel snap into place.

7. If you disconnected any external cables from the back of the enclosure, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

Note: See"Input/output ports" on page 31 for connector locations.

Updating your server configuration

When you start a connected server for the first time after you add or remove an option from the enclosure, you might see a message telling you that the configuration has changed. The Configuration/Setup Utility program on the server automatically starts so that you can save the new configuration information. For detailed information about using this utility, see the configuration information for the server on the server *IBM xSeries Documentation* CD.

Some optional PCI/PCI-X adapters have device drivers that you need to install. See the documentation that comes with your option for information about installing any required device drivers.

Notes:

1. You must obtain and install the latest BIOS, drawer management controller, and service processor code for your server before you can successfully attach your server to the enclosure. You can obtain the latest code versions from the IBM Support Web page at: http://www.ibm.com/pc/support on the World Wide Web.

2. If you are connecting your enclosure to an xSeries 360 server, see "Appendix A. IBM xSeries 360 configuration guidelines" on page 49 for important NOS installation and configuration guidelines.

3. If you are connecting your enclosure to an xSeries 440 server, see "Appendix B. IBM xSeries 440 configuration guidelines" on page 55 for important adapter configuration guidelines.

Input/output ports

This section provides information about the following input/output (I/O) ports on the rear panel of the enclosure:
- One input and one output RXE Management Port for each PCI-X expansion kit in the enclosure
- One RXE Expansion Port for each PCI-X expansion kit in the enclosure

The following figure shows the I/O ports on the rear of your enclosure.

RXE Management A (in) Port
RXE Management A (out) Port
RXE Management B (in) Port
RXE Management B (out) Port
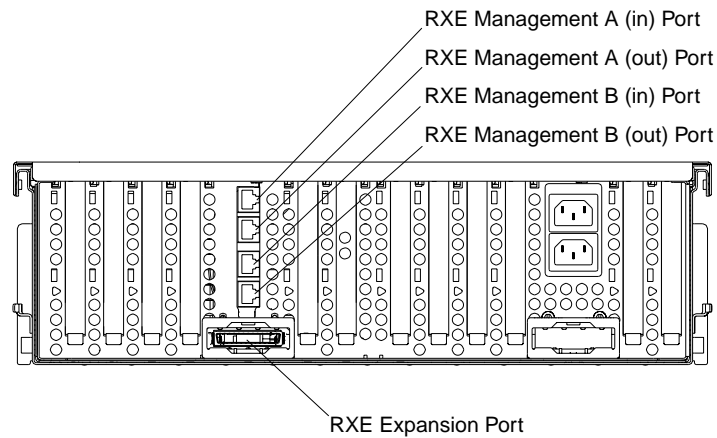
RXE Expansion Port

RXE Expansion Port

Your enclosure comes with one 48-pin RXE Expansion Port on the rear of each PCI-X expansion kit in the enclosure. The RXE Expansion Port uses the remote I/O cable to connect the enclosure to the server.

48   2
47   1
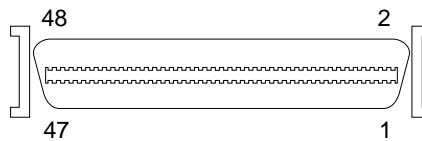
RXE Management Port

Your enclosure comes with four RXE Management Ports on the rear of the enclosure. The RXE Management Ports use dual RS-485 connectors to connect to the server.

1   8
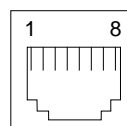
Cabling the enclosure

Install your enclosure in a rack before you cable the enclosure. Use the following instructions in conjunction with the *Rack Installation Instructions* that comes with your enclosure to install your enclosure in a rack and to cable the enclosure.

Detailed rack installation instructions, including the use of the cable-management arm, are given in the *Rack Installation Instructions.* See "Input/output ports" on page 31 for a description of the I/O ports on the rear of your enclosure.

If you are attaching your enclosure to an xSeries 360 server, go to "Attaching the enclosure to an xSeries 360 server". If you are attaching your enclosure to an xSeries 440 server, go to "Attaching the enclosure to an xSeries 440 server" on page 34.

Attaching the enclosure to an xSeries 360 server

Complete the following steps to attach the enclosure to an xSeries 360 server:

1. Review the information in "Safety" on page v, "Before you begin" on page 3, and "Handling static-sensitive devices" on page 4.
2. Turn off the server and disconnect all power cords and external cables from the enclosure and server.
3. If the enclosure has both expansion kit A and expansion kit B installed, go to step 5 on page 33. If the enclosure has only expansion kit A installed, go to step 4
4. If the enclosure has only expansion kit A installed, complete the following steps:
   a. Connect the interconnect management cable between the RXE Management Port on the rear of the server and the RXE Management A (In) Port on the rear of the enclosure.
   b. Connect the remote I/O cable between the RXE Expansion Port on the rear of the server and the RXE Expansion Port on the rear of the enclosure.
   c. Go to step 6.

The following illustrates the cabling between one server and an enclosure with expansion kit A installed.
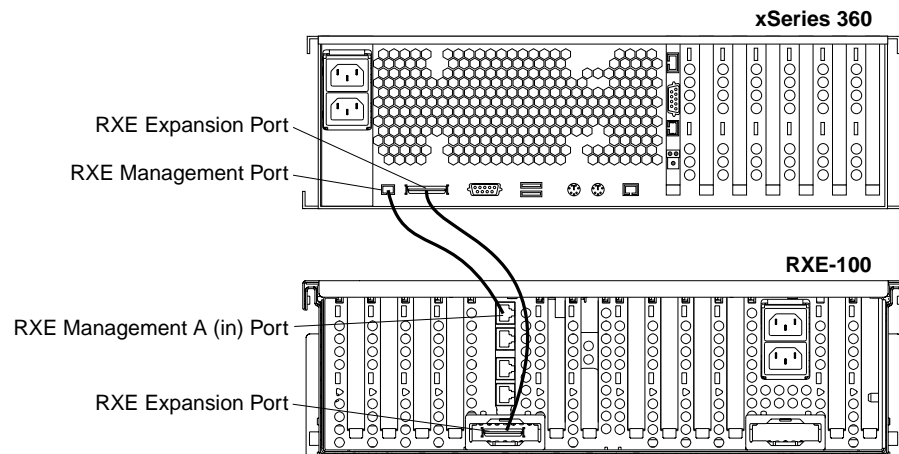
5. If the enclosure has both expansion kit A and expansion kit B installed, complete the following steps:

   a. Connect the interconnect management cable between the RXE Management Port on the rear of the server and RXE Management A (In) Port on the rear of the enclosure.

   b. Connect the interconnect management cable, which is provided with the Remote I/O PCI-X 6-slot Expansion Kit option, between the RXE Management A (Out) Port on the rear of the enclosure and the RXE Management B (In) Port on the rear of the enclosure.

   c. Connect the remote I/O cable between the RXE Expansion Port on the rear of the server and the RXE Expansion Port on the rear of the expansion kit A of the enclosure.

   The following illustrates the cabling between one server and an enclosure with both expansion kit A and expansion kit B installed.
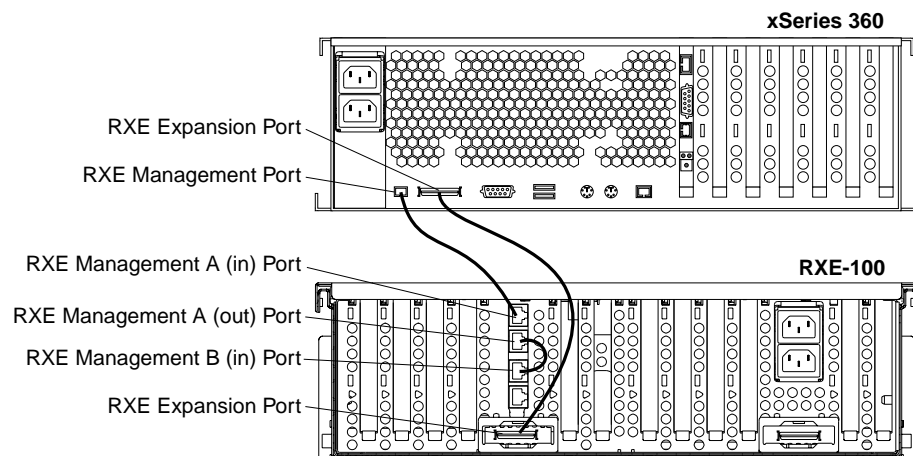
6. Plug the server and enclosure power cords into a power source.

7. Turn on the server connected to the enclosure.

8. Go to "Updating your server configuration" on page 30 to complete your installation.

Attaching the enclosure to an xSeries 440 server

Complete the following steps to attach the enclosure to an xSeries 440 server:

1. Review the information in "Safety" on page v, "Before you begin" on page 3, and "Handling static-sensitive devices" on page 4.

2. Turn off the server and disconnect all power cords and external cables from the enclosure and server.

3. If the server has two SMP modules installed, go to step 5. If the server has one SMP module installed, go to step 4.

4. If the server has one SMP module installed, complete the following steps:

   Note: Use the following instructions if your enclosure has only expansion kit A installed or both expansion kit A and expansion kit B installed.

   a. Connect the interconnect management cable between the RXE Management Port on the rear of the server and the RXE Management A (in) Port on the rear of the enclosure.

   b. Connect the remote I/O cable between the RXE Expansion Port (A) on the rear of the server and the expansion kit A RXE Expansion Port on the rear of the enclosure.

   c. Go to step 6.

   The following shows the connections between an xSeries 440 server with one SMP module installed and an enclosure with only expansion kit A installed or both expansion kit A and expansion kit B installed.
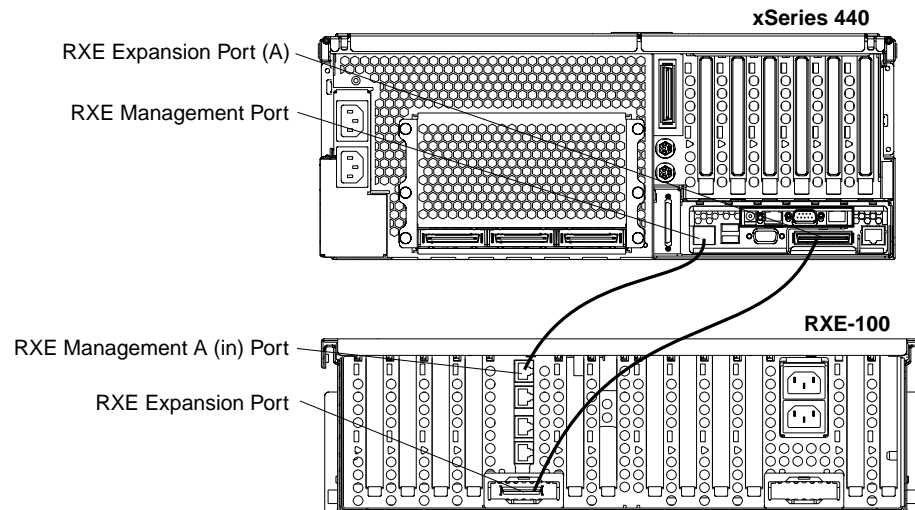
5. If the server has two SMP modules installed, complete the following steps:

   Note: Use the following instructions if your enclosure has only expansion kit A installed or both expansion kit A and expansion kit B installed.

   a. Connect the interconnect management cable between the RXE Management Port on the rear of the server and the RXE Management A (in) Port on the rear of the enclosure.

   b. Connect the remote I/O cable between the RXE Expansion Port (B) on the rear of the server and the expansion kit A RXE Expansion Port on the rear of the enclosure.

   The following shows the connections between an xSeries 440 server with two SMP modules installed and an enclosure with only expansion kit A installed or both expansion kit A and expansion kit B installed.
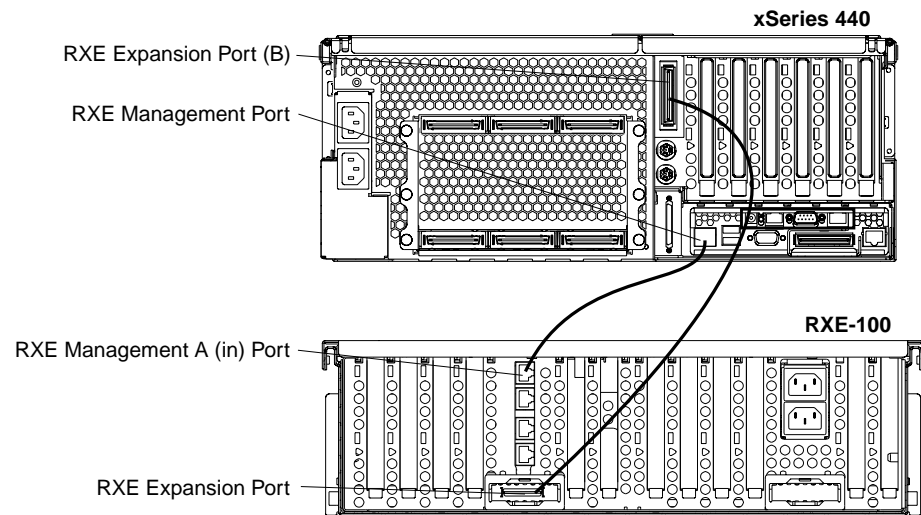
6. Plug the enclosure and server power cords into a power source.
7. Turn on the server connected to the enclosure.
8. Go to "Updating your server configuration" on page 30 to complete your installation.

Using the cable-management arm

When you cable the enclosure into the rack cabinet, be sure to route the cables through the cable-management arm on the rear of the enclosure.

The following figure shows the cable routing for a typical enclosure configuration. Detailed cabling instructions, including the use of the cable-management arm, are given in the *Rack Mounting Instructions* that come with the enclosure. See "Input/output ports" on page 31 for a description of the ports on the rear of the enclosure.

Notes:

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

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

3. The cable-management arm does not come with the rack kit. It comes with the enclosure.
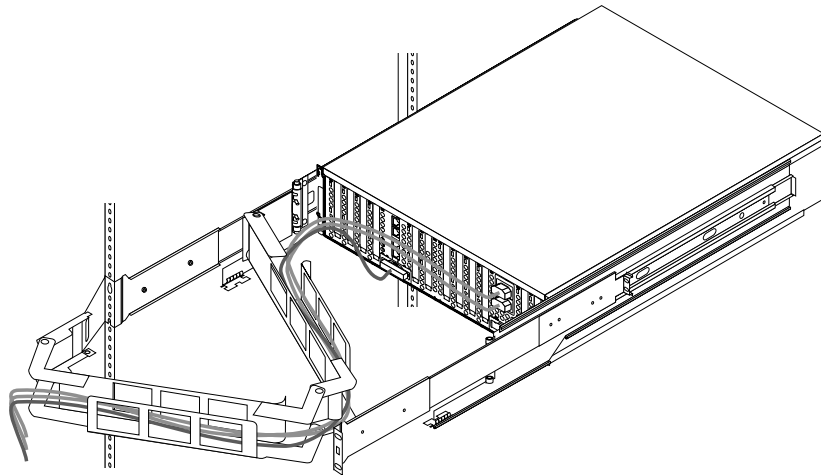
Chapter 4. Solving problems

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

If you cannot locate and correct the problem using the information in this chapter, see "Getting information, help, and service" on page 43 for more information.

Diagnostic tools overview

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

- **Light Path Diagnostics**™

  Your enclosure has light-emitting diodes (LEDs) to help you identify problems with enclosure components. By following the path of lights, you can quickly identify the type of error that occurred. The light path begins with the LEDs on the operator information panel. See "Diagnostic panel LEDs" on page 40 for more information.

- **Customized support Web page**

  You can create a customized support page that is specific to your hardware, complete with frequently asked questions, parts information, technical hints and tips, and downloadable files. In addition, you can choose to receive electronic mail (e-mail) notifications whenever new information becomes available about your registered products.

  After you register and create a profile for your IBM® products, you can diagnose problems using the IBM Online Assistant, and you can participate in the IBM discussion forum. For more detailed information about registering and creating a customized profile for your IBM products, visit the following addresses on the Web:
  - http://www.ibm.com/pc/register
  - http://www.ibm.com/pc/support

Light Path Diagnostics

The Light Path Diagnostics LEDs help you to identify problems with enclosure components. By following the light path, you can quickly identify and correct the type of problem that occurred. The light path begins with the LEDs on the operator information panel. If the enclosure encounters a problem, it lights the fault LED. If the enclosure power supplies are nonredundant or if some other noncritical event has occurred, the enclosure lights the system information LED.

To isolate the source of the trouble, examine the Light Path Diagnostics LEDs through the special cutout on the enclosure top cover (refer to "Diagnostic panel LEDs" on page 40). These LEDs can indicate a problem with a single component or a problem with one of several similar components. In the latter case, to isolate the specific failing component, remove the enclosure top cover and look for a lit LED.

For example, if the FAN LED is lit, the specific failing fan is indicated by an LED viewable with the top cover removed. If the VRM LED is lit, the specific failing VRM is indicated by an LED on the PCI-X expansion kit.

Power-supply LEDs

The ac and dc power LEDs on each power supply provide status information about the power supply. The following figure shows the location of the ac and dc power LEDs.
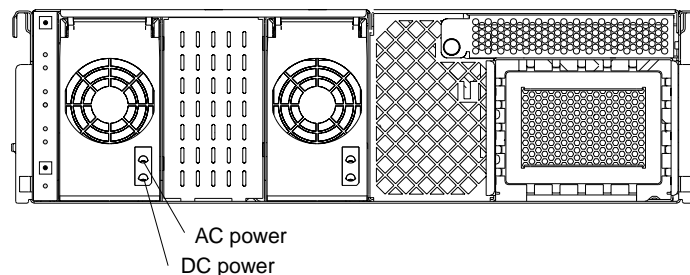
AC power
DC power

The following table describes the ac and dc power LEDs on each power supply.

Table 2. Power supply LED definition

AC power LED	DC power LED	Description and action
On	On	The power supply is on and operating correctly.
On	Off	Either the host server has not issued a power-on, or there is a dc power problem. Possible causes: • The enclosure is not turned on (the power LED is blinking on the operator information panel). **Action:** Cause the host server to issue a power on. • The power supply has failed. **Action:** Replace the power supply. If the problem remains, call for service.
Off	Off	There is an ac power problem. Possible causes: • There is no ac power to the power supply. **Actions:** Verify that: – The electrical cord is properly connected to the enclosure. – The electrical outlet functions properly. • The power supply has failed. **Action:** Replace the power supply. If the problem remains, call for service.

Diagnostic panel LEDs

The following figure shows the location of the Diagnostic panel LEDs, visible through a special cutout area at the left front of the top cover. See "Light Path Diagnostics troubleshooting" on page 41 for information about using them to identify problems.
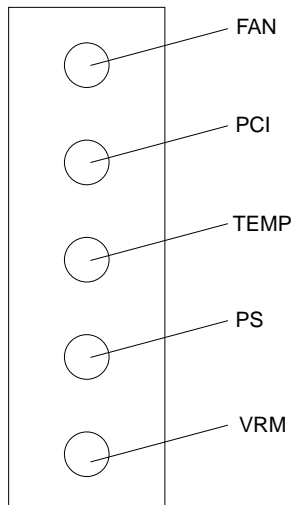
The meanings of these LEDs are as follows:

FAN	Fan failure
PCI	PCI failure
TEMP	Over temperature condition
PS	Power failure
VRM	VRM failure

Notes:

1. The enclosure supports one replaceable voltage regulator module (VRM).
2. The enclosure supports a maximum of two power supplies.

The Light Path Diagnostics feature might direct you to look for an LED on the PCI-X expansion kit or drawer-management controller that identifies the specific failing component. The following figure identifies the LEDs on the PCI-X expansion kit and drawer-management controller.
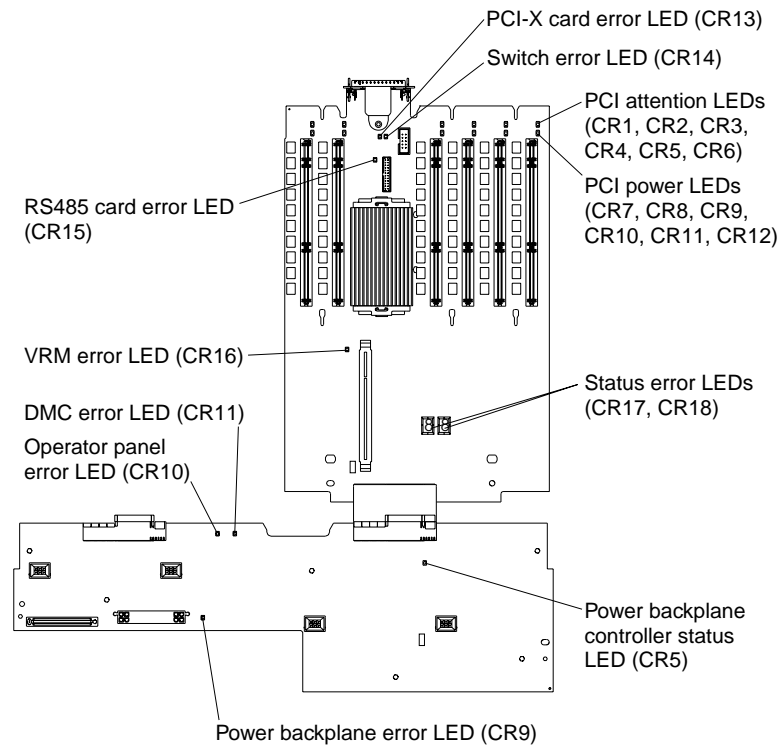
Light Path Diagnostics troubleshooting

You can use the Light Path Diagnostics feature built into your enclosure to quickly identify the type of error that occurred. The LEDs remain illuminated when the enclosure shuts down, provided that the power supplies are operating properly. This feature helps you to isolate the problem if an error causes the enclosure to shut down.

If the Light Path Diagnostics feature indicates a problem that does not require immediate action, you can press the Remind button on the operator information panel. This enables normal operations to continue, possibly using redundant components, until reduced enclosure activity enables you to correct the problem. The LED for the component causing the problem stays lit until you make repairs.

Table 3. Light Path Diagnostics

Fault LED (on operator information panel)	Lit LED on diagnostics panel	Cause	Action
On	FAN	One of the fans has failed or is operating too slowly.	Remove the top cover. The LED on the failing fan will be lit. Replace the fan.
On	PCI	An error occurred on a PCI/PCI-X adapter.	1. Check the error log on the server to identify the PCI/PCI-X adapter causing the problem, and replace the adapter. 2. If you cannot correct the problem from the information in the error log, try to determine the failing adapter by removing one adapter at a time and restarting the enclosure after each adapter is removed. If the problem remains, call for service.
On	TEMP	The system temperature has exceeded the maximum rating.	1. If a fan LED is on, replace the fan. 2. Make sure the room temperature is not too high. (See "Features and specifications" on page 2.) If the problem remains, call for service.
On	PS	The power supply has failed.	1. Check the error log on the server to identify the power supply causing the problem and replace the power supply. 2. If you cannot correct the problem from the information in the error log, try to determine the failing power supply by removing one power supply at a time and restarting the enclosure after each power supply is removed. If the problem remains, call for service.
On	VRM	The voltage regulator module has failed.	1. Remove the top cover, and check the VRM error LED. 2. Replace the VRM.
Off	None	The Light Path Diagnostics feature has not detected an enclosure error.	None

Troubleshooting charts

You can use the troubleshooting charts in this section to find solutions to problems that have definite symptoms.

If you cannot find the problem in the troubleshooting charts, see the solving problems information for the server on the server *Documentation* CD. If you have run the diagnostic tests or if running the tests does not reveal the problem, call for service.

Look for the symptom in the left column of the chart. Instructions and potential solutions to the problem are in the right column.

Table 4. Troubleshooting charts

Device and problem	Suggested action
General Problems such as broken cover locks or indicator lights not working.	Call for service.
Intermittent problems A problem occurs only occasionally and is difficult to detect.	Verify that: 1. All cables and cords are connected securely. 2. When the enclosure is turned on, air is flowing from the grill at the rear of the enclosure. If there is no airflow, the fans are not working. This causes the enclosure to overheat and shut down. If the problem remains, call for service.
Power The enclosure does not power on.	Verify that: 1. All cables and cords are connected securely. 2. The electrical outlet functions properly. 3. If you just installed an option, remove it, and restart the enclosure. If the enclosure now powers on, you might have installed more options than the power supplies support. 4. The LEDs on the power supplies are on. If the problem remains, call for service.
The enclosure does not power off.	Verify that you are using an ACPI or non-ACPI server operating system: If you are using a non-ACPI server operating system: 1. Press Ctrl+Alt+Delete. 2. Turn off the system by pressing the server power-control button. If the problem remains or if you are using an ACPI-aware server operating system, call for service.

Getting information, help, and service

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 section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your computer, and whom to call for service should it be necessary.

Getting information

Information about your IBM server product and preinstalled software, if any, is available in the documentation that comes with your server. That documentation includes printed books, online books, README files, and help files. In addition, information about IBM products is available on the World Wide Web.

On the World Wide Web, the IBM Web site has up-to-date information about IBM products and support. The address for the IBM Personal Computing home page is http://www.ibm.com/pc/.

You can find support information for your IBM products at http://www.ibm.com/pc/support/.

If you click **Profile** from the support page, you can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable Files. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products.

You also 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 service

If you have a problem with your server product, you will find a wide variety of sources available to help you.

Using the documentation and diagnostic programs

Many problems can be solved without outside assistance. If you experience a problem with your server product, the first place to start is the troubleshooting information in your IBM documentation. If you suspect a software problem, see the documentation, including README files and online help, that comes with the operating system or application program.

Most IBM server products come with a set of diagnostic programs that you can use to help you identify hardware problems. See the troubleshooting information in your IBM documentation for instructions on 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.

Calling for service

If you have tried to correct the problem yourself and still need help, during the warranty period, you can get help and information by telephone through the IBM HelpCenter®. The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service.

- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been sold. IBM or your reseller, if authorized by IBM, will make selected Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered:
- Replacement or use of non-IBM parts or nonwarranted IBM parts. All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources.
- Configuration of BIOS as part of an installation or upgrade.
- Changes, modifications, or upgrades to device drivers.
- Installation and maintenance of network operating systems (NOS).
- Installation and maintenance of application programs.

Refer to your IBM Statement of Limited Warranty for a full explanation of IBM warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

In the U.S. and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m.

Note: Response times vary; may exclude some holidays.

Please have the following information ready when you call:
- Machine type and model
- Serial numbers of your IBM hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

Telephone numbers

Phone numbers are subject to change without notice. For the most up-to-date phone numbers, go to http://www.ibm.com/pc/support/ and click **Support Phone List**.

Country		Telephone number
Austria	Österreich	01-24 592 5901
Belgium - Dutch	Belgie	02-210 9820
Belgium - French	Belgique	02-210 9800
Canada	Toronto only	416-383-3344
Canada	Canada - all other	1-800-565-3344
Denmark	Danmark	45 20 82 00
Finland	Suomi	09-459 6960
France	France	02 38 55 74 50
Germany	Deutschland	07032-1549 201
Ireland	Ireland	01-815 9202
Italy	Italia	02-7031 6101
Luxembourg	Luxembourg	298-977 5063
Netherlands	Nederland	020-514 5770
Norway	Norge	66 81 11 00
Portugal	Portugal	21-791 51 47
Spain	España	91-662 49 16
Sweden	Sverige	08-477 4420
Switzerland	Schweiz/Suisse/Svizzera	058-333 0900
United Kingdom	United Kingdom	01475-555 055
U.S.A. and Puerto Rico	U.S.A. and Puerto Rico	1-800-772-2227

In all other countries or regions, contact your IBM reseller or IBM marketing representative.

International Warranty Service

If you travel with your server product or relocate it to a country where your server machine type is sold and serviced by IBM or by IBM resellers who are authorized to perform warranty service, International Warranty Service is available for your server product.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your server product is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.ibm.com/pc/support/, and click **Warranty Lookup**. Eligible IBM server products are identified by their four-digit machine types. For more information about International Warranty Service, see Service Announcement 601-034 at http://www.ibm.com/. Click **Support & downloads**, click **Announcement letters**, and click **Announcements search**. In the **Search by letter number only** field, type 601-034, and click **Search**.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region.

For more information about these services, contact your IBM marketing representative.

Appendix A. IBM xSeries 360 configuration guidelines

This appendix contains information to help you configure an xSeries 360 server with the enclosure.

Adapter support

Use the following table to determine the maximum number of supported adapters.

Table 5. Adapter limitations

Family	Type	IBM Part Number	Description	Maximum number of adapters	Option ROM size
LAN	Fast Ethernet	06P3601	IBM@server xSeries 10/100 Ethernet Adapter	10	
Controller	Fibre Channel	19K1246	2 GB Fibre Channel PCI Adapter	17	
Controller	Fibre Channel	00N6881	Netfinity FAST Host Adapter	12	
LAN	GB Ethernet	06P3701	IBM Gigabit Ethernet SX Server Adapter	10	
LAN	GB Ethernet	22P6801	Intel 100/100/1000 PCI-X Server NIC (Copper PRO/1000XT)	14	
Controller	LVDS	37L6080	IBM ServeRAID-4M Ultra 160 SCSI Controller	12	32K
Controller	LVDS	37L6889	IBM ServeRAID-H Ultra160 SCSI Controller	12	32K
Controller	LVDS	37L6091	IBM ServeRAID-4L Ultra160 SCSI Controller	12	32K
Controller	LVDS	06P5738	IBM ServeRAID-4Mx Ultra160 SCSI Controller (Japan)	12	32K
Controller	LVDS	06P5736	IBM ServeRAID-4Mx Ultra160 SCSI Controller	12	32K
LAN	Token Ring	32L5201	IBM High Speed 100/16/4 Token-Ring PCI Management Adapter	10	20K
LAN	Token Ring	34L5001	IBM 16/4 Token Ring PCI management Adapter	10	20K

Notes:

1. The information in this table applies to adapters with the same part number and manufacturer. It does not apply to adapters with the same IBM part number but another manufacturer.
2. The maximum number of adapters assumes no other adapters are loaded. Your results might vary depending on device driver implementation and other factors, such as the operating system installed, other adapters loaded, and the adapter slot order.
3. The option ROM size was obtained by either collecting data from the adapter developer or by direct measurement. Please note that there is a difference between option ROM size and the amount of option ROM space used by the adapter after it is configured. For example, the integrated SCSI controller

requires 50 KB of option ROM space to load, and occupies only 22 KB after the controller has been configured. Similarly, the integrated Ethernet controller requires 54 KB of option ROM space to load, and occupies only 6 KB after the controller has been configured. The integrated video controller requires 32 KB to install, and occupies all 32 KB after the controller is configured.

4. The xSeries 360 server scans slots in the following sequence: the integrated devices, then PCI slots 3, 4, 5, 6, 1, and 2. If an enclosure is attached, the scan continues in sequence with slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, and 14. The Configuration/Setup program allows you to redefine the scan order of one of the first six PCI slots to be higher than the integrated devices. You cannot redefine the scan order of the enclosure slots.

5. Attaching an enclosure to the xSeries 360 server increases the complexity of configuring adapters. The difficulty arises because there are only two segments (128 KB) of memory space available for all option ROM loading and configuration. You can improve the likelihood of successfully configuring adapters by installing adapters in the order of the slot scan sequence, and by starting with the largest option ROM size first. Therefore, the last populated slot scanned should have the adapter with the smallest option ROM size.

6. The xSeries 360 server provides less than 64 KB of I/O space for allocation to devices. The first 8 KB of I/O space is reserved for legacy devices and the integrated devices. The remaining 56 KB of I/O space is available for use by PCI/PCI-X adapters. For most configurations, this enough I/O space for all adapters.

Some configurations can consume all available I/O space before all adapters have been allocated a range of addresses. These configurations usually contain PCI/PCI-X to PCI/PCI-X bridges. This is due to the method these bridges use to define address space allocated to them. The PCI specification states that bridges must be allocated I/O space in increments of 4 KB. Therefore, it is possible to exhaust all of the available I/O space in the system by inserting 14 adapters, each containing only one PCI/PCI-X to PCI/PCI-X bridge. In practice, an allocation failure can occur with considerably fewer bridge adapters. This is due to several factors, including: I/O space requirements for non-bridge devices, chipset requirements for address space alignment, and hot-plug installation requirements for adapters.

7. Only the odd-numbered slot of a bus pair is able to run at 133 MHz, if the even-numbered slot of the pair is not populated. The even-numbered slots run at 100 MHz, maximum. If both slots of a pair are populated, they both run at 100 MHz.

If an odd-numbered slot is populated and running at 133 MHz, and an adapter is hot-added to the even-numbered slot, the system generates an error message. If an even-numbered slot of a pair is running at 100 MHz, and an adapter is hot-added to the odd-numbered slot, the adapter will run at 100 MHz, maximum.

POST error message and solution

The following describes a memory resource POST error message that can appear during startup.

Table 6. POST error message

POST message	Description
00180100	A PCI/PCI-X adapter has requested memory resources that are not available. **Action:** 1. If the PCI/PCI-X adapter that is requesting the memory resources is the start (boot) device, change the order of the adapters in the PCI-X slots. Memory is allocated to devices in the order that is specified in the Boot Priority option from the Start Options menu in the Configuration/Setup Utility program. Ensure that the adapter is early in the boot priority order so that it is allocated the necessary memory resources. 2. Make sure that the PCI/PCI-X adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 3. If all memory resources are being used and either the integrated SCSI controller or integrated Ethernet controller are not being used, you can make more memory resource available by disabling the integrated SCSI controller, integrated Ethernet controller, or both, using the Configuration/Setup Utility program. 4. If all memory resources are being used, disable the network boot option for network cards. Press CTRL+S during startup to access the SCSISelect Utility and select **Local Boot Disk** to disable the network boot option. 5. If all memory resources are being used, remove an adapter to make the memory available to the PCI/PCI-X adapter. Disabling the adapter BIOS code on the adapter might correct the error. Refer to the documentation that comes with the adapter.

Operating system support

Use the following table to determine the installation requirements for your operating system.

Table 7. Operating system support

Operating system	Installation requirements
Windows 2000 Server Windows 2000 Advanced Server	No limitations.
Windows NT 4.0 Windows NT 4.0 Enterprise Edition	Modified HAL required.
Netware 5.1 Netware 6.0	Hot-plug code update required. Microprocessor code update required.
Linux Red Hat 7.2	Installer must force into APIC mode. Select SMP kernel for uni-microprocessor system. Supports an enclosure with one expansion kit installed only.
Linux SuSe 7.3	Supports an enclosure with one expansion kit installed only.

Notes:

1. You must install the latest service processor device driver when installing the following operating systems:
   Windows NT 4.0
   Windows NT 4.0 Enterprise Edition
   Netware 5.1
   Netware 6.0
   Linux Red Hat 7.2
   Linux SuSe 7.3

   You can download the service processor device driver and many other code updates for your enclosure and server at http://www.ibm.com/pc/support on the World Wide Web.

2. **Windows 2000 Server and Windows 2000 Advanced Server** operating systems have no installation limitations. These operating system versions will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure.

3. **Windows NT 4.0 and Windows NT 4.0 Enterprise Edition** require a special HAL to support an xSeries 360 server with an enclosure attached. You must install the HAL with the enclosure attached, otherwise the normal install process might fail, and adapters might not function properly in the enclosure.

   You can download the HAL and many other code updates for your enclosure and server at http://www.ibm.com/pc/support on the World Wide Web. The HAL is listed with other downloadable code for your enclosure.

   Windows NT 4.0 and Windows NT 4.0 Enterprise Edition will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure.

4. **Netware 5.1 and Netware 6.0** will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure. Novell supplies the following code updates:

   - **Hot-plug code update**

     Note: Both Netware 5.1 and Netware 6.0 require the installation of the hot-plug code update.

     See note 4 on page 50 for information on the server scan order. Complete the following steps to install the hot-plug code update:

     a. Obtain the NBIUP1.EXE code update from the Novell Support site at: http://support.novell.com/filefinder on the World Wide Web.

        Note: Install the Netware Support Pack before you install the hot-plug code update.

     b. From the DOS prompt on the xSeries 360 server, rename the NBI.NLM file to NBI.OLD, if the NBI.NLM file exists. The NBI.NLM file is located in the C:\NWSERVER directory.

     c. Copy the NBI.NLM file from the code update to the C:\NWSERVER directory.

        Note: The code update contains a NBI.NLM file for each Novell operating system version.

     d. Start the server.

   - **Microprocessor code update**

     Note: Only Netware 5.1 requires the installation of the microprocessor code update.

     Obtain the 4PENT.EXE code update from the Novell Support site at: http://support.novell.com/filefinder on the World Wide Web. This microprocessor code update is a self-extracting file.

5. **Red Hat Linux 7.2** supports an xSeries 360 server attached to an enclosure with one expansion kit installed. Red Hat 7.2 will not support an xSeries 360 server attached to an enclosure with two expansion kits installed. The operating system will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure.

   Red Hat Linux 7.2 does not automatically install with APIC mode. If APIC mode is not used, the operating system will not recognize the slots in the enclosure after installation. To force the installer program to use APIC mode, specify *linux apic* during installation.

   Note: The command to force Red Hat 7.2 to use APIC mode is case-sensitive.

   The Red Hat 7.2 installer program will automatically install the uni-microprocessor kernel on systems with uni-microprocessor installed. However, the uni-microprocessor kernel does not support APIC mode. Install the SMP kernel for a uni-microprocessor system to override the installer program and install the SMP kernel. The installer program automatically selects the SMP kernel for multi-microprocessor systems.

6. **SuSe Linux 7.3** supports an xSeries 360 server attached to an enclosure with one expansion enclosure installed. SuSe Linux 7.3 does not support an xSeries 360 server attached to an enclosure with two expansion kits installed.

The operating system will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure. SuSe Linux 7.3 always installs in APIC mode.

Startup considerations

Windows 2000, Windows NT 4.0, and Netware 5.1 support system startup from a SCSI or RAID adapter installed in the enclosure. Be sure that the operating system is installed to the proper hard disk drive when multiple SCSI or RAID adapters are present in the server and in the enclosure.

To install an operating system to a hard disk drive attached to a specific adapter in the enclosure, ensure that no other loadable adapters or devices in the slot scan sequence are installed before the adapter or device. Also, to avoid startup failure, ensure that no other loadable adapters or devices in the slot scan sequence are installed before the startup device. You can install other types of adapters in the slot scan sequence before the startup adapter or device.

Note: During startup, it might appear that the system is unresponsive for an unusual length of time (30 seconds to several minutes). This condition is due to the complexity of the configuration. Allow several minutes for the system to complete the startup procedure.

Software utilities support

Use the following information to help you determine the support provided by the software utilities.

ServerGuide   The ServerGuide program will not configure SCSI or RAID adapters installed in your enclosure. To use ServerGuide to configure your system, you must remove the adapters from the slots or raise the adapter-retention latch to disable the slots.

UpdateXpress

The UpdateXpress program will not recognize SCSI or RAID adapters installed in your enclosure. You can download code updates for your SCSI or RAID adapters at http://www.ibm.com/pc/support on the World Wide Web and apply the updates manually.

Appendix B. IBM xSeries 440 configuration guidelines

This appendix contains information to help you configure an xSeries 440 server with the enclosure.

Adapter support

Use the following table to determine the maximum number of supported adapters.

Table 8. Adapter limitations

Family	Type	IBM Part Number	Description	Maximum number of adapters	Option ROM size
LAN	Fast Ethernet	06P3601	IBM@server xSeries 10/100 Ethernet Adapter	10	
Controller	Fibre Channel	19K1246	2 GB Fibre Channel PCI Adapter	17	
Controller	Fibre Channel	00N6881	Netfinity FAST Host Adapter	12	
LAN	GB Ethernet	06P3701	IBM Gigabit Ethernet SX Server Adapter	10	
LAN	GB Ethernet	22P6801	Intel 100/100/1000 PCI-X Server NIC (Copper PRO/1000XT)	14	
Controller	LVDS	37L6080	IBM ServeRAID-4M Ultra 160 SCSI Controller	12	32K
Controller	LVDS	37L6889	IBM ServeRAID-H Ultra160 SCSI Controller	12	32K
Controller	LVDS	37L6091	IBM ServeRAID-4L Ultra160 SCSI Controller	12	32K
Controller	LVDS	06P5738	IBM ServeRAID-4Mx Ultra160 SCSI Controller (Japan)	12	32K
Controller	LVDS	06P5736	IBM ServeRAID-4Mx Ultra160 SCSI Controller	12	32K
LAN	Token Ring	32L5201	IBM High Speed 100/16/4 Token-Ring PCI Management Adapter	10	20K
LAN	Token Ring	34L5001	IBM 16/4 Token Ring PCI management Adapter	10	20K

Notes:

1. The information in this table applies to adapters with the same part number and manufacturer. It does not apply to adapters with the same IBM part number but another manufacturer.

2. The maximum number of adapters assumes no other adapters are loaded. Your results might vary depending on device driver implementation and other factors, such as the operating system installed, other adapters loaded, and the adapter slot order.

3. The option ROM size was obtained by either collecting data from the adapter developer or by direct measurement. Please note that there is a difference between option ROM size and the amount of option ROM space used by the adapter after it is configured. For example, the integrated SCSI controller

requires 50 KB of option ROM space to load, and occupies only 22 KB after the controller has been configured. Similarly, the integrated Ethernet controller requires 54 KB of option ROM space to load, and occupies only 6 KB after the controller has been configured. The integrated video controller requires 32 KB to install, and occupies all 32 KB after the controller is configured.

4. The xSeries 440 server scans slots in the following sequence: the integrated devices, then PCI slots 1, 2, 6, 5, 3, and 4. If an enclosure is attached, the scan continues in sequence with slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, and 14. The Configuration/Setup program allows you to redefine the scan order of one of the first six PCI slots to be higher than the integrated devices. You cannot redefine the scan order of the enclosure slots.

5. Attaching an enclosure to the xSeries 440 server increases the complexity of configuring adapters. The difficulty arises because there are only two segments (128 KB) of memory space available for all option ROM loading and configuration. You can improve the likelihood of successfully configuring adapters by installing adapters in the order of the slot scan sequence, and by starting with the largest option ROM size first. Therefore, the last populated slot scanned should have the adapter with the smallest option ROM size.

6. The xSeries 440 server provides less than 64 KB of I/O space for allocation to devices. The first 8 KB of I/O space is reserved for legacy devices and the integrated devices. The remaining 56 KB of I/O space is available for use by PCI/PCI-X adapters. For most configurations, this is enough I/O space for all adapters.

   Some configurations can consume all available I/O space before all adapters have been allocated a range of addresses. These configurations usually contain PCI/PCI-X to PCI/PCI-X bridges. This is due to the method these bridges use to define address space allocated to them. The PCI specification states that bridges must be allocated I/O space in increments of 4 KB. Therefore, it is possible to exhaust all of the available I/O space in the system by inserting 14 adapters, each containing only one PCI/PCI-X to PCI/PCI-X bridge. In practice, an allocation failure can occur with considerably fewer bridge adapters. This is due to several factors, including: I/O space requirements for non-bridge devices, chipset requirements for address space alignment, and hot-plug installation requirements for adapters.

7. Only the odd-numbered slot of a bus pair is able to run at 133 MHz, if the even-numbered slot of the pair is not populated. The even-numbered slots run at 100 MHz, maximum. If both slots of a pair are populated, they both run at 100 MHz.

   If an odd-numbered slot is populated and running at 133 MHz, and an adapter is hot-added to the even-numbered slot, the system generates an error message. If an even-numbered slot of a pair is running at 100 MHz, and an adapter is hot-added to the odd-numbered slot, the adapter will run at 100 MHz, maximum.

POST error message and solution

The following describes a memory resource POST error message that can appear during startup.

Table 9. POST error message

POST message	Description
00180100	A PCI/PCI-X adapter has requested memory resources that are not available.
	Action:
	1. If the PCI/PCI-X adapter that is requesting the memory resources is the start (boot) device, change the order of the adapters in the PCI-X slots. Memory is allocated to devices in the order that is specified in the Boot Priority option from the Start Options menu in the Configuration/Setup Utility program. Ensure that the adapter is early in the boot priority order so that it is allocated the necessary memory resources.
	2. Make sure that the PCI/PCI-X adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings.
	3. If all memory resources are being used and either the integrated SCSI controller or integrated Ethernet controller are not being used, you can make more memory resource available by disabling the integrated SCSI controller, integrated Ethernet controller, or both, using the Configuration/Setup Utility program.
	4. If all memory resources are being used, disable the network boot option for network cards. Press CTRL+S during startup to access the SCSISelect Utility and select **Local Boot Disk** to disable the network boot option.
	5. If all memory resources are being used, remove an adapter to make the memory available to the PCI/PCI-X adapter. Disabling the adapter BIOS code on the adapter might correct the error. Refer to the documentation that comes with the adapter.

Operating system support

Use the following table to determine the installation requirements for your operating system.

Table 10. Operating system support

Operating system	Installation requirements
Windows 2000 Server Windows 2000 Advanced Server	Modified HAL required.
Windows NT 4.0 Windows NT 4.0 Enterprise Edition	Modified HAL required.
Netware 5.1 Netware 6.0	Hot-plug code update required. Microprocessor code update required.
Linux Red Hat 7.2	Installer must force into APIC mode. Select SMP kernel for uni-microprocessor system. Supports an enclosure with one expansion kit installed only.
Linux SuSe 7.3	Supports an enclosure with one expansion kit installed only.

Notes:

1. You must install the latest service processor device driver when installing the following operating systems:

   Windows NT 4.0
   Windows NT 4.0 Enterprise Edition
   Netware 5.1
   Netware 6.0
   Linux Red Hat 7.2
   Linux SuSe 7.3

   You can download the service processor device driver and many other code updates for your enclosure and server at http://www.ibm.com/pc/support on the World Wide Web.

2. **Windows 2000 Server and Windows 2000 Advanced Server** require a special HAL to support an xSeries 440 server with an enclosure attached. You can install the HAL during the operating system installation, or later. Copy the HAL to the winnt/system32 directory; then using a text editor, edit the following line of code: boot.ini:hal=″*name of HAL*″. These operating system versions will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure.

3. **Windows NT 4.0 and Windows NT 4.0 Enterprise Edition** require a special HAL to support an xSeries 440 server with an enclosure attached. You must install the HAL with the enclosure attached, otherwise the normal install process might fail, and adapters might not function properly in the enclosure.

   You can download the HAL and many other code updates for your enclosure and server at http://www.ibm.com/pc/support on the World Wide Web. The HAL is listed with other downloadable code for your enclosure.

Windows NT 4.0 and Windows NT 4.0 Enterprise Edition will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure.

4. **Netware 5.1 and Netware 6.0** will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure. Novell supplies the following code updates:

   • **Hot-plug code update**

      Note: Both Netware 5.1 and Netware 6.0 require the installation of the hot-plug code update.

      See note 4 on page 56 for information on the server scan order. Complete the following steps to install the hot-plug code update:

      a. Obtain the NBIUP1.EXE code update from the Novell Support site at: http://support.novell.com/filefinder on the World Wide Web.

         Note: Install the Netware Support Pack before you install the hot-plug code update.

      b. From the DOS prompt on the xSeries 440 server, rename the NBI.NLM file to NBI.OLD, if the NBI.NLM file exists. The NBI.NLM file is located in the C:\NWSERVER directory.

      c. Copy the NBI.NLM file from the code update to the C:\NWSERVER directory.

         Note: The code update contains a NBI.NLM file for each Novell operating system version.

      d. Start the server.

   • **Microprocessor code update**

      Note: Only Netware 5.1 requires the installation of the microprocessor code update.

      Obtain the 4PENT.EXE code update from the Novell Support site at: http://support.novell.com/filefinder on the World Wide Web. This microprocessor code update is a self-extracting file.

5. **Red Hat Linux 7.2** supports an xSeries 440 server attached to an enclosure with one expansion kit installed. Red Hat 7.2 will not support an xSeries 440 server attached to an enclosure with two expansion kits installed. The operating system will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure.

   Red Hat Linux 7.2 does not automatically install with APIC mode. If APIC mode is not used, the operating system will not recognize the slots in the enclosure after installation. To force the installer program to use APIC mode, specify *linux apic* during installation.

   Note: The command to force Red Hat 7.2 to use APIC mode is case-sensitive.

   The Red Hat 7.2 installer program will automatically install the uni-microprocessor kernel on systems with uni-microprocessor installed. However, the uni-microprocessor kernel does not support APIC mode. Install the SMP kernel for a uni-microprocessor system to override the installer program and install the SMP kernel. The installer program automatically selects the SMP kernel for multi-microprocessor systems.

6. **SuSe Linux 7.3** supports an xSeries 440 server attached to an enclosure with one expansion enclosure installed. SuSe Linux 7.3 does not support an xSeries 440 server attached to an enclosure with two expansion kits installed.

   The operating system will install to a hard disk attached to the first SCSI or RAID adapter encountered in either the server or in the enclosure. SuSe Linux 7.3 always installs in APIC mode.

Startup considerations

Windows 2000, Windows NT 4.0, and Netware 5.1 support system startup from a SCSI or RAID adapter installed in the enclosure. Be sure that the operating system is installed to the proper hard disk drive when multiple SCSI or RAID adapters are present in the server and in the enclosure.

To install an operating system to a hard disk drive attached to a specific adapter in the enclosure, ensure that no other loadable adapters or devices in the slot scan sequence are installed before the adapter or device. Also, to avoid startup failure, ensure that no other loadable adapters or devices in the slot scan sequence are installed before the startup device. You can install other types of adapters in the slot scan sequence before the startup adapter or device.

Note: During startup, it might appear that the system is unresponsive for an unusual length of time (30 seconds to several minutes). This condition is due to the complexity of the configuration. Allow several minutes for the system to complete the startup procedure.

Software utilities support

Use the following information to help you determine the support provided by the software utilities.

ServerGuide   The ServerGuide program will not configure SCSI or RAID adapters installed in your enclosure. To use ServerGuide to configure your system, you must remove the adapters from the slots or raise the adapter-retention latch to disable the slots.

UpdateXpress

The UpdateXpress program will not recognize SCSI or RAID adapters installed in your enclosure. You can download code updates for your SCSI or RAID adapters at http://www.ibm.com/pc/support on the World Wide Web and apply the updates manually.

Appendix C. Warranty information

This appendix contains the warranty period for your product, information about obtaining warranty service and support, and the IBM Statement of Limited Warranty.

Warranty period

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

> **Machine** - IBM RXE-100 Remote Expansion Enclosure
>
> **Warranty period** - One year

Warranty service and support

With the original purchase of an IBM server product, you have access to extensive support. During the IBM Machine warranty period, you may call IBM or your reseller for problem-determination assistance under the terms of the IBM Statement of Limited Warranty.

The following services are available during the warranty period:
- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered under warranty service:
- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of non-IBM software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of machine code or licensed internal code that is designated as customer installable.

If you do not register your server with IBM, you might be required to present proof of purchase to obtain warranty service.

Before you call for service

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 server and software.

Most computers, operating systems, and application programs come with information that contains troubleshooting procedures and explanations of error

messages and error codes. The information that comes with your server also describes the diagnostic tests that you can perform.

If you suspect a software problem, refer to the information for the operating system or application program.

Calling for service

Please have the following information ready:
- Machine type, model, and serial number
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

To find the telephone number for the HelpCenter nearest you, see "Telephone numbers" on page 45 in the "Getting information, help, and service" section.

IBM Statement of Limited Warranty Z125-4753-06 8/2000

This warranty statement consists of two parts: Part 1 and Part 2. Be sure to read Part 1 and the country-unique terms in Part 2 that apply to your country or region.

Part 1 - General Terms

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

The IBM Warranty for Machines

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

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

Extent of Warranty

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

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

Items Not Covered by Warranty

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

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

Warranty Service

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

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

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

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

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

You also agree to
1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
    a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
    b. secure all programs, data, and funds contained in a Machine;
    c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
    d. inform IBM or your reseller of changes in a Machine's location.

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

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

Limitation of Liability

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

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

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

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

Governing Law

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

Part 2 - Country-unique Terms

AMERICAS

BRAZIL

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

NORTH AMERICA

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

CANADA

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

UNITED STATES

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

ASIA PACIFIC

AUSTRALIA

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

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

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

CAMBODIA, LAOS, AND VIETNAM

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

The following is added to this Section: Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

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

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

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

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

HONG KONG AND MACAU

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

INDIA

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

JAPAN

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

NEW ZEALAND

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

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

PEOPLE'S REPUBLIC OF CHINA (PRC)

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

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

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

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

EUROPE, MIDDLE EAST, AFRICA (EMEA)

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

Warranty Service:

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

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

Governing Law:

The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique,

Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

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

The following paragraphs are added to this Section:

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

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

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

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

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

EGYPT

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

Applicability of suppliers and resellers (unchanged).

FRANCE

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

IRELAND

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

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

Applicability of suppliers and resellers (unchanged).

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

ITALY

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

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

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

UNITED KINGDOM

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

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

Applicability of suppliers and resellers (unchanged).

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

Appendix D. Notices

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

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

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Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be the trademarks or service marks of others.

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 1000000 bytes, and GB stands for approximately 1000000000 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 is less.

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.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven®, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

Unless otherwise stated, IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

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

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de 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.

Taiwan electrical emission statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Power cords

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

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

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

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

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

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

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

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