



IBM Netfinity EXP200

Installation and User's Handbook



IBM Netfinity EXP200

Installation and User's Handbook

Note

Before using this information and the product it supports, be sure to read the general information under Appendix B, "Product warranties and notices" on page 49.

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Safety Information



Before installing this product, read the Safety Information.

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)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

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).

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.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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 pečítajte 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.

安裝本產品之前，請先閱讀「安全資訊」。

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:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

About this book

This book provides instructions for installing and replacing options in your IBM Netfinity EXP200 Storage Expansion Unit. It also provides information on troubleshooting your expansion unit. If you have not yet set up your expansion unit, refer to Chapter 2, "Installing the expansion unit" on page 11 for detailed information.

How this book is organized

Chapter 1, "Introduction," describes the expansion unit. This chapter includes an inventory checklist and an overview of the expansion unit features and components.

Chapter 2, "Installing the expansion unit," contains the information and instructions needed to install the expansion unit in an EIA standard rack, the Netfinity EXP200 Rack-to-Tower Conversion enclosure, or a Netfinity NetBAY enclosure. Operating specifications, option switch settings, and power cord routing information are also included.

Chapter 3, "Installing and replacing devices," contains step-by-step instructions for installing and removing customer replaceable units (CRUs), such as hard disk drives, power supplies, and fans. In addition, this chapter contains instructions for turning the expansion unit On and Off during normal and emergency situations.

Chapter 4, "Solving problems," contains the problem symptoms and error messages that are specific to your expansion unit. This chapter also provides instructions on how to obtain service and technical assistance for your expansion unit and other IBM products that you might plan to use.

Appendix A, "Records," provides a section to record and update important information about your expansion unit, including serial number and device records. Whenever you add options to your expansion unit, be sure to update the information in this appendix.

Appendix B, "Product warranties and notices," contains product notices, warranties, and trademarks.

Notices used in this book

This book contains notices to highlight information or provide safety information:

- **Notes**

These notices provide important tips, guidance, or advice.

- **Attention**

These notices indicate possible damage to programs, devices, or data. An attention notice is placed just *before* the instruction or situation in which damage could occur.

- **Caution**

These notices indicate situations that can be potentially hazardous to you. A caution notice is placed just *before* descriptions of potentially hazardous procedure steps or situations.

- **Danger**

These notices indicate situations that are potentially lethal or extremely hazardous to you. A danger notice is placed just *before* descriptions of potentially lethal or extremely hazardous procedure steps or situations.

Related publications

Additional publications are available for purchase from IBM. For a list of publications available in your country:

- In the U.S. and Puerto Rico, call 1-800-426-7282.
- In Canada, call 1-800-465-1234.
- In other countries, contact the IBM support organization that services your area, your IBM marketing representative, or your IBM reseller.

Chapter 1. Introduction

The IBM® Netfinity® EXP200 Expansion Unit is a compact unit that provides high-capacity small computer system interface (SCSI) disk storage. It delivers fast, high-volume data transfer, retrieval, and storage functions across multiple drives, to multiple hosts. The expansion enclosure is designed for continuous, reliable service; the modular, redundant disk drives, power supplies, and fans use hot-swap technology for easy replacement without shutting down the system.

Designed for easy installation and integration into a wide range of system environments, the expansion unit supports Ultra and Ultra2 SCSI for the host interface and Ultra2 SCSI for the drive interface.

The expansion unit comes with a limited three-year on-site warranty. In addition, the Startup Support program provides coverage to customers during the first 90 days after installation at no additional charge.¹ This comprehensive program enhances IBM support for setup, installation, configuration, and problem determination. In the U.S. and Puerto Rico, call IBM at 1-800-772-2227, or in Canada, call 1-800-565-3344 if you need assistance. In all other countries, contact the IBM support organization that services your area, your IBM marketing representative, or your IBM reseller.

After you review the introductory information provided in this chapter, refer to Chapter 2, "Installing the expansion unit" on page 11 to begin the installation process.

This chapter contains:

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¹ Service availability will vary by country. Response time will vary depending on the number and nature of calls received.

Features at a glance

The following table summarizes the features of the expansion unit. For a list of the operating specifications, such as weight, height, and heat output, see Table 2 on page 12.

General <ul style="list-style-type: none">• Modular components:<ul style="list-style-type: none">– High-capacity disk drives– Environmental services monitor (ESM) board– Power– Cooling fans• Technology:<ul style="list-style-type: none">– Supports disk array technology– Supports clustering– SCSI (Ultra2 or Ultra) host interface– Redundant data storage, cooling system, and power system– Hot-swap technology for drives, power supplies, and fans	<ul style="list-style-type: none">• User interface:<ul style="list-style-type: none">– Built-in power, activity, and fault indicators– Identification labeling on customer replaceable units (CRUs), rear indicator lights, switches and connectors– Easy-to-replace drives, power supplies, and fans Disk drive storage <ul style="list-style-type: none">• Current Capabilities:<ul style="list-style-type: none">– Maximum drives per expansion unit: 10– Drives per SCSI bus: 5– SCSI buses per unit: 2– SCSI buses can be chained together	ESM board <ul style="list-style-type: none">• Technology and interfaces:<ul style="list-style-type: none">– SCSI: Ultra2 and Ultra– SCSI bus interface: Two 68-pin, VHDCI connectors for incoming and outgoing SCSI bus cables Attention: <p>Removal or replacement of the ESM board must be performed by trained service personnel only.</p>
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Table 1. Features at a glance

Clustering support

One of the features listed in the previous table is clustering. Clustering is a means of sharing SCSI buses and disk drives among SCSI controllers to provide redundancy of SCSI controllers and servers. This redundancy is important if a hardware component fails. If a hardware component failure occurs after clustering has been set up, then another server will take ownership of the disk drives or SCSI bus.

If IBM ServeRAID controllers are used in a cluster configuration, the termination power LED on the rear of the expansion unit is useful when servicing the cluster. The ServeRAID controller provides the term power signal. If a termination power LED is not on, it indicates that a particular EXP200 expansion unit is not attached to a powered-on controller. It is useful to know which external EXP200 expansion unit is attached to which server when the hardware is being serviced.

Clustering requires additional hardware and specialized software. For more information about clustering, visit the following IBM Web site:

<http://www.ibm.com/pc/netfinity/clustering>

Getting help on the world wide web

You can obtain up-to-date information about your IBM Netfinity EXP200, a complete listing of the options that are supported on your model, and information about other IBM server products by accessing the IBM web page at the following address:

<http://www.ibm.com/pc/us/netfinity>

See “Getting help, service, and information” on page 45 for more information.

Inventory checklist

After you fully unpack your expansion unit, verify that you have the following items:

Hardware:

- IBM Netfinity EXP200 Storage Expansion Unit
- Up to two power cords
- One 2 m (6.56 ft) SCSI cable
- One tray ID (0-9) label
- Two long, narrow SCSI bay ID labels
- Rack-mounting hardware kit (1)
 - Two rails (right and left assembly)
 - Ten M6 black hex head screws
 - Ten M6 cage nuts
 - Ten M6 clip nuts

Publications:

- IBM Netfinity EXP200 Installation and User's Handbook*
- IBM Safety Booklet*
- Template for installing the expansion unit in a rack

If an item is missing or damaged, contact your IBM reseller or your IBM marketing representative.

If you have not already done so, take a moment to review the information in this chapter and record your expansion unit serial number in the table in "Identification numbers" on page 48; then, refer to Chapter 2, "Installing the expansion unit" on page 11 to begin the installation process.

Netfinity EXP200 bays

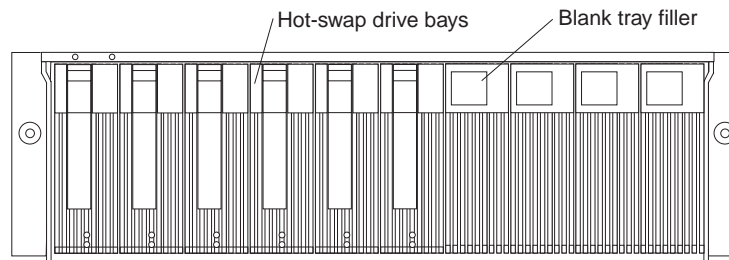
The following sections show the hot-swap and environmental services monitor (ESM) bays on the Netfinity EXP200 expansion unit.

The hot-swap features of the Netfinity EXP200 enable you to remove and replace hard disk drives, power supplies, and fans without turning off the expansion unit. Therefore, you can maintain the availability of your system while a hot-swap device is removed, installed, or replaced.

Hot-swap drive bays

The following illustration shows the location of the hot-swap drive bays accessible from the front of your expansion unit. The EXP200 supports up to ten IBM Ultra2 SCSI hard disk drives. These drives come preinstalled in a drive tray. This drive and tray assembly is called a *drive CRU* (customer replaceable unit). You can install the drive CRUs in the 10 drive bays on the front of the expansion unit.

In this example illustration, six of the ten bays contain drive CRUs and four bays contain blank tray fillers. To maintain proper cooling within your expansion unit, always keep a blank tray filler in each drive bay that does not contain a drive CRU. For information on installing and replacing drive CRUs, refer to Chapter 3, "Installing and replacing devices" on page 27.

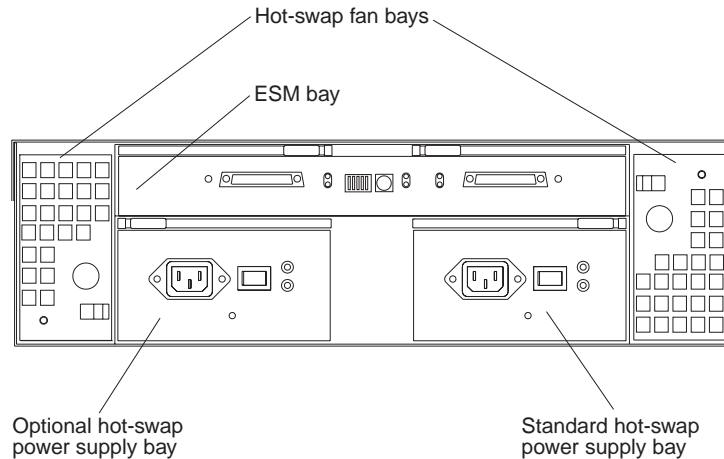


Attention:

Never hot swap a drive CRU when its green Activity LED is lit or flickering. Only hot swap a drive CRU when its amber Fault LED is lit or when the drive is inactive.

Fan, ESM, and power supply bays

The following illustration shows the location of the hot-swap fan bays, the environmental services monitor (ESM) bay, and the hot-swap power supply bays.



Hot-swap fan bays: Your expansion unit has two interchangeable hot-swap and redundant fan units. If one fan unit fails, the second fan unit continues to operate. Each unit contains two fans.

ESM bay: The environmental services monitor (ESM) board provides a SCSI interface to the drives and monitors the overall status of the expansion unit.

Attention:

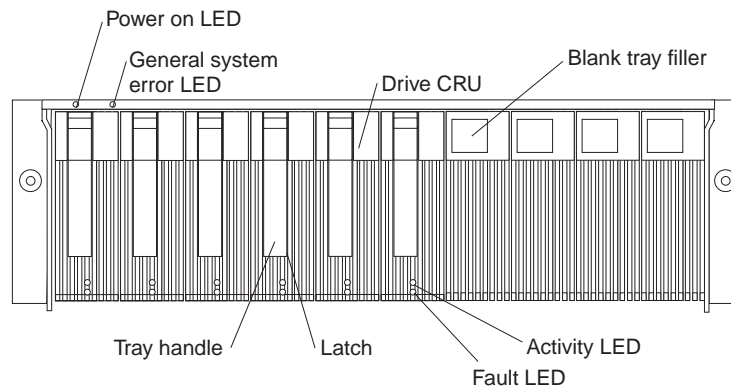
Removal or replacement of the ESM board must be performed by trained service personnel only.

Hot-swap power supply bays: Your expansion unit comes with one hot-swap power supply and one empty power supply bay into which you can install the optional redundant hot-swap power supply.

When you operate the expansion unit with only one power supply (other than while hot swapping), the power supply must be installed in the standard bay and the blank cover must be installed in the optional bay to maintain proper function and cooling within your expansion unit.

Front controls and indicators

The primary controls on the front of the expansion unit are shown in the following illustration.



Power-on LED: This green light indicates that the unit has good DC power.

General system error LED: When lit, this amber LED indicates that the unit has a fault, such as in a power supply, fan unit, or hard disk drive.

Drive CRU: You can install up to 10 hot-swap drive CRUs (customer replaceable units) in the expansion unit. Each drive CRU consists of a hard disk drive and tray.

Blank tray filler: Expansion units shipped without a full set of drives (10) contain blank trays in the unused drive bays. Before installing new drives, you must remove the blank trays, which should be saved. Each of the 10 bays must always contain either a blank tray or a drive CRU. Each blank tray contains a filler piece for use with a slim-high drive.

Activity LED: Each drive CRU has an Activity LED. When flashing, this green LED indicates drive activity.

Fault LED: Each drive CRU has a Fault LED. When lit, this amber LED indicates a drive failure. When flashing, this amber LED indicates that a drive Identify or Rebuild is in progress.

Latch: This multipurpose blue latch releases or locks the drive CRU in place.

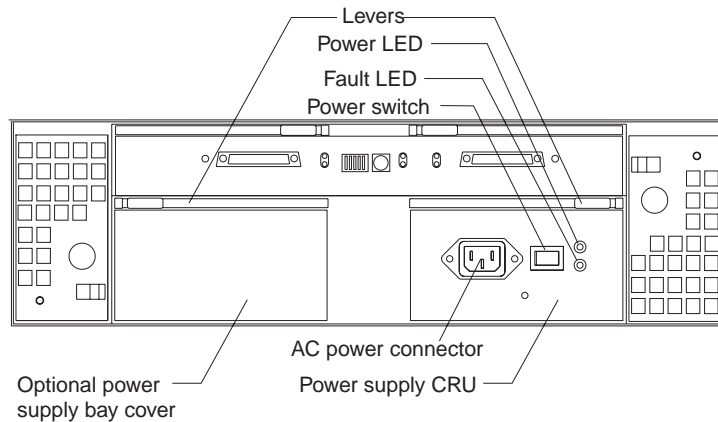
Tray handle: You can use this multipurpose handle to insert and remove a drive CRU in the bay.

Note: The IBM ServeRAID® II, ServeRAID-3H, ServeRAID-3L, ServeRAID-3HB adapters and the Netfinity Fibre Channel RAID Controller Unit provide support only for the amber Fault LEDs.

Rear controls, indicators, and connectors

Two hot-swap power supply CRUs, two hot-swap fan CRUs, and one environmental services monitor (ESM) board are accessible from the back of the expansion unit. These components contain several user controls, indicators, and connectors.

Power supply controls, indicators, and connectors



Levers: Use these locking handles to remove or install a power supply.

Power LED: This green LED is lit when the expansion unit is turned On and receiving ac power.

Fault LED: The amber Fault LED lights if a power supply failure occurs.

Power switch: Use this switch to turn the power supply On and Off.

AC Power connector: The power cord for the power supply connects here.

Power supply CRU: The standard hot-swap power supply is located here. Your expansion unit might also contain the optional redundant hot-swap power supply.

Attention:

Do not hot swap the power supply when only one supply is installed. The expansion unit power is redundant only when the optional second power supply CRU is installed.

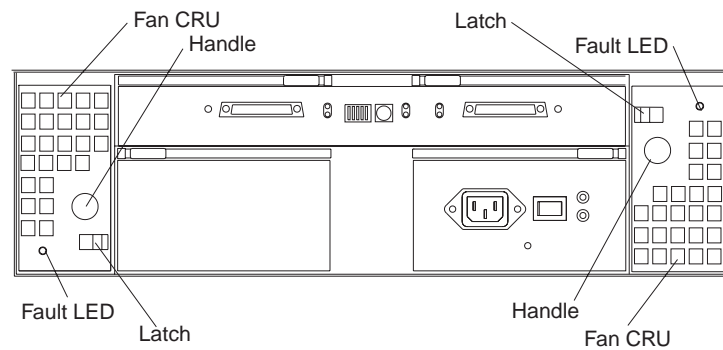
Optional power supply bay cover: Your expansion unit comes with one empty power supply bay into which you can install the optional redundant hot-swap power supply. If you do not install the optional supply, you must keep this bay cover installed to maintain proper function and cooling within your expansion unit.

Fan controls and indicators

The fans in your IBM Netfinity EXP200 are hot-swappable and redundant. This means that your IBM Netfinity EXP200 will continue to operate if a fan fails. It also means that you can remove and replace the fan while the IBM Netfinity EXP200 is On and accessing drives.

Attention:

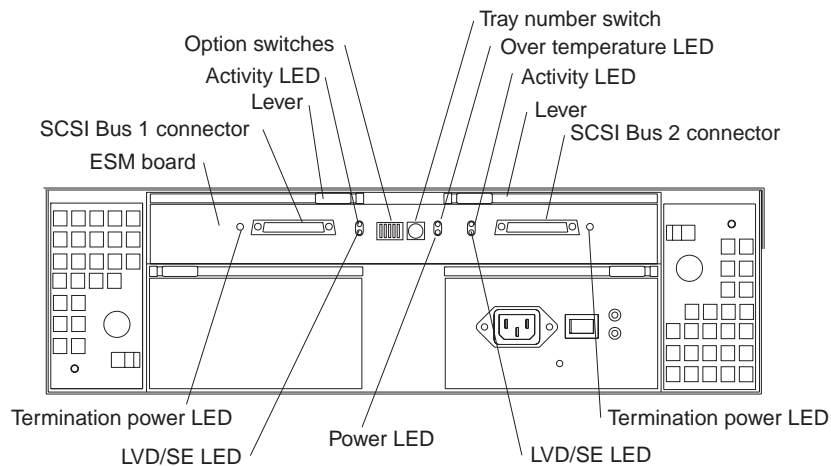
The fans in your expansion unit pull in fresh air and force out hot air. These fans are hot-swappable redundant; however, when one fan fails, the fan unit must be replaced within 48 hours in order to maintain redundancy and optimum cooling. When replacing the failed unit with the new fan unit, ensure that this operation is performed in less than 10 minutes to prevent any overheating due to the lack of the additional fan unit.



Fault LEDs: These amber LEDs light when a fan failure occurs.

Latches and handles: Use the latches and handles to remove or install the fan CRUs.

ESM board user controls



ESM board: This environmental services monitor (ESM) board contains the SCSI controls, switches, and LEDs.

Attention:

Removal or replacement of the ESM board must be performed by trained service personnel only.

SCSI bus connectors: These two 68-pin VHDCI connectors are for attaching your SCSI cables to SCSI Bus 1 and SCSI Bus 2.

Levers: Trained service personnel can use these levers when removing and inserting the ESM board.

Activity LED: This green LED flashes when there is activity on the external SCSI bus. Each external bus has a separate Activity LED.

Option switches: Switch 1 controls the configuration of the SCSI bus. Set the switch to the Off position to combine the two internal SCSI buses or set the switch to the On position if you want two separate five-drive SCSI buses. Switch 5 sets the expansion unit to rack or tower mode. For rack mode, set Switch 5 to the Off position. For tower mode, set Switch 5 to the On position. Switches 2, 3, and 4 are reserved and must remain set to the Off position.

Tray number switch: This switch sets the expansion unit ID using values of 0–9. The ID is used in conjunction with system-management software.

Over temperature LED: This amber LED lights if the expansion unit overheats.

Termination power LEDs: These green LEDs light if termination power is present. (When a termination power LED is lit, it indicates that the other end of the cable is connected to a powered-on controller.) Each external bus has a separate termination power LED.

LVD/SE LED: This green LED lights if the host bus is in LVD mode. (The default is LVD mode.) Each external bus has a separate LVD/SE LED.

Power LED: This green LED is lit when there is power to the ESM board.

System-management software support

The IBM Netfinity EXP200 provides software alert functions through the system monitor functions provided in the IBM Netfinity Manager software.

The following alerts are supported:

- Disk drive disabled
- Power supply failure
- Fan fault
- IBM Netfinity EXP200 over temperature

For up-to-date information about the IBM Netfinity Manager software support available for your EXP200, visit the following IBM Web site:

<http://www.ibm.com/pc/us/netfinity/smt0012.html>

This system-management software is supported on the IBM ServeRAID Adapter with Service Pack Version 2.23 or later. System-management software is also supported on the IBM ServeRAID II Adapter with Version 2.30 or later, IBM ServeRAID-3H, IBM ServeRAID-3L, and IBM ServeRAID-3HB.

Netfinity Manager Service and drive Fault LEDs are supported only by IBM ServeRAID II, IBM ServeRAID-3H, IBM ServeRAID-3L, IBM ServeRAID-3HB adapters and the Netfinity Fibre Channel Controller Unit.

Chapter 2. Installing the expansion unit

This chapter contains the information needed to install the expansion unit. You can install the EXP200 expansion unit in the following types of enclosures:

- An EIA standard rack cabinet
- The IBM Netfinity EXP200 Rack-to-Tower Conversion Kit
- An IBM Netfinity NetBAY enclosure

You will need a flat-blade and a phillips screwdriver to install your expansion unit. Each type of enclosure comes with general installation instructions for installing optional devices.

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Operating specifications

The following table summarizes the operating specifications of the expansion unit.

<p>Size (with front panel and without mounting rails)</p> <ul style="list-style-type: none"> • Depth: 56.3 cm (22.2 in) • Height: 12.8 cm (5 in) • Width: 44.7 cm (17.6 in) <p>Weight</p> <ul style="list-style-type: none"> • Standard expansion unit as shipped: 22.5 kg (49.5 lbs) • Typical expansion unit fully loaded: 36.1 kg (79.5 lbs) <p>Electrical input</p> <ul style="list-style-type: none"> • Sine-wave input (50 to 60 Hz) is required • Input Voltage: <ul style="list-style-type: none"> – Low range: <ul style="list-style-type: none"> - Minimum: 90 V ac - Maximum: 127 V ac – High range: <ul style="list-style-type: none"> - Minimum: 198 V ac - Maximum: 257 V ac – Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> - Minimum configuration: 0.06 kVA - Maximum configuration: 0.36 kVA 	<p>Environment</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – expansion unit on: 10° to 35° C (50° to 95° F) Altitude: 0 to 914 m (3000 ft.) – expansion unit off: 10° to 32° C (50° to 90° F) Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.) • Humidity: <ul style="list-style-type: none"> – 10% to 80% 	<p>Acoustical noise emissions values</p> <p>For open bay (0 drives installed) and typical system configurations (8 hard drives installed).</p> <ul style="list-style-type: none"> – Sound Power (idling): <ul style="list-style-type: none"> - 6.3 bels (open bay) - 6.5 bels (typical) – Sound Power (operating): <ul style="list-style-type: none"> - 6.3 bels (open bay) - 6.6 bels (typical) – Sound Pressure (idling): <ul style="list-style-type: none"> - 47 dBA (open bay) - 49 dBA (typical) – Sound Pressure (operating): <ul style="list-style-type: none"> - 47 dBA (open bay) - 50 dBA (typical) <p>These levels are measured in controlled acoustical environments according ISO 7779 and are reported in accordance with ISO 9296. The declared sound power levels indicate an upper limit, below which a large portion of machines operate. Sound pressure levels in your location might exceed the average 1-meter values stated because of room reflections and other nearby noise.</p>
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Table 2. Expansion unit operating specifications

Getting started

Before you begin, review the following tasks and assumptions:

- If you are installing the expansion unit in a rack, you have already installed the other components in the rack and moved the rack to its permanent operating location.
- You have already installed and configured the host controllers and appropriate host adapters.
- There are 68-pin SCSI cables attached to the host controllers, ready for final connection to the expansion unit.
- The installation site meets all area, environmental, power, and site requirements for the expansion unit. Refer to the expansion unit requirements listed above in “Operating specifications.”

Preparing the expansion unit

This section explains how to prepare the expansion unit for installation by removing the CRUs (customer replaceable units) and by setting the interface options.

Removing CRUs

It is easier to lift the expansion unit and install it in a rack or tower enclosure if you remove all CRUs (drives, fans, and power supplies) first. A fully loaded expansion unit with 10 disk drives, two fan units, and the second power supply installed weighs 36.1 kg (79.5 lbs). The standard unit shipped with one power supply and two fan units weighs 22.5 kg (49.5 lbs). If you remove all the CRUs, you can reduce the overall weight.

Attention:

If you have data stored on the drives, label the drives before you remove them. Then when you replace the drives, install them in the exact drive bays from which you removed them.

See Chapter 3, “Installing and replacing devices” on page 27 for the information needed to remove the CRUs.

4



≥36.1 kg (79.5 lbs)

CAUTION:
Use safe practices when lifting.

Attention:

The expansion unit is shipped with the decorative bezel attached to the front of the unit with two white screws and nuts. This bezel protects the light pipes located above the drive trays. Leave the decorative bezel in place until you are instructed to remove it during the installation process.

Setting the interface options

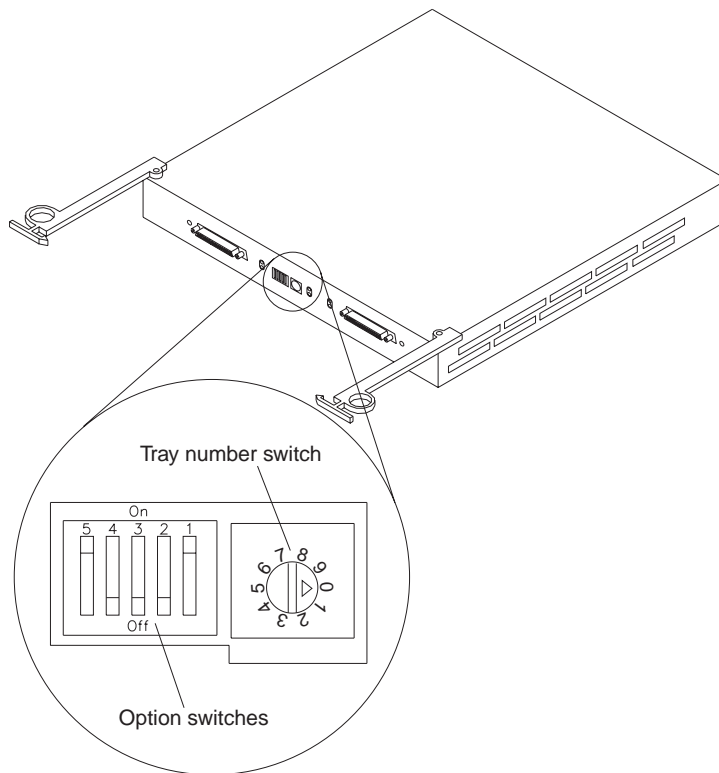
There are five option switches and a rotary dial switch located on the back of the expansion unit. It is easier to set these switches before you install the expansion unit in a rack or tower enclosure.

Attention:

Option switch settings must always be done while the expansion unit and host server are powered off. Failure to do so will result in loss of data.

Option Switch 1 controls the SCSI bus and ID settings, and Option Switch 5 controls the rack and tower installation modes. Option Switches 2 through 4 are Reserved; leave these switches in the Off position.

The rotary dial switch has ten settings. You can use these settings (0–9) to identify the tray number for the expansion unit. System-management software, such as IBM Netfinity Manager, uses this tray number when it provides data and alerts for the expansion unit.



SCSI bus and ID settings

When you install a drive CRU in the expansion unit, the drive tray plugs into a printed circuit board called the *midplane*. The midplane sets the SCSI bus number and ID automatically, based on the setting of Option Switch 1 and the physical location (bay) of the drive CRU.

Your expansion unit supports up to two external SCSI buses and up to two internal SCSI buses. Each internal SCSI bus uses five SCSI IDs. When you install the expansion unit, you can set Option Switch 1 on the ESM board to create two separate five drive SCSI buses, or you can leave it set as one, daisy-chained ten drive SCSI bus.

- **Option Switch 1 set to Off:**

With this default setting, all 10 disk drive bays are on a single SCSI bus. The midplane will assign the SCSI IDs for the drive bays in ascending order from left to right (rack mode) or from top to bottom (tower mode) as follows: 0, 1, 2, 3, 4, 8, 9, 10, 11, 12. The system-management SCSI accessed fault tolerant enclosure (SAF-TE) processor uses SCSI ID 15. When Option Switch 1 is set to the Off position, you can use either external cable connector.

- **Option Switch 1 set to On:**

When Option Switch 1 is set to the On position, two independent internal five drive SCSI buses are created. External SCSI Bus 1 maps to internal SCSI Bus 1 and external SCSI Bus 2 maps to internal SCSI Bus 2. The midplane assigns the five internal Bus-1 bays SCSI IDs 0, 1, 2, 3, and 4; and the five internal Bus-2 bays SCSI IDs 0, 1, 2, 3, and 4. On each SCSI bus, the system-management processor uses SCSI ID 15.

Important information for IBM ServeRAID users:

If you are using a ServeRAID software version earlier than Version 3.50, the View Configuration screens might show SCSI IDs or bay numbers. If the data shown on the View Configuration screen begins with '0', it denotes SCSI IDs. If the data shown on the View Configuration screen begins with '1', it denotes bay numbers.

Rack and tower mode settings

Option Switch 5 on the ESM board is the rack and tower mode switch. Switch 5 must be in the Off position when the unit is placed in a rack and in the On position if the unit is placed in a tower. When shipped, Option Switch 5 is set to the rack (Off) position.

When Option Switch 5 is in the On position, two changes to your expansion unit will occur. First, the SCSI ID ordering will be reversed. This SCSI ID reversal provides SCSI IDs in ascending order from top to bottom, when the expansion unit is installed in a tower. Second, the general system error indicator on the front panel will be swapped with the power-on LED, placing the green power-on LED above the general-system error indicator.

Tray number settings

Use the rotary dial switch on the ESM board to set a tray identification number for the expansion unit. You can set a number from 0–9. System-management software, such as IBM Netfinity Manager, uses this identification number when it provides data and alerts for the expansion unit.

Installing the expansion unit in a rack

The EXP200 expansion unit requires 3U of EIA rack mounting space. Before installing the expansion unit in your rack you must:

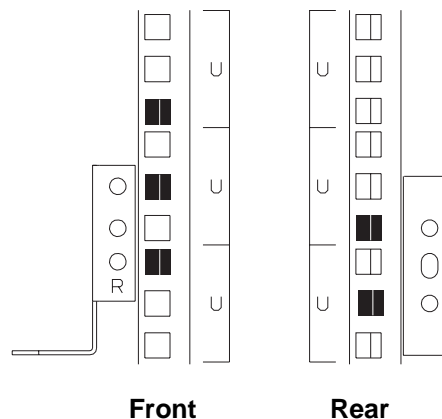
- Plan device installation starting from the bottom of the rack
- Refer to the rack documentation for safety and cabling considerations. Ensure that your planned installation is within the rack enclosure guidelines for heat generation, electrical requirements, air flow, and mechanical loading.

Note: Because of the limited space in some racks, it might be easier to connect and route cables before you install the mounting brackets and hardware devices.

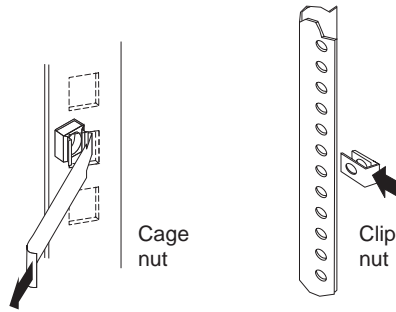
- Position the unit in the rack to allow for proper air circulation around and through the expansion unit
- Turn off power to your rack
- Refer to the rack documentation for instructions on removing its doors and side panels

Use the rack mounting template that comes with the expansion unit to locate the rack mounting holes and install the unit into a rack cabinet. If you misplace the template, you can use the following steps to install your expansion unit:

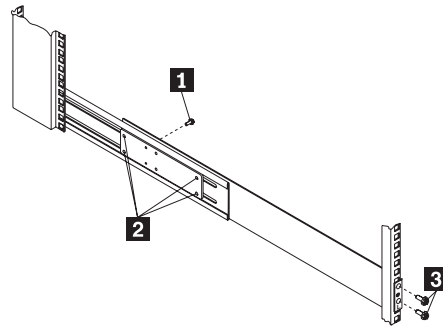
1. Use the following illustration of front and rear rack mounting flanges to determine the appropriate rack mounting holes for installing cage nuts or clip nuts to secure your EXP200 rails.



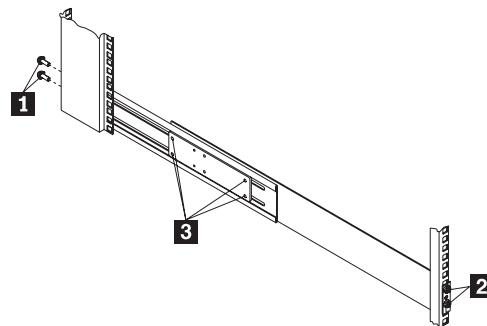
Note: Use clip nuts if your rack has round holes. If your rack has square holes, you can use the rack insertion tool or a flat-blade screwdriver to install cage nuts.



2. On the rail marked "L", remove and save the small screw **1**; then, loosen the four large screws **2**.



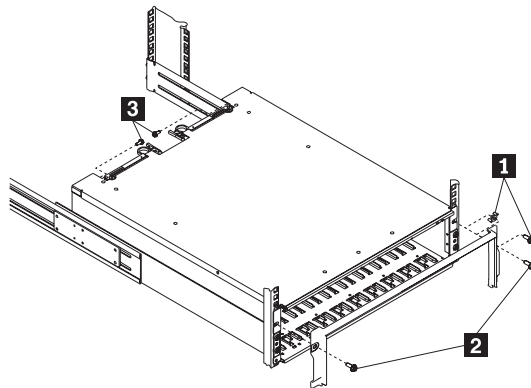
3. Hold the rail against the outside of the left rack mounting flange and loosely insert the front black hex screws **3**.
4. Extend the rail outside of the rear rack mounting flange; then, install and tighten both rear black hex screws **1**.



5. Tighten the two front screws **2**; then, tighten the four large screws **3**.

Repeat step 2 through step 5 to install the rail marked "R" on the right side of the rack.

6. Slide the expansion unit into the rack; then, remove and discard both white screws and wingnuts **1** from the bezel.

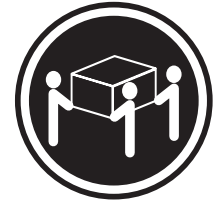
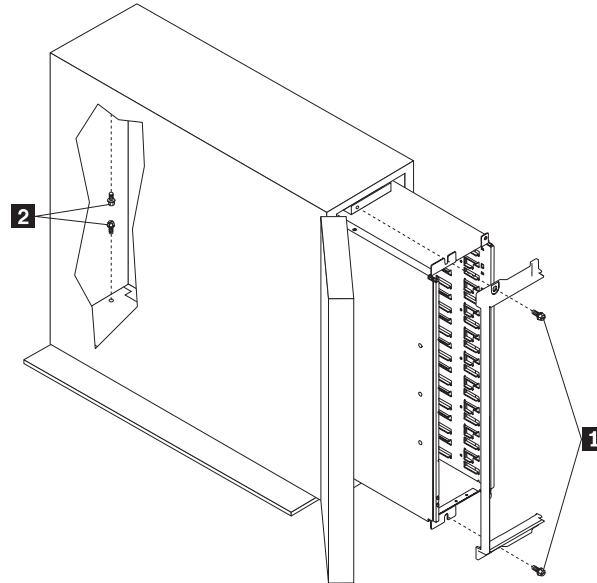


≥ 36.1kg (79.5lbs)

7. Align the bezel locator pins with the expansion unit; then, secure the bezel and EXP200 with two black hex screws **2**.
8. Use the two small screws **3** (removed in step 2 on page 17) to secure the rear of the expansion unit.
9. Verify that Option Switch 5 is set to Off (see “Setting the interface options” on page 14 for further device settings).
10. Install hard drives, fans, and power supplies in the EXP200 expansion unit according to Chapter 3, “Installing and replacing devices” on page 27; then, return here to complete the installation.
11. Continue with “Completing the installation” on page 21.

Installing the expansion unit in a tower conversion kit

The EXP200 Rack-to-Tower Conversion Kit provides an enclosure for a single EXP200 expansion unit. Use the mounting hardware that comes with the EXP200 expansion unit to install the unit in the enclosure as follows:



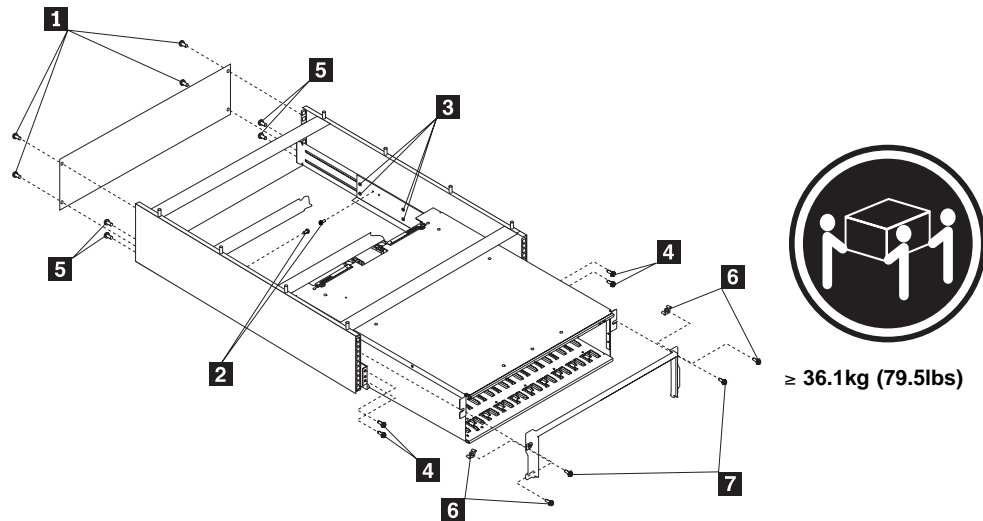
≈ 36.1kg (79.5lbs)

1. Unlock and open the enclosure door.
2. Turn the EXP200 expansion unit counter-clockwise onto its left side and slide it into the enclosure; then, remove the white screws and wingnuts from the EXP200 bezel.
3. Align the bezel locator pins with the expansion unit; then, secure the bezel and EXP200 with black hex screws **1** on the top and bottom.
4. Remove the two small screws from the rails that come with the EXP200 expansion unit; then, secure the rear of the expansion unit with the small screws **2** on the top and bottom.
5. Verify that Option Switch 5 is set to On (see “Setting the interface options” on page 14 for further device settings).
6. Install hard drives, fans, and power supplies in the EXP200 expansion unit according to Chapter 3, “Installing and replacing devices” on page 27; then, return here to complete the installation.
7. Continue with “Completing the installation” on page 21.

Installing the expansion unit in a NetBAY enclosure

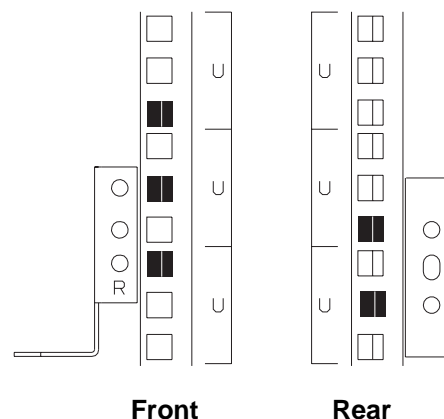
NetBAY enclosures are stackable and each can store a different device, such as the EXP200 expansion unit. You can also attach a server on top of the enclosure. Refer to the NetBAY documentation for details on installing other devices.

Note: Due to the depth of the NetBAY3E enclosure, it might be difficult to set the expansion unit option switches once installed. Verify that Option Switch 5 is set to Off and Option Switch 1 and the tray ID switch are set properly for your environment (see “Setting the interface options” on page 14 for further device settings).



To install the expansion unit in the enclosure, use the following procedure:

1. Remove the rear of the enclosure **1**.
2. Use the following illustration to determine the appropriate enclosure mounting holes for installing cage nuts to secure your device and rails.



3. On the rail marked "L", remove and save the small screw **2**; then, loosen the four large screws **3**.
4. Hold the rail against the outside of the left enclosure mounting flange and loosely insert the front black hex screws **4**.
5. Extend the rail outside of the rear enclosure mounting flange; then, install and tighten both rear black hex screws **5**.

6. Tighten the two front screws **4**; then, tighten the four large screws **3**.
Repeat step 3 on page 20 through step 6 to install the rail marked "R" on the right side of the enclosure.
7. Slide the expansion unit into the enclosure; then, remove and discard both white screws and wingnuts **6** from the bezel.
8. Align the bezel locator pins with the expansion unit; then, secure the bezel and EXP200 with two black hex screws **7**.
9. Use the two small screws **2** (removed in step 3 on page 20) to secure the rear of the expansion unit.
10. Install hard drives, fans, and power supplies in the EXP200 expansion unit according to Chapter 3, "Installing and replacing devices" on page 27; then, return here to complete the installation.
11. Continue with "Completing the installation."

Completing the installation

This section provides the information needed to complete the installation. Instructions for installing the identification labels and cabling the expansion unit are included.

Installing identification labels

Your expansion unit comes with three labels: two SCSI bay ID labels and one tray ID label. Two additional SCSI bay ID labels for tower orientations come with the EXP200 Rack-to-Tower Conversion Kit.

1. Install the SCSI bay ID label:

Verify the setting of Option Switch 1. (See "Setting the interface options" on page 14 if you need more detailed information.)

- If Option Switch 1 is in the On position, continue with step 2 on page 22
- If Option Switch 1 is in the Off position, go to step 4 on page 23.

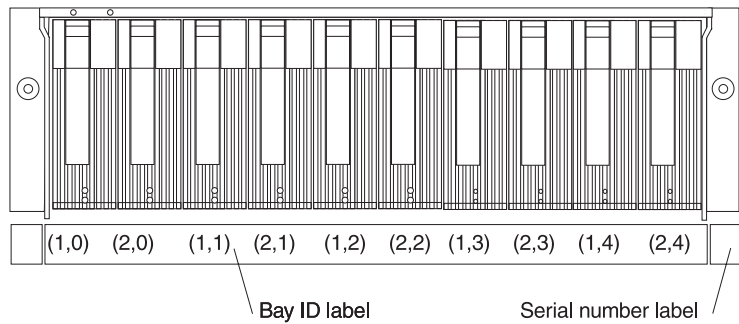
2. Locate the SCSI bay ID label for your configuration.

Note: The first number represents the bus number and the second number is the SCSI ID.

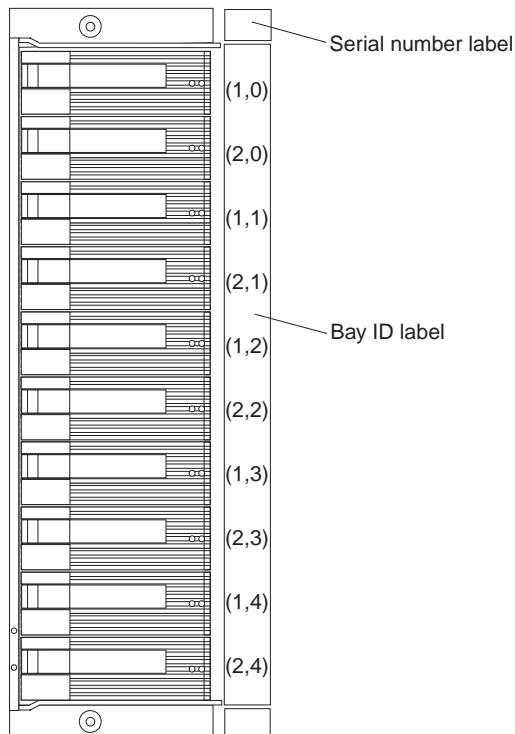
To install the label:

- a. Orient the label so that the printed numbers are legible from left-to-right or top-to-bottom.
- b. Peel the backing away from the adhesive side of the label.
- c. Carefully butt the edge of the ID label up against the edge of the serial number label so that the 10 printed ID numbers are centered beneath or to the right of each of the drive bays.
- d. Apply the label to the front of the unit, as shown in the following illustrations.

Switch 1 On
Switch 5 Off



Switch 1 On
Switch 5 On



3. Go to step 6 on page 24.

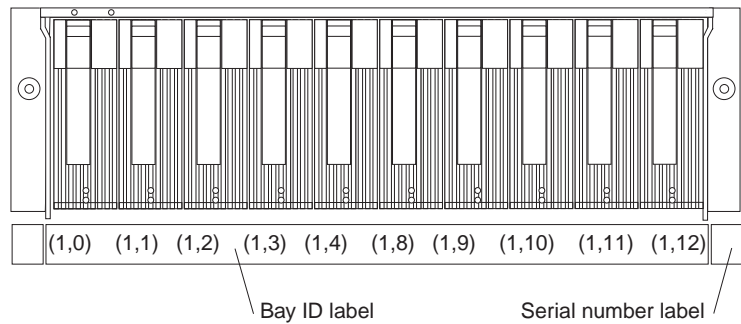
4. Locate the SCSI bay ID label for your configuration.

Note: The first number represents the bus number and the second number is the SCSI ID.

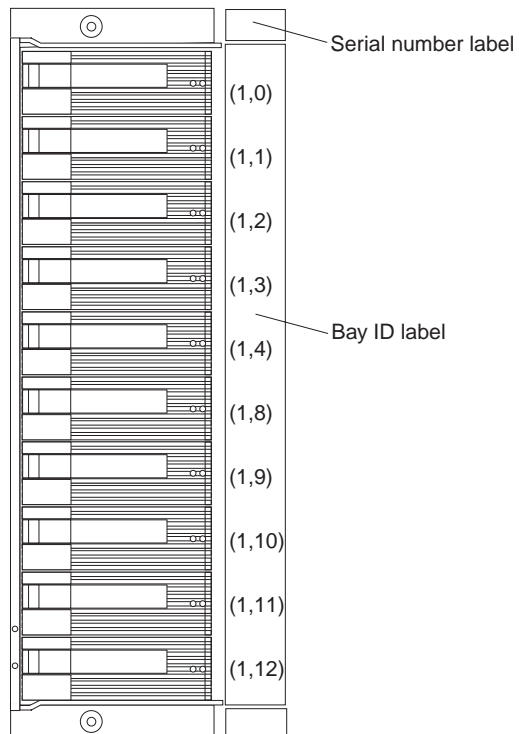
To install the label:

- a. Orient the label so that the printed numbers are legible from left-to-right or top-to-bottom.
- b. Peel the backing away from the adhesive side of the label.
- c. Carefully butt the edge of the ID label up against the edge of the serial number label so that the 10 printed ID numbers are centered beneath or to the right of each of the drive bays.
- d. Apply the label to the front of the unit, as shown in the following illustrations.

Switch 1 Off
Switch 5 Off



Switch 1 Off
Switch 5 On



5. Go to step 6 on page 24

6. Install the tray ID label.
 - a. Verify the setting of the tray number switch (0–9).
 - b. Apply the tray number label that matches the setting for the tray number in the blank label area directly to the left of (or below) the bay ID label.
7. Continue with “Cabling the expansion unit.”

Cabling the expansion unit

This section provides the SCSI and power cabling information. After you attach your SCSI and power cables, use the instructions provided in “Turning the expansion unit on and off” on page 39 for the initial startup of the expansion unit.

SCSI cabling information

The IBM Netfinity EXP200 comes with an ESM board (environmental services monitor) between the external SCSI cables and the hot-swap backplane. There are a total of two 68-pin SCSI Very High Density Connector Interface (VHDCI) connectors. From left to right as seen from the back, these connectors are: SCSI Bus 1 and SCSI Bus 2. (See “Rear controls, indicators, and connectors” on page 7 for the location of these connectors.) There are several ways to use these buses.

- To configure each bus independently:
 1. Verify that Option Switch 1 is set to the On position. (See “Setting the interface options” on page 14 for more information.)
 2. Attach one external SCSI cable from the controller in the server to the SCSI bus-1 connector.
 3. Attach a second external SCSI cable from the controller in the server to the SCSI bus-2 connector.
 - To configure the expansion unit as a single 10-drive SCSI bus:
 1. Verify that Option Switch 1 is set to the Off position. (See “Setting the interface options” on page 14 for more information.)
 2. Attach one external SCSI cable from the controller in the server to either SCSI bus connector.
 - To configure the expansion unit as a cluster of 10 drives on a single SCSI bus when using IBM ServeRAID adapters:
 1. Verify that Option Switch 1 is set to the Off position. (See “Setting the interface options” on page 14 for more information.)
 2. Attach one external SCSI cable from the controller in the server to the SCSI bus-1 connector.
 3. Attach a second external SCSI cable from the controller in the server to the SCSI bus-2 connector.
- Note:** When clustering with an IBM ServeRAID adapter, you must configure all 10 disk drives as a single SCSI bus.
- To configure the expansion unit as a cluster when using the Netfinity Fibre Channel RAID Controller:
 1. Configure each bus independently, or
 2. Configure the expansion unit as a single 10-drive SCSI bus.

SCSI Cable restrictions

Controllers that are compliant with Ultra2 and that default to Low Voltage Differential (LVD) signaling, can use any external cable length offered by IBM in any clustered or nonclustered application. These adapters include the IBM ServeRAID-3H, ServeRAID-3L, ServeRAID-3HB, and the Netfinity Fibre Channel RAID Controller. Some controllers (Ultra SCSI or Fast SCSI speeds using single ended (SE) signaling) are limited to less than or equal to 2 meters (6.5 ft) of cable to operate at Ultra SCSI speeds (20 MHz or 40 MB/sec), and less than 6 meters (19.7 ft) of cable to operate at Fast SCSI speeds (10 MHz or 20 MB/sec). The speed setting is a setup operation for a SCSI controller. Refer to your SCSI controller documentation to set the appropriate speed.

Note: A SCSI channel from a SCSI controller must be dedicated to the IBM Netfinity EXP200. This means that the corresponding internal SCSI connector must be left unused.

Power cabling

The expansion unit uses one standard power cord. If the redundant power supply is installed, the expansion unit uses two power cords. You can connect the power cords to a primary power unit inside the rack, such as a properly grounded ac distribution unit or uninterruptible power supply (UPS), or to an external source, such as a properly grounded electrical outlet.

If you have not already done so, attach the power supply cord as follows:

1. Wrap the clamp around the power cord approximately 20.3 cm (8 in.) from the power supply connection end.
2. Attach the power supply nut and tighten it securely.
3. Connect the power cord to the power supply.
4. Plug the supply power cord into a properly grounded electrical outlet.
5. Go to "Turning the expansion unit on and off" on page 39 for the initial startup of the expansion unit.

Chapter 3. Installing and replacing devices

This chapter provides instructions to help you install or remove customer replaceable units (CRUs), such as hot-swap drives, fans, and power supplies. This chapter also contains instructions for turning the expansion unit on and off.

This chapter contains:

Handling static-sensitive devices	28
Working with hot-swap drives	29
Installing hot-swap drives	30
Replacing hot-swap drives	33
Working with hot-swap power supplies	35
Removing a hot-swap power supply	35
Installing a hot-swap power supply	36
Working with hot-swap cooling fans	38
Turning the expansion unit on and off	39
Turning on the expansion unit	39
Turning off the expansion unit	40
Performing an emergency shutdown	40
Restoring power after an emergency	41

Handling static-sensitive devices

Static electricity, though harmless to you, can seriously damage expansion unit components or options.

Note: When you are adding an internal option, do not open the static-protective package containing the option until you are instructed to do so.

When you handle options and other expansion unit components, take these precautions to avoid damage from static electricity:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you are installing a new option, touch the static-protective package containing the option to a metal expansion-slot screw or other unpainted metal surface on the expansion unit for at least two seconds. (This reduces static electricity from the package and from your body.)
- When possible, remove the option and install it directly into the expansion unit without setting the option down. When this is not possible, place the static-protective package that the option comes in on a smooth, level surface and place the option on it.
- Do not place the option on the expansion unit's covers or any metal surface.
- When possible, wear an ESD protective ground strap.

Working with hot-swap drives

Before you begin

- Read the safety and handling guidelines provided in “Safety Information” on page v and “Handling static-sensitive devices” on page 28.
- Ensure that your current system configuration is working properly.
- Back up all important data before you make changes to storage devices, such as hard disk drives.

Drives are devices that your system uses to store and retrieve data. This section explains how you can increase the expansion unit capacity by adding more drives or replacing existing drives with larger capacity ones.

Before you install or remove drive CRUs, review the following information:

- **Hot-swap hardware:**

Your expansion unit contains hardware that enables you to replace a failed hard disk drive without turning off the expansion unit. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives.

- **Drive CRUs:**

Your expansion unit supports IBM Ultra2 SCSI hard disk drives. These IBM drives come preinstalled in a drive tray, ready for installation. (Do not detach the drive from the tray.) This drive and tray assembly is called a *drive CRU* (customer replaceable unit). You can install the drive CRUs directly into the 10 drive bays on the front of the expansion unit.

- **Drive CRU labels:**

A label is provided on the front of the drive-CRU tray. Use this label to record the location information for each drive *before* you remove it. Ensure that you keep track of the drives and their corresponding bays. Also, record the location information in Table 5 on page 48. (If you re-install a drive in the wrong bay, you might lose data.)

- **Drive LEDs:**

Each drive tray has two LEDs, which indicate the status for that particular drive. The drive LED states and descriptions are as follows:

LED	LED State	Definitions
Activity LED	Green/flashing	Flashes during read/write or inquiry operations to the drive.
Fault LED	Amber/flashing	Amber flashes to indicate a drive rebuild is under way, or that a drive has been identified by software.
Fault LED	Amber On	Amber is On to indicate a drive failure.

- **SCSI buses and IDs:**

There are two SCSI buses (Bus 1 and Bus 2) in the expansion unit. Each bus uses five SCSI ID numbers. Each disk drive within the expansion unit has a unique SCSI bus and ID assignment, based on its physical location in the expansion unit and the setting for Option Switch 1.

The label on the front of the expansion unit shows the bus and SCSI ID numbers for the drives. The first number represents the bus number and the second number is the SCSI ID. (See “Setting the interface options” on page 14 for more information.)

- **Blank trays:**

Expansion units shipped without a full set of drives (10) contain blank trays in the unused drive bays. Before installing new drives, you must remove the empty trays, which should be saved. Each of the 10 bays must always contain either a blank tray or a drive CRU. Each blank tray contains a filler piece for use with a slim-high drive.

- **Slim-high drives:**

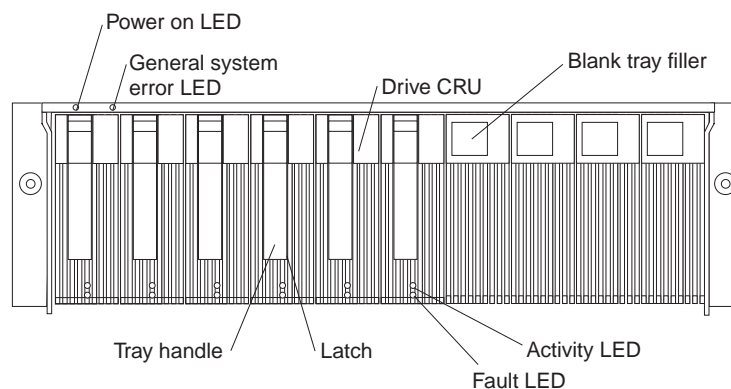
You can install slim-high hot-swap drive CRUs, which are slightly smaller in size than the standard disk drive. These drive CRUs do not fill the entire drive bay. To maintain proper air flow and cooling when you install a slim-high disk drive, you must also install one of the fillers provided in the blank trays.

Installing hot-swap drives

Use the following procedure to install drives in the expansion unit. You can install additional drives while the expansion unit is powered up and running.

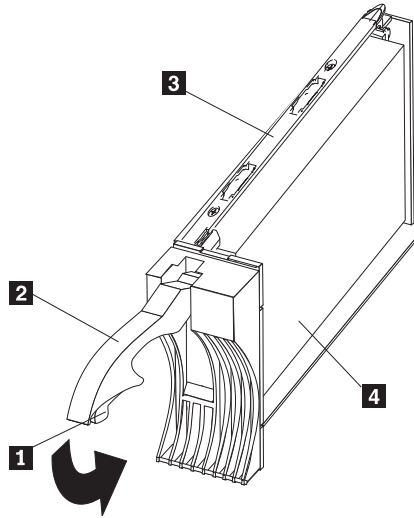
Note: If you are replacing a drive, see “Replacing hot-swap drives” on page 33.

1. Read the instructions that come with the drive CRU.
2. Check for Fault LEDs. If any amber LEDs are lit, refer to the “Troubleshooting charts” on page 44.



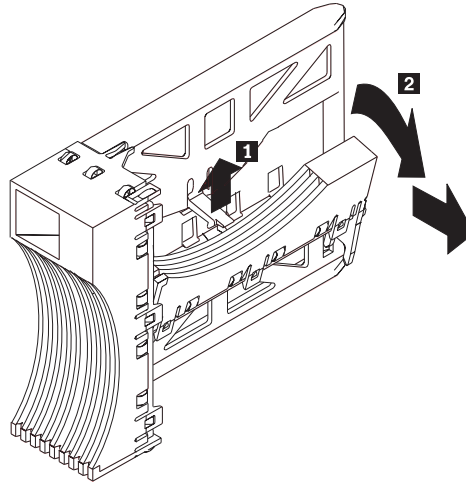
3. Determine the bay into which you want to install the drive.
4. Remove the blank tray.
 - a. Insert a finger into the square hole at the top of the blank tray to grip and pull the tray out of the drive bay.
 - b. Save the blank tray for later use.
5. Install the drive CRU:

Note: The hard disk drive comes with a tray already attached. Do not attempt to detach the drive **4** from the tray **3**.

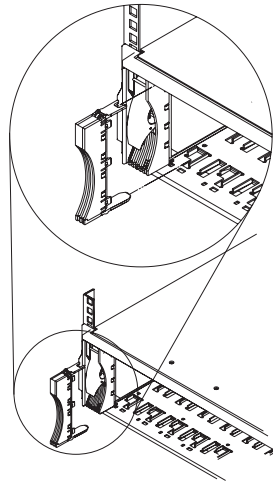


- a. Release the blue latch **1** on the drive CRU by pressing on the inside of the bottom of the tray handle.
- b. Pull the handle **2** on the tray out into the open position.
- c. Slide the drive CRU into the empty bay until the tray handle **2** touches the expansion unit bezel.
- d. Push the tray handle **2** down into the closed (latched) position.

6. If you are installing a slim-high drive, continue with step 6a. Otherwise, go to step 7 on page 33.
 - a. Locate the filler piece on the inside of the blank tray.
 - b. Pull up on the small latch **1** inside the blank tray to release the filler piece.
 - c. Tilt the filler piece up from the blank tray **2** ; then, remove it from the tray as shown in the following illustration:



- d. Insert the filler piece into the empty space left in the drive bay, as shown in the following illustration.



7. Check the drive LEDs.
 - a. When a drive is ready for use, the green Activity LED and the amber Fault LED are Off.
 - b. If the amber Fault LED is On, remove the drive from the unit and wait 10 seconds; then, reinstall the drive.

ServeRAID Information

In some cases, the ServeRAID controller will automatically reset the drive to the Hot Spare or Rebuild state. If the drive state change does not occur automatically (amber LED stays lit), refer to your ServeRAID documentation for information about manually changing the state of the drive from the current state to another state, such as Hot Spare or Ready. The amber LED should turn Off within 10 seconds of the drive state change.

8. Configure the drive using the appropriate software.

Replacing hot-swap drives

Drive problems include any malfunctions that delay, interrupt, or prevent successful I/O activity between the hosts and the hard disk drives in the expansion unit. This includes transmission problems between the host controllers, the ESM board, and the drives. This section explains how to replace a failed drive.

Attention:

Failure to replace the drives in their correct bays might result in loss of data. If you are replacing a drive that is part of a RAID level 1 or RAID level 5 logical drive, ensure that you install the replacement drive in the correct bay.

Check the hardware and software documentation provided with your system to see if there are restrictions regarding hard disk drive configurations. Some system SCSI configurations might not allow mixing different drive capacities or types within an array.

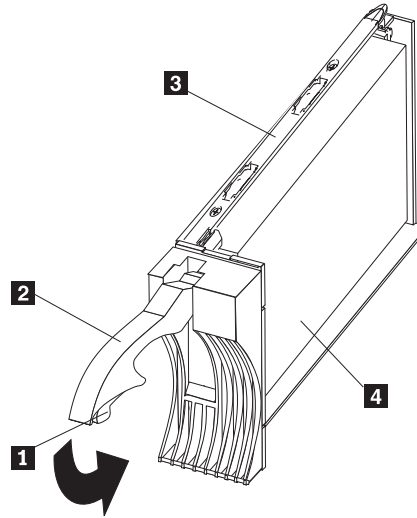
1. Determine the location of the drive that you want to remove.

Attention:

Never hot swap a drive CRU when its green Activity LED is lit or flickering. Only hot swap a drive CRU when its amber Fault LED is lit or when the drive is inactive.

2. Remove the drive CRU.

- a. Press on the inside of the bottom of the tray handle to release the blue latch **1**.
- b. Pull the handle **2** on the tray **3** out into the open position.
- c. Lift the drive CRU partially out of the bay.
- d. To avoid possible damage to the drive **4**, wait at least 20 seconds before fully removing the drive CRU from the expansion unit to allow for the drive to spin down.



- e. Verify that there is proper identification (such as a label) on the drive CRU, then slide it completely out of the expansion unit.
 - f. If you are replacing a slim-high drive, ensure that the filler piece remains in place for use with the new drive.
3. Install the new drive CRU.
- a. Gently push the drive CRU into the empty bay until the tray handle **2** touches the expansion unit bezel.
 - b. Push the tray handle **2** down into the closed (latched) position.
4. Check the drive LEDs.
- a. When a drive is ready for use, the green Activity LED and the amber Fault LED are Off.
 - b. If the amber Fault LED is On, remove the drive from the unit and wait 10 seconds; then, reinstall the drive.

ServeRAID Information

In some cases, the ServeRAID controller will automatically reset the drive to the Hot Spare or Rebuild state. If the drive state change does not occur automatically (amber LED does not turn Off), refer to your ServeRAID documentation for information about manually changing the state of the drive from the current state to another state, such as Hot Spare or Ready. The amber LED should turn Off within 10 seconds of the drive state change.

5. Return to normal operation.

Working with hot-swap power supplies

The power supplies are customer replaceable units (CRUs) and do not require preventive maintenance.

Attention:

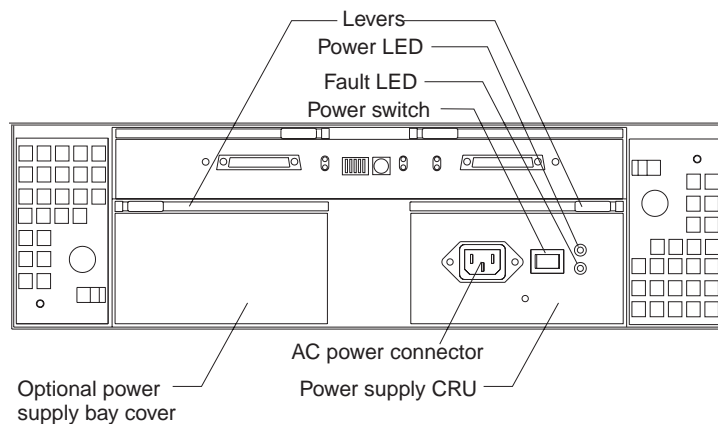
The base unit with one power supply is *not* redundant. You must install the redundant power supply option to make your unit redundant. If you unplug the standard power supply from the basic configuration without having the redundant power option installed, you will lose power to the expansion unit and you might lose data.

- The standard power supply must always be in its proper place to maintain proper expansion-unit cooling.
- Use only the supported power supplies for your specific expansion unit.
- The power supply bay cover must remain in place to maintain proper cooling when only one power supply is installed.

Removing a hot-swap power supply

To remove a hot-swap power supply:

1. Turn the power supply switch to the Off position.

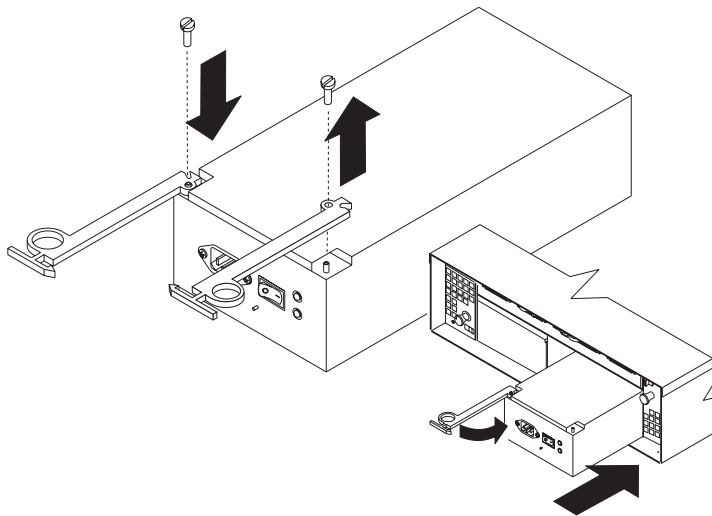


2. Unplug the power supply cord from the electrical outlet.
3. Disconnect the power cord from the power supply.
4. Remove the nut and clamp from the rear of the power supply.
5. Remove the power supply from the expansion unit.
 - a. Grasp the pull-ring on the power supply lever and squeeze the latch to release it.
 - b. Pull the lever open and remove the power supply.

Installing a hot-swap power supply

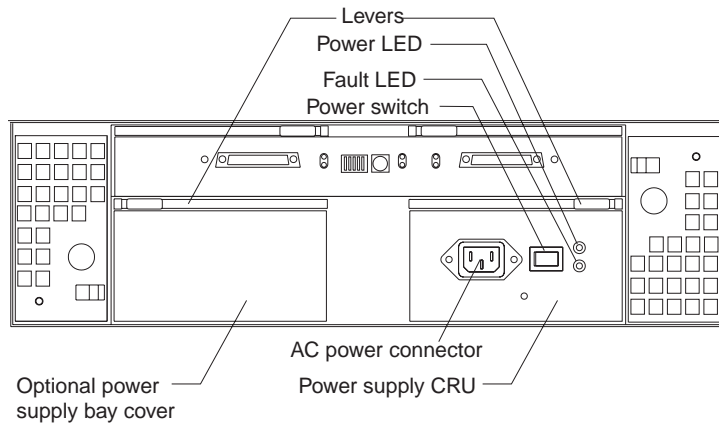
After the standard power supply is installed, you can install the optional power supply in the optional power supply bay. The procedure for installing this option is the same as for installing the standard power supply. However, you must remove the power supply bay cover before installing the additional supply.

Note: When replacing a power supply due to a failure, ensure that the power supply latch is mounted on the side of the power supply that faces the middle of the expansion unit. If not, remove the lever screw, flip the lever over and tighten the screw on the opposite side.

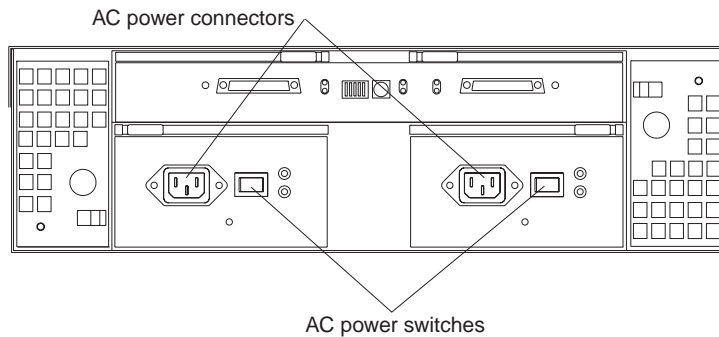


To install a hot-swap power supply:

1. Ensure that the ac power switch on the power supply you are installing is in the Off position.
2. If you are installing the redundant power supply option:
 - a. Grasp the pull-ring on the lever for the optional bay cover and squeeze the latch to release it.



- b. Pull the lever open and remove the bay cover.
3. Install the power supply in the expansion unit.
 - a. Slide the power supply into the expansion unit. Be sure the lever is pulled straight out as you slide the power supply into the expansion unit.
 - b. Close the lever until the pull-ring latch locks in place. Make sure the lever locks into place in the expansion-unit chassis.
4. Wrap the clamp around the power cord approximately 20.3 cm (8 in.) from the power supply connection end.
5. Attach the power supply nut and tighten it securely.
6. Connect the power cord to the power supply.



7. Plug the supply power cord into a properly grounded electrical outlet.

If you just installed a second (redundant) supply, the amber LED will light because its power switch is in the Off position.

8. Turn the power supply switch to the On position.

If you just installed a second (redundant) supply, its amber LED will turn Off and its green LED will turn On when you turn the switch to the On position.

Working with hot-swap cooling fans

Attention:

Do not run the expansion unit without adequate ventilation and cooling, because it might cause damage to the internal components and circuitry.

The fans are interchangeable and customer replaceable and do not require preventive maintenance. The fans help maintain proper air circulation across the components inside the expansion unit. Air flows through the expansion unit from the front to the back.

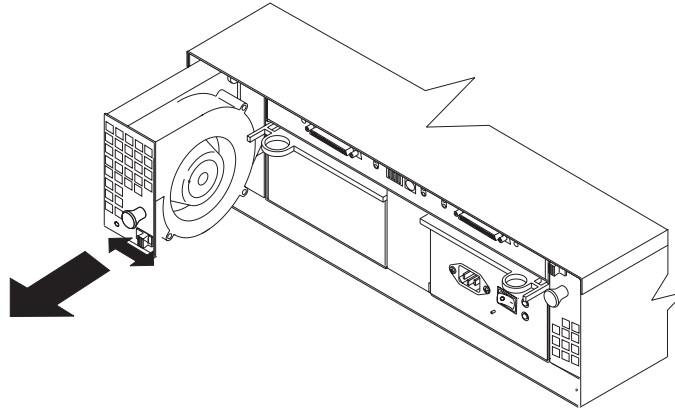
You can hot-swap the fans (replace them while the expansion unit is turned on and running), as long as you complete the exchange within 10 minutes. This time limit applies only to the total time that a fan is out of the expansion unit, beginning when you remove the failed unit and ending when you reseal the new one. This does not include the time it takes you to perform this entire procedure (checking LEDs, unpacking the new fan, and so on).

Both fan units must always be in place, even if one is not functioning properly, to maintain proper cooling.

Use the following procedure to replace a hot-swap fan:

1. Check the LEDs on the back of the expansion unit.
2. If the amber Fault LED is On, remove the failed fan.
 - a. Slide the latch to unlock the fan CRU.
 - b. Use the handle (black knob) to pull the fan from the expansion unit.
3. Install the new fan unit.
 - a. Place the fan CRU in front of the fan slot.
 - b. Hold the latch open and slide the fan all the way into the slot. If the fan does not go into the bay, rotate it 180°. The latch should always be on the side closest to the center of the expansion unit.
 - c. Release the latch. If the lever remains open, pull back on the fan slightly, then push it in again until the latch snaps into place.
4. Check the LEDs.

The Fault LEDs turn Off after a few seconds; if they remain On, refer to the “Troubleshooting charts” on page 44.



Turning the expansion unit on and off

This section contains instructions for turning the expansion unit on and off under normal and emergency circumstances.

If you are turning on the expansion unit after an emergency shutdown or power outage, refer to “Restoring power after an emergency” on page 41.

Turning on the expansion unit

Use this procedure to turn on the power for the initial startup of the expansion unit.

1. Verify that:
 - a. All communication and power cables are plugged into the back of the expansion unit and an ac power outlet.
 - b. All hard disk drives are locked securely in place.
 - c. Option Switches 1 through 5 and the tray number switch on the expansion unit are set correctly. (See “Setting the interface options” on page 14 for more information.)
2. Check the system documentation for all the hardware devices you intend to turn on and determine the proper power-up sequence.

Note: Be sure to turn on the IBM Netfinity EXP200 before or at the same time as the system server.

3. Turn on the power to each device, based on this power-up sequence.
4. Turn on the power supply switch on the back of the unit. Turn on both power supply switches if you have the second power-supply option installed.

The expansion unit might take a few seconds to power up. During this time, you might see the amber and green LEDs on the expansion unit turn On and Off intermittently. When the power-up sequence is complete, only the green LEDs on the front and back should remain On. If one or more amber LEDs remain lit, refer to the “Troubleshooting charts” on page 44.

Attention:

If you are restarting the system after a normal shutdown, wait at least 10 seconds before you attempt to turn on the power supply switches.

Turning off the expansion unit

Attention:

Except in an emergency, never turn off the power if any Fault LEDs are lit on the expansion unit. Correct the fault before you attempt to turn off the power, using the proper troubleshooting or servicing procedure. This will ensure that the expansion unit will power up correctly later. For guidance, refer to the “Troubleshooting charts” on page 44.

The expansion unit is designed to run continuously, 24 hours a day. Once you turn on the expansion unit, do not turn it off. Turn off the power only when:

- Instructions in a hardware or software procedure require you to turn off the power.
- A service technician tells you to turn off the power.
- A power outage or emergency situation occurs (see “Performing an emergency shutdown”).

Use this procedure to turn off the power.

1. Make sure that all I/O activity has stopped. If applicable, disconnect from the host controller.
2. Make sure that all amber Fault LEDs are Off. If any Fault LEDs are lit (drives, power supplies, or fans), correct the problem before you turn off the power. For guidance, refer to the “Troubleshooting charts” on page 44.
3. Turn off the appropriate power supply switch on the back on the expansion unit. Turn off both power supply switches if you have the second power supply option installed.

Performing an emergency shutdown

Attention:

Emergency situations might include: fire, flood, extreme weather conditions, or other hazardous circumstances. If a power outage or emergency situation occurs, always turn off all power switches on all computing equipment. This will help safeguard your equipment from potential damage due to electrical surges when power is restored. If the expansion unit loses power unexpectedly, it might be due to a hardware failure in the power system or midplane (see the “Troubleshooting charts” on page 44).

Use this procedure to shut down during an emergency.

1. If you have time, stop all activity and check the LEDs (front and back). Make note of any Fault LEDs that are lit so you can correct the problem when you turn on the power again.
2. Turn off all power supply switches; then, unplug the power cords from the expansion unit.

Restoring power after an emergency

Use this procedure to restart the expansion unit if you turned off the power supply switches during an emergency shut down, or if a power failure or a power outage occurred.

1. After the emergency situation is over or power is restored to the building, check the expansion unit for damage. If there is no visible damage, continue with Step 2; otherwise, have your system serviced.
2. After you have checked for damage, plug in the expansion unit power cords and turn on the power switches.
3. Check the system documentation for the hardware devices you intend to power up and determine the proper power-up sequence.

Note: Be sure to power on the IBM Netfinity EXP200 prior to or at the same time as the system unit.

4. Turn on the power to each device, based on this power-up sequence.
5. Turn on the power supply switch on the back of the IBM Netfinity EXP200. Turn on both power supply switches if the optional power supply is installed.
6. Only the green LEDs on the front and back should be on. If one or more of the amber Fault LEDs are on, refer to the “Troubleshooting charts” on page 44 for instructions.
7. Use your installed software application as appropriate to check the status of the expansion unit.

Chapter 4. Solving problems

This chapter contains information to help you solve some of the simpler problems you might have with your expansion unit. It contains the problem symptoms and error messages along with suggested actions to take to resolve the problem.

This chapter also provides instructions on how to obtain service and technical assistance for your expansion unit and other IBM products that you might plan to use.

This chapter contains:

Troubleshooting charts	44
Getting help, service, and information	45

Troubleshooting charts

You can use these charts to find solutions to problems that have definite symptoms.

Problem Indicator	Component	Possible Cause	Possible Solutions
Amber LED On	Drive CRU	Drive failure	Replace failed drive.
	Fan CRU	Fan failure	Replace failed fan.
	ESM board	Subsystem is overheated	Check fans for faults. Replace failed fan if necessary.
		Environment too hot	Check the ambient temperature around the expansion unit. Cool as necessary.
		Defective LED or hardware failure	If you cannot detect a fan failure or overheating problem, have the expansion unit serviced.
Front panel	General machine fault	Indicates that a Fault LED somewhere on the expansion unit has been turned on. (Check for amber LEDs on CRUs).	
Amber LED On and green LED Off	Power supply CRU	Power switch is turned off	Turn on all power supply power switches.
Amber and green LEDs On	Power supply CRU	Power supply failure	Replace failed power supply CRU.
All green LEDs Off	All CRUs	Subsystem power off	Check that all expansion unit power cords are plugged in and the power switches are On. If applicable, check that the main circuit breakers for the rack are turned on.
		ac power failure	Check the main circuit breaker and ac outlet.
		Power supply failed	Replace the power supply.
		Midplane failure	Have the expansion unit serviced.
Amber LED flashing	Drive CRUs	Drive rebuild or identity	No corrective action needed.
One or more green LEDs Off	Power supply CRUs	Power cord unplugged or switch turned off	Make sure the cord is plugged in and the switch is turned on.
	One or two drive CRUs	No activity to the drives	No action required.
	All drive CRUs or those on one bus	No activity to the drives	No action required.
		Damaged or loose SCSI cables	Check SCSI bus cables and connections.
		ESM board failure	Use RAID management software to check the SCSI bus status. Have the ESM board replaced (service technician only).
		Midplane failure	Have the midplane replaced (service technician only).
	Several CRUs	Hardware failure	Replace the affected CRUs. If this does not correct the problem, have the ESM board replaced followed by the midplane (service technician only).
	Front panel	Power supply problem	Make sure the cords are plugged in and power supplies are turned on.
		Hardware failure	If any other LEDs are turned on, replace the midplane (service technician only).

Table 3. Expansion unit troubleshooting chart

Problem Indicator	Component	Possible Cause	Possible Solutions
Intermittent or sporadic power loss to the expansion unit	Some or all CRUs	Defective ac power source or partially plugged power cord	Check the ac power source. Reseat all installed power cables and power supplies. If applicable, check the power components (power units, UPS, and so on). Replace defective power cords.
		Power supply failure	Check for a Fault LED on the power supply and replace the failed CRU.
		Midplane failure	Have the midplane replaced (service technician only).
Unable to access drives on one or both SCSI buses	Drives and SCSI bus	Incorrect SCSI ID settings	Make sure SCSI cables are undamaged and properly connected. Check the drive SCSI ID settings. Ensure that option switches 1 and 5 are set to the appropriate position. Note: Only change switch position when your expansion unit is powered off.
		ESM board failure	Have the ESM board replaced (service technician only).
	SCSI bus	Cable too long	If the external SCSI controller is SE (check LEDs), make sure the cable length is appropriate.
Random errors	Subsystem	Midplane failure	Have the midplane replaced (service technician only).

Table 4. Expansion unit troubleshooting chart

Note: If you cannot find the problem in the troubleshooting charts, test the entire system. See your server documentation for more detailed information on testing and diagnostic tools.

If you already have run the server test program, or if running the test does not reveal the problem, have the system serviced.

Getting help, service, and information

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

With the original purchase of an IBM hardware product, you have access to extensive support coverage. During the IBM hardware product warranty period, you may call the IBM Personal Computer HelpCenter (1-800-772-2227 in the U.S.) for hardware product assistance covered 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.
- 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 Engineering Changes (ECs) available that apply to your hardware.

Be sure to retain your proof of purchase to obtain warranty service. Refer to the IBM hardware warranty for a full explanation of IBM's warranty terms.

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

On the World Wide Web, the IBM Personal Computing Web site has up-to-date information about IBM Personal Computer products and support.

Some helpful addresses are:

http://www.ibm.com	Main IBM home page
http://www.ibm.com/pc	IBM Personal Computing
http://www.ibm.com/pc/support	IBM Personal Computing Support
http://www.ibm.com/pc/us/accessories	Options by IBM (U.S.)
http://www.ibm.com/pc/us/netfinity	IBM Netfinity Servers (U.S.)
http://www.ibm.com/pc/techconnect	IBM TechConnect

You can select a country-specific Web site from these pages.

If you select 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. You will have the information you need, all in one place. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products. You also can access online support forums, which are community sites monitored by IBM support staff.

Appendix A. Records

Whenever you add options to your expansion unit, be sure to update the information in this appendix. Accurate, up-to-date records make it easier to add other options and provide needed data whenever you contact technical support.

This appendix contains:

Identification numbers	48
Installed device records	48

Identification numbers

Record and retain the following information.

Product name	IBM Netfinity EXP200
Machine type	3530
Model number	_____
Serial number	_____

Table 5. Identification record

The serial number is located on bottom surface on the rear of the machines.

Installed device records

Use the following table to keep a record of the options installed in or attached to your expansion unit. This information can be helpful when you install additional options or if you ever need to report a hardware problem. Copy these tables before recording information in them, in case you need extra space to write new values later, when you update your system configuration.

Expansion unit disk drive location	Disk drive part number and model number	Disk drive serial number	Expansion unit SCSI channel (1,2)	SCSI ID (0-4) or (8-12)	Adapter number	Adapter channel number (1:6)
Bay 1	_____	_____	_____	_____	_____	_____
Bay 2	_____	_____	_____	_____	_____	_____
Bay 3	_____	_____	_____	_____	_____	_____
Bay 4	_____	_____	_____	_____	_____	_____
Bay 5	_____	_____	_____	_____	_____	_____
Bay 6	_____	_____	_____	_____	_____	_____
Bay 7	_____	_____	_____	_____	_____	_____
Bay 8	_____	_____	_____	_____	_____	_____
Bay 9	_____	_____	_____	_____	_____	_____
Bay 10	_____	_____	_____	_____	_____	_____

Table 6. Internal drives and devices

Appendix B. Product warranties and notices

This appendix contains warranty and emission notices for the United States, Puerto Rico, Canada, and the United Kingdom. In addition, this appendix contains trademarks and general-information notices.

This appendix contains:

Warranty Statements	50
IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (Part 1 - General Terms)	50
IBM Statement of Warranty Worldwide except Canada, Puerto Rico, Turkey, United States (Part 1 - General Terms)	52
Part 2 - Worldwide Country-Unique Terms	53
Notices	56
Trademarks	56
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United Kingdom telecommunications safety requirement	57
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Australia and New Zealand Class A statement	57
Taiwanese electromagnetic interference (EMI) statement	58
Power cords	58

Warranty Statements

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

- **United States, Puerto Rico, and Canada (Z125-4753-05 11/97)**
(Part 1 - General Terms on page 50)
- **Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)**
(Part 1 - General Terms on page 52)
- **Worldwide Country-Unique Terms**
(Part 2 - Country-Unique Terms on page 53)

IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (Part 1 - General Terms)

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

Machine - IBM Netfinity EXP200

Warranty Period* - Limited Three-Year On-Site Service

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

The IBM Warranty for Machines

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

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

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

Extent of Warranty

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

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

Items Not Covered by Warranty

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

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

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

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. In the United States, call IBM at 1-800-772-2227. In Canada, call IBM at 1-800-565-3344. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

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

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

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

You also agree to

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

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

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

Production Status

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

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

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

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

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

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

Machine - IBM Netfinity EXP200

Warranty Period* - Limited Three-Year On-Site Service

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

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

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

Extent of Warranty

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

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

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IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be

new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

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

You also agree to

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

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

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

Production Status

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

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

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

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

Part 2 - Worldwide Country-Unique Terms

ASIA PACIFIC

AUSTRALIA: The IBM Warranty for Machines: The following paragraph is added to this Section:

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section:

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

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

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

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

INDIA: Limitation of Liability: The following replaces items 1 and 2 of this Section:

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

NEW ZEALAND: The IBM Warranty for Machines: The following paragraph is added to this Section:

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

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

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

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

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

Warranty Service

If you purchased an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchased an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

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

The following terms apply to the country specified:

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

2. as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

FRANCE: Limitation of Liability: The following replaces the second sentence of the first paragraph of this Section:

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY: The IBM Warranty for Machines: The following replaces the first sentence of the first paragraph of this Section:

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

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months.

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

Extent of Warranty: The second paragraph does not apply.

Warranty Service: The following is added to this Section:

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

Production Status: The following paragraph replaces this Section:

Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

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

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

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

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

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

IRELAND: Extent of Warranty: The following is added to this Section:

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: The following replaces items one and two of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to the greater of Irish Pounds 75,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY: Limitation of Liability: The following replaces the second sentence in the first paragraph:

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: (item 1 unchanged) 2) as to any other actual damage arising in all situations involving non-performance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

The following replaces the second paragraph of this Section:

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND: Limitation of Liability: The following is added to this Section:

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

TURKIYE: Production Status: The following replaces this Section:

IBM fulfils customer orders for IBM Machines as newly manufactured in accordance with IBM's production standards.

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

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to the greater of Pounds Sterling 150,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

The following item is added to this paragraph:

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default will be limited to damages.

NORTH AMERICA

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

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

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Electronic emission statements

Federal Communications Commission (FCC) Statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

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 community directive conformance statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electro-magnetic compatibility.

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.

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.

Taiwanese electromagnetic interference (EMI) 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，在這種情形下，使用者會被要求採取某些適當的對策。

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, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, 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, Cyprus, Dubai, Fiji, Ghana, Hong Kong, 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
6952300	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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