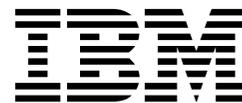IBM® Netfinity® EXP300

IBM

Installation and User's Guide

IBM® Netfinity® EXP300

Installation and User's Guide

Before using this information and the product it supports, be sure to read the general information in "Appendix B. Product warranties and notices," on page 41.

Contents

Safety

Before installing this product, read the Safety Information book.

مج، يجب قراءة   دات السلامة

Antes de instalar este produto, leia o Manual de Informações sobre Segurança.

安装本产品前请先阅读《安全信息》手册。

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs hæftet med sikkerhedsforskrifter, før du installerer dette produkt.

Lue Safety Information -kirjanen, ennen kuin asennat tämän tuotteen.

Avant de procéder à l'installation de ce produit, lisez le manuel Safety Information.

Vor Beginn der Installation die Broschüre mit Sicherheitshinweisen lesen.

Πριν εγκαταστήσετε αυτό το προϊόν, διαβάστε το εγχειρίδιο Safety Information.

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

Przed zainstalowaniem tego produktu należy przeczytać broszurę Informacje Dotyczące Bezpieczeństwa.

Prima di installare questo prodotto, leggere l'opuscolo contenente le informazioni sulla sicurezza.

本製品を導入する前に、安全情報資料を御読みください。

이 제품을 설치하기 전에, 안전 정보 책자를 읽어보십시오.

Пред да го инсталирате овој производ прочитајте ја книгата со безбедносни информации.

Lees voordat u dit product installeert eerst het boekje met veiligheidsvoorschriften.

Les heftet om sikkerhetsinformasjon (Safety Information) før du installerer dette produktet.

Antes de instalar este produto, leia o folheto Informações sobre Segurança.

Перед установкой продукта прочтите брошюру по технике безопасности (Safety Information).

Pred inštaláciou tohto produktu si pre ítajte Informa nú brožúrku o bezpe nosti.

Preden namestite ta izdelek, preberite knjižico Varnostne informacije.

Antes de instalar este producto, lea la Información de Seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

在安裝本產品之前，也請先閱讀「安全性資訊」小冊子。

Installálás el tt olvassa el a Biztonsági el írások kézikönyvét !

Statement 1

Danger

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

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**

- **Connect all power cords to a properly wired and grounded electrical outlet.**

- **Connect to properly wired outlets any equipment that will be attached to this product.**

- **When possible, use one hand only to connect or disconnect signal cables.**

- **Never turn onany equipment when there is evidence of fire, water, or structural damage.**

- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**

- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

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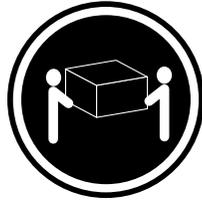
Statement 4

≥18 kg (37 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)
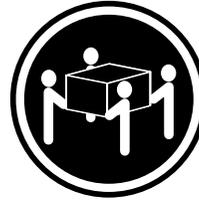
CAUTION:
Use safe practices when lifting.

Statement 5

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

2

1

About this book

This book provides instructions for installing and replacing components in your IBM Netfinity EXP300 storage expansion unit. It also provides information on troubleshooting your expansion unit. To set up your expansion unit, refer to "Chapter 2. Installing the expansion unit," on page 9 for detailed information.

How this book is organized

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

"Chapter 2. Installing the expansion unit," on page 9 contains the information and instructions needed to install the expansion unit in an Electronic Industries Association (EIA) standard rack or NetBAY enclosure. This chapter also contains operating specifications, an inventory checklist, option-switch settings, and power-cord routing information. In addition, this chapter contains instructions for turning the expansion unit on and off during normal and emergency situations.

"Chapter 3. Installing and replacing devices," on page 25 contains step-by-step instructions for installing and removing customer replaceable units (CRUs), such as hard disk drives, power supplies, and environmental services monitor (ESM) boards.

"Chapter 4. Solving problems," on page 35 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.

"Appendix A. Records," on page 39 provides a section to record and update important information about your expansion unit, including serial number and device records. Whenever you add components to your expansion unit, be sure to update the information in this appendix.

"Appendix B. Product warranties and notices," on page 41 contains product notices, warranties, trademarks, and acknowledgments.

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.

- **Caution**

  These notices indicate situations that can be potentially hazardous to you. A caution notice is placed just *before* a description of a potentially hazardous procedure step or situation.

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® EXP300 is a compact unit that provides high-capacity, small computer system interface (SCSI) disk storage. It supports up to 14 Ultra160 SCSI drives on a single or dual logical bus. It delivers fast, high-volume data transfer, retrieval, and storage functions across multiple drives, to multiple hosts. The expansion unit is designed for continuous, reliable service; the modular, redundant disk drives, power supplies with built-in fans, and environmental services monitor (ESM) boards use hot-swap technology for easy replacement without turning off the expansion unit.

The expansion unit supports Ultra160 SCSI for the host and drive interfaces and it is designed for easy installation and integration into a variety of system environments.

After you review the introductory information provided in this chapter, refer to "Chapter 2. Installing the expansion unit," on page 9 to begin the installation process.

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 "Operating specifications" on page 9.

General	• User interface:	ESM boards
• Modular components:	— Built-in power, activity, and fault indicators	• Technology and interfaces:
— High-capacity disk drives	— Identification labeling on customer replaceable units (CRUs), rear indicator lights, switches, and connectors	— SCSI: Ultra160
— Environmental services monitor (ESM) boards		— SCSI bus interface: Two 68-pin, Very High Density Connector Interface (VHDCI) connectors for SCSI bus cables
— Power supplies with built-in fans	— Easy-to-replace drives, power supplies, ESM boards, and fans	
• Technology:		
— Supports disk array technology	**Disk drive storage**	
— Supports clustering	• Current capabilities:	
— SCSI (Ultra160) host interface	— Maximum drives per expansion unit: 14	
— Redundant data storage, power and cooling system, and ESM boards	— Drives per SCSI bus: 7	
	— SCSI buses per unit: 2	
— Hot-swap technology for drives, power supplies with built-in fans, and ESM boards	— SCSI buses can be configured as one continuous SCSI bus.	

Clustering support

Clustering is a feature of the expansion unit. 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 fails after clustering has been set up, another server will take ownership of the disk drives or SCSI bus.

The IBM Netfinity EXP300 supports twin-tailed clustering. With twin-tailed clustering, you can connect two IBM ServeRAID® controllers to an EXP300 expansion unit. In the twin-tailed clustering environment, you can use dual-host controllers cabled separately to the EXP300 expansion unit; however, only a single logical bus of 13 drives is supported. Each SCSI device on a SCSI bus must have a unique ID. To prevent conflicts in a twin-tailed configuration, do not install a drive in the bay that uses SCSI ID 6 because your secondary SCSI ServeRAID controller is set to 6.

Service tip: If you use IBM ServeRAID controllers in a cluster configuration, the termination power LED on the back of the expansion unit is useful. The ServeRAID controller provides the signal for termination power. If the termination power LED is not lit, it indicates that a particular EXP300 expansion unit is not attached to a controller that is turned on. Make a note of which EXP300 expansion unit is attached to which server before the hardware is serviced.

Clustering requires additional hardware and specialized software. For more information, visit the IBM Netfinity Cluster Solutions Web site at:

http://www.ibm.com/pc/us/netfinity/clustering

Getting help on the World Wide Web

You can obtain up-to-date information about your IBM Netfinity EXP300, 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:

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

See "Getting help, service, and information" on page 37 for more information.

Netfinity EXP300 bays

The following sections describe the hot-swap CRUs, the switch card bay, and the bridge card bay on the Netfinity EXP300 expansion unit.

With the hot-swap features of the Netfinity EXP300, you can remove and replace hard disk drives, power supplies/fans, and ESM boards 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. See "Chapter 3. Installing and replacing devices," on page 25 for more information.

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 Netfinity EXP300 supports up to 14 IBM Ultra160 SCSI or Ultra2 SCSI hard disk drives. These drives come pre-installed in a drive tray. The drive and tray assembly is called a *drive CRU* (customer replaceable unit). You can install the drive CRUs in the 14 drive bays on the front of the expansion unit.

In the following figure, seven of the 14 bays contain drive CRUs, and seven bays contain filler panels. To maintain proper cooling within your expansion unit, always keep a filler panel 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 25.

Hot-swap drive bays   Filler panel

Bridge card bay
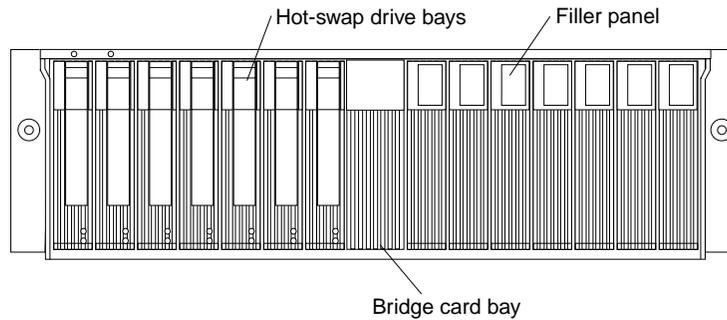
Attention: Never hot-swap a drive CRU when its green activity light emitting diode (LED) is flashing. Hot-swap a drive CRU only when its amber fault LED is lit (not flashing) or when the drive is inactive with the green activity LED off (not flashing).

Bridge card bay

The bridge card is accessible from the front of the unit. You can replace the bridge card CRU, but you must turn off the expansion unit before doing so. Refer to "Replacing a bridge card" on page 30 for step-by-step instructions.

Attention: Never remove the bridge card while the expansion unit is turned on. Refer to "Turning the expansion unit on and off" on page 21.

ESM and power supply bays

The following illustration shows the location of the environmental services monitor (ESM) bays (for the hot-swap ESM boards) and the power supply bays where the hot-swap power supplies are located.

Hot-swap ESM bays

Hot-swap power supply/fan bays
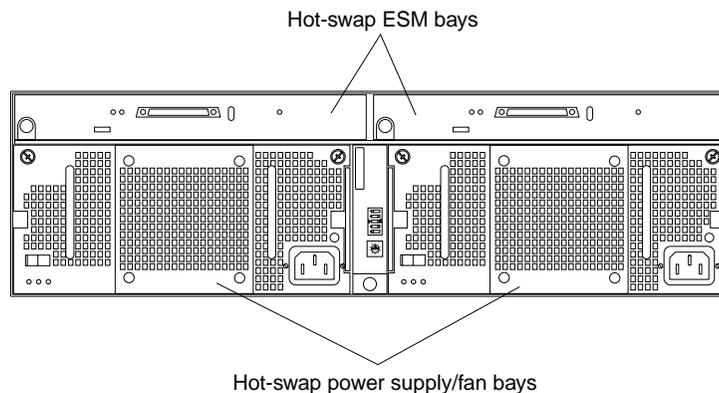
Hot-swap ESM bays
> The ESM boards provide a SCSI interface to the drives and monitor the overall status of the expansion unit. Refer to "Replacing an ESM board" on page 31 for more information.

Hot-swap power supply/fan bays
> Your expansion unit comes with two 500 Watt hot-swap and redundant power supplies with built-in fans. The power supplies are redundant in that a single power supply can provide adequate power and cooling for the entire expansion unit. A single power supply can support up to 14 hard disk drives; however, both power supplies must be installed, even if one power supply is not operational. Refer to "Working with hot-swap power" on page 32 for step-by-step instructions.

Switch card bay

Your expansion unit comes with a switch card that contains five external option switches and four internal option switches. The switch card is located on the back of the expansion unit between the two power supplies. The switch card contains switches that control how power is supplied to the expansion unit and what expansion unit services are enabled (for example, switching between a tower configuration and a rack configuration or switching between a single bus and a dual-bus configuration.) In a dual-bus configuration, each bus uses seven drives. A single-bus configuration uses all 14 drives. To access the four internal option switches, you must turn off the expansion unit; then remove the switch card. Refer to "Replacing the switch card" on page 30 for step-by-step instructions.

Attention: Never remove the switch card or change the switch card settings while the expansion unit and host server is turned on. Refer to "Turning the expansion unit on and off" on page 21.

In addition to the internal and external option switches, the switch card also has a 10-position unit ID switch for setting the expansion unit ID using values 0 through 9. System-management software, such as IBM Netfinity Manager™, uses the ID when it provides data and alerts for the expansion unit.

For more information on option switch settings, see "Setting the interface options and ID settings" on page 11.

The following illustration shows the location of the switch card on the expansion unit.

Switch card

External option switches

Unit ID switch
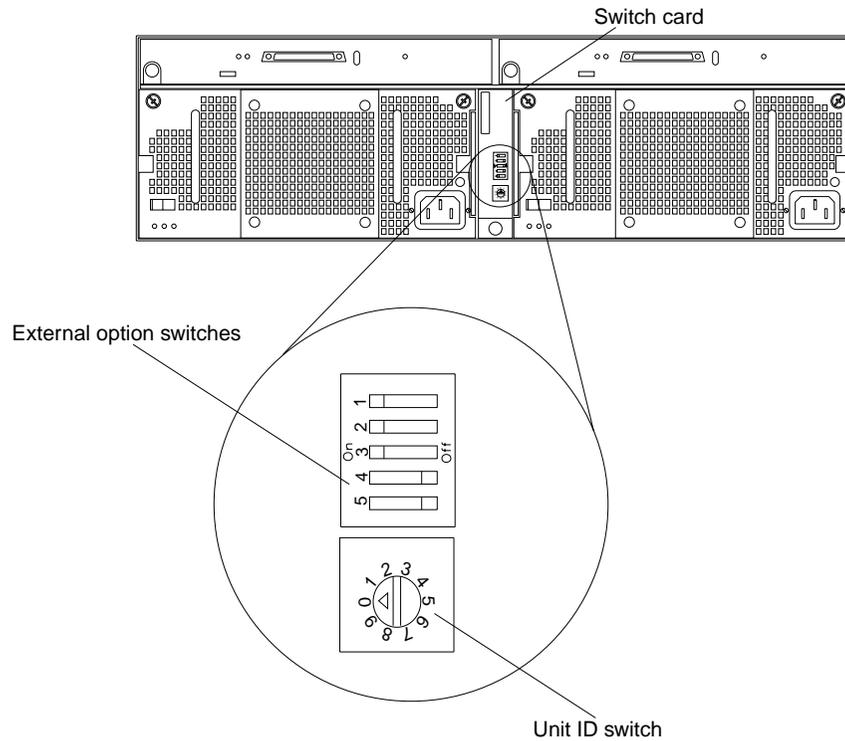
Front controls, indicators, and devices

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

Power-on LED (green)
General-system-
error LED (amber)
Bridge
card bay
Filler panel

Drive CRU

Activity
LED (green)
Fault
LED (amber)
Tray
handle
Latch
Drive bays
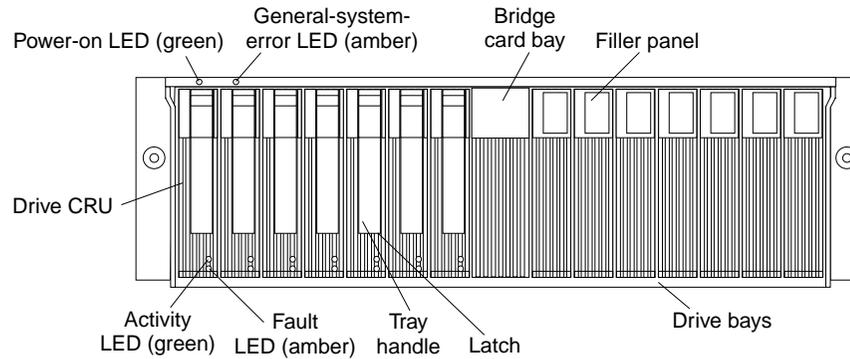
Power-on LED (green)
> This green light indicates that the unit has good dc power.

General-system-error LED (amber)
> When lit, this amber LED indicates that the unit has a fault, such as in a power supply, ESM board, or hard disk drive.

Bridge card bay
> This is the location of the bridge card CRU.

Filler panel
Expansion units shipped without a full set of drives (14) contain filler panels in the unused drive bays. Before installing new drives, you must remove the filler panels and save them for later use. Each of the 14 bays must always contain either a filler panel or a drive CRU.

Drive bays There are 14 drive bays that contain either a drive CRU or a filler panel.

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

Tray handle You can use this multipurpose handle to insert or remove a drive CRU.

Fault LED (amber)
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.

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

Drive CRU You can install up to 14 hot-swap drive CRUs in the expansion unit. Each drive CRU consists of a slim hard disk drive and tray.

Rear controls, indicators, and connectors

Two hot-swap power supplies with built-in fans and two environmental services monitor (ESM) boards are accessible from the back of the expansion unit. These components contain several user indicators and connectors.

Power-supply controls, indicators, and connectors

The following is a list of the controls, indicators, and connectors at back of the EXP300 expansion unit. A description of each item is included:
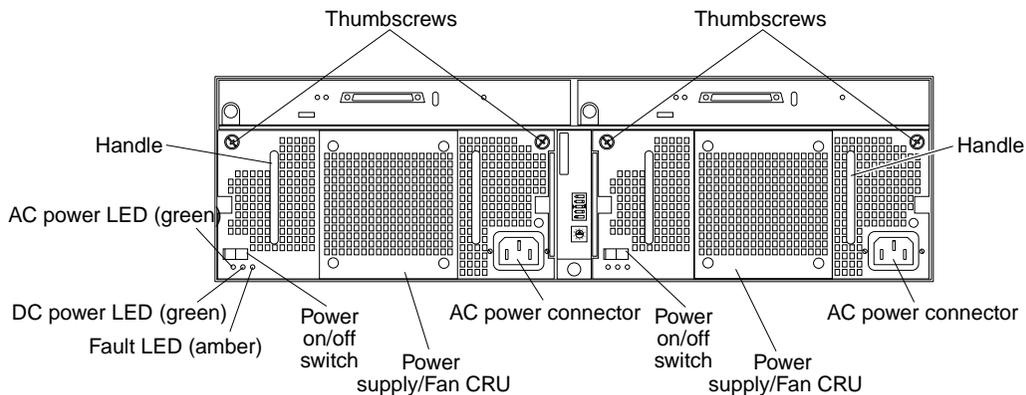
Thumbscrews Loosen the thumbscrews to remove or install a power supply.

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

Power-supply/Fan CRU
The two hot-swap power supplies with built-in fans are located on the back of the expansion unit.

Attention: The EXP300 comes with two power-supply/fan units installed. When one power supply fails, the power-supply unit must be replaced to re-establish redundancy. When replacing the failed unit with the new power supply unit, ensure that this operation is performed in less than 10 minutes to prevent any overheating.

The fan that is visible from the rear of the power supply is an auxiliary fan that is normally off. This fan turns on only when the main fan within the power supply fails.

Power on/off switch
Use this switch to turn the power supply on and off.

Fault LED (amber)
When completely lit, this amber fault LED indicates a power supply failure or that a redundant power supply is not on. This LED also flashes when the built-in fan fails.

DC power LED (green)
This green LED is lit when the expansion unit is turned on and is supplying both 5 V and 12 V dc power.

AC power LED (green)
This green LED is lit when the expansion unit is receiving ac power.

Handles The two handles are used for installing and removing the power supply.

ESM board user controls

Two environmental services monitor (ESM) boards are accessible from the back of the expansion unit. These components contain several user controls, indicators, and connectors.
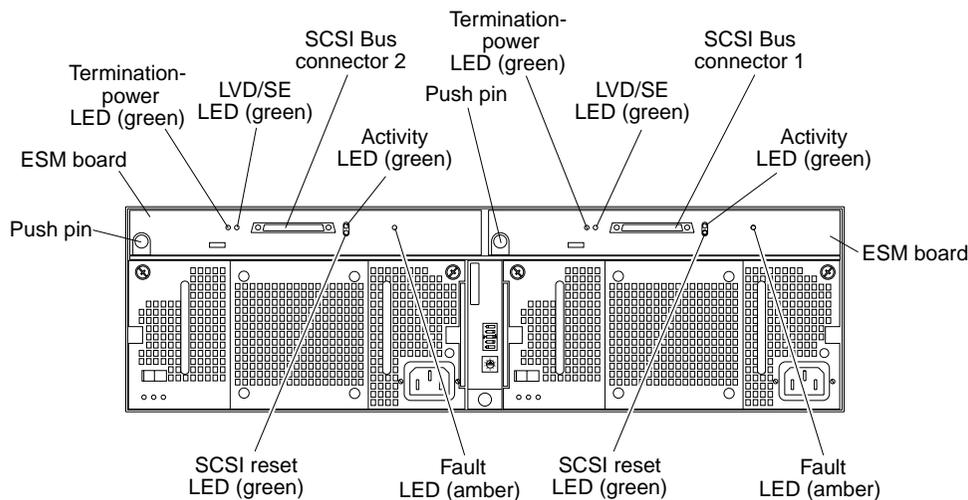
ESM board The environmental services monitor (ESM) boards contain the SCSI controls, LEDs, and connectors.

Fault LED (amber)
When lit, this amber LED indicates an ESM board failure.

SCSI reset LED
When lit, this green LED indicates a SCSI bus reset.

Push pins Each ESM board has an orange push pin at the lower left of the board. Use the orange push pin and lever to remove and insert the ESM board.

Termination-power LED (green)
When lit, this green LED indicates that 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 (green)
When lit, this green LED indicates that the external host bus is in low voltage differential (LVD) mode. When this LED is off, this indicates that the external host bus is in single-ended (SE) mode. Each external bus has a separate LVD ⁄ SE LED. Only LVD host bus controllers are supported.

SCSI bus connector
The 68-pin Very High Density Connector Interface (VHDCI) connectors are for attaching your SCSI cables to SCSI bus 1 and SCSI bus 2.

Activity LED (green)
When lit, this green LED indicates there is activity on the external SCSI bus. Each external bus has a separate activity LED.

System-management software support

The Netfinity EXP300 provides software alert functions through the system monitor functions provided in the IBM Netfinity Manager, IBM Netfinity Director, and IBM ServeRAID manager software.

The following alerts are supported:

- Disk drive disabled
- Power supply failure
- Cooling failure
- IBM Netfinity EXP300 too hot
- Vital Product Data for subcomponents

Note: You must have the correct level of system-management software on your server to enable this functionality.

You must use ServeRAID Version 4.20 or later for your ServeRAID controller to report status and alerts properly. To download the latest ServeRAID software, visit the IBM web site at: http://www.ibm.com/pc/support

For up-to-date information about the IBM Netfinity Manager and Netfinity Director software support available for your EXP300, visit the IBM Web site at: http://www.ibm.com/pc/us/netfinity

For Netfinity Manager users, download Netfinity Manager Version 5.20.6 SP1 or later.

For Netfinity Director users, download Netfinity Director, UM Server extensions Version 2.12 SP1.

Chapter 2. Installing the expansion unit

You can install the EXP300 expansion unit in the following types of enclosures:

* An Electronic Industries Association (EIA) 310 standard rack cabinet
* The IBM Netfinity EXP300 Rack-to-Tower Conversion Kit
* An IBM Netfinity NetBAY enclosure

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

Operating specifications

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

Electrical input	Environment	Acoustical noise emissions values
- Sine-wave input (50 to 60 Hz) is required - Input voltage: - Low range: - Minimum: 90 V ac - Maximum: 127 V ac - High range: - Minimum: 198 V ac - Maximum: 257 V ac - Input kilovolt-amperes (kVA) approximately: - Minimum configuration: 0.06 kVA - Maximum configuration: 0.45 kVA	- Air temperature: - Expansion unit on: 10° to 35° C (50° to 95° F) Altitude: 0 to 914 m (3000 ft) - Expansion unit on: 10° to 32° C (50° to 90° F) Altitude: 914 m (3000 ft.) to 2133 m (700 ft) - Humidity: 8% to 80% **Size (with front panel and without mounting rails)** - Depth: 53.8 cm (21.2 in) - Height: 12.8 cm (5 in) - Width: 44.7 cm (17.6 in) **Weight** - Standard expansion unit as shipped: 22.5 kg (49.5 lbs) - Typical expansion unit fully loaded: 36.1 kg (79.4 lbs)	For open bay (no drives installed) and maximum system configurations (14 hard disk drives installed). - Sound power (idling): 5.6 bels (open bay) 5.7 bels (typical) - Sound power (operating): 5.6 bels (open bay) 6.5 bels (typical) - Sound pressure (idling): 44 dBA (open bay) 47 dBA (typical) - Sound pressure (operating): 44 dBA (open bay) 54 dBA (typical) These levels are measured in controlled acoustical environments according to 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.

Inventory checklist

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

- **Hardware:**
    - IBM Netfinity EXP300 storage expansion unit
    - Two or four power cords, depending on your country
    - One 2 m (6.56 ft) SCSI cable
    - One sheet of expansion unit ID (0-9) labels
    - One sheet of four SCSI ID labels
    - One rack-mounting hardware kit
        - Two rails (right and left assembly)
        - Two M5 screws
        - Ten M6 screws
        - Ten M6 cage nuts
        - Ten M6 clip nuts
- **Publications:**
    - *IBM Netfinity EXP300 Installation and User's Guide* (this book)
    - IBM Safety Book
    - 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 39. Then, return to this chapter to begin the installation process.

Getting started

Before you begin, review the following 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 VHDCI 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 under "Operating specifications" on page 9.

Preparing the expansion unit

This section explains how to remove the CRUs and set the option switches to prepare the expansion unit for installation.

Removing CRUs

It is easier to lift the expansion unit and install it in a rack or tower enclosure if you remove all CRUs (disk drives, power supplies, and ESMs) first. A fully loaded expansion unit with 14 hard disk drives and two power supplies installed weighs 36.1 kg (79.5 lb). The standard unit with two power supplies weighs 22.5 kg (49.5 lb). 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 each one in the same drive bay from which you removed it. Failure to do so could result in a loss of data.

See "Chapter 3. Installing and replacing devices," on page 25 for information on removing the CRUs.

Statement 4
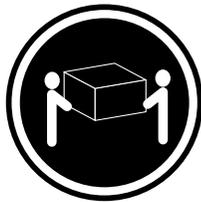
≥18 kg (37 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)
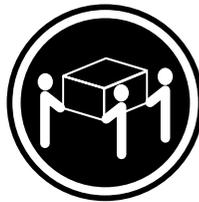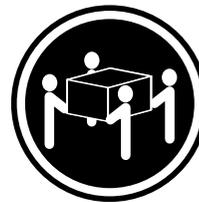
CAUTION:
Use safe practices when lifting.

Setting the interface options 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.

The switch card located on the back of the expansion unit has five external option switches, four internal option switches, and a unit ID switch. It is easier to set these switches before you install the expansion unit in a rack or tower enclosure.

Attention: Always set the option switches while the expansion unit and host server are turned off. Failure to do so will result in loss of data. See "Turning the expansion unit on and off" on page 21.
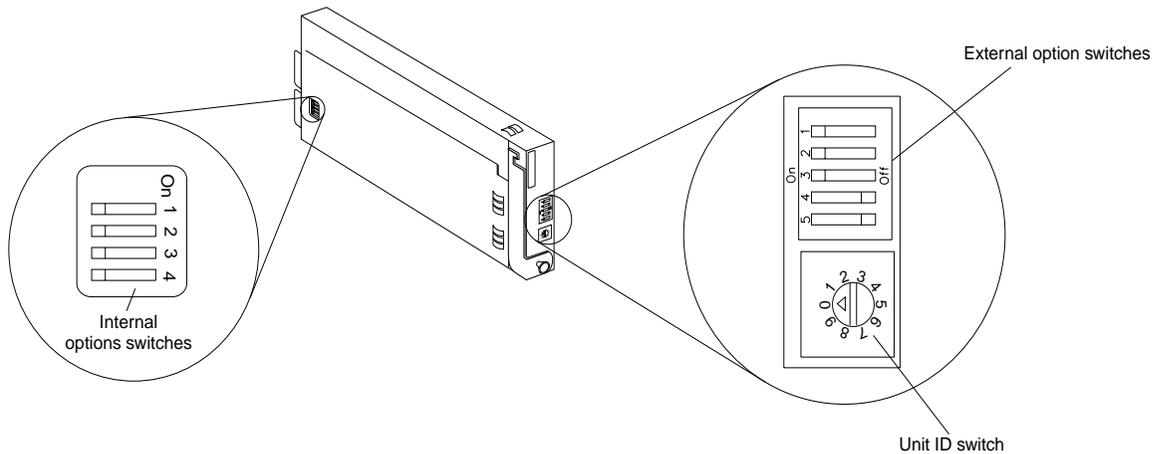
External option switches

The five option switches on the exterior of the switch card are: Option switch 1 controls the power supply to the expansion unit. Option switches 2 through 5 are reserved; leave these switches in the default positions.

Option switch 1 — Power-control switch
> When this option switch is set to Off, the expansion unit turns on and off automatically when you turn the host machine on and off. This occurs only if termination power is present (the termination-power LED is on) at the external SCSI connector.
>
> When this option switch is set to On (the default), you must turn the expansion unit on and off separately.

Option switches 2 through 5 — Reserved
> These option switches are reserved; leave these option switches set to the default positions. Set switches 2 through 5 (On, On, Off, Off) respectively.

Internal option switches

The four option switches inside the switch card are: Option switch 1 controls SCSI addresses for the rack and tower installation modes. Option switch 2 controls the front panel power and fault LEDs for the rack and tower. Option switch 3 controls the SCSI bus, and option switch 4 is reserved; leave this switch in the Off position.

Attention: A loss of data can occur if you change the position of internal option switch 1 or internal option switch 3 after storing data on the drives. Please contact the IBM HelpCenter for assistance if you want to change the configuration of your expansion unit from a rack (internal switch 1 Off) to a tower (internal switch 1 On) or from a tower to a rack orientation. If you want to change the configuration of your expansion unit from a single-bus (internal option switch 3 Off) to a dual-bus (internal option switch 3 On) or from a dual-bus to a single-bus. See "Getting help, service, and information" on page 37 for more information.

SCSI buses and IDs
> There are two SCSI buses (bus 1 and bus 2) in the expansion unit. Each bus uses seven 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 of option switch 1 (inside the switch card).

Option switch 1 — SCSI-address switch
> This switch sets the order of the SCSI IDs. The default is Off for a rack unit installation. In the rack unit, the SCSI IDs are from left to right, 0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, and 14. When this switch is set to On for a tower installation, the SCSI IDs are from top to bottom, 0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, and 14.

Option switch 2 — Rack/tower LED switch
> **Note:** If you are installing the EXP300 in a tower, refer to the Rack-to-Tower Conversion Kit instructions for option switch settings and labeling information.
>
> Option switch 2 is the rack and tower mode switch. Set this switch to the Off position when the unit is placed in a rack and in the On position when the unit is placed in a tower.
>
> When shipped, option switch 2 is set to the rack (Off) position. When you make the change to install it into a tower, option switch 2 is in the On position and the general system error indicator on the front panel is swapped with the power-on LED, placing the green power-on LED above the general-system error indicator.
>
> Set this switch to Off (the default) for a rack unit and On for a tower unit.

Option switch 3 — SCSI bus split switch
> This switch controls the SCSI bus configuration. When this option switch is set to Off (the default), the expansion unit configuration is set as a single SCSI bus mode. When this option switch is set to On, the expansion unit configuration is set as a dual SCSI bus (split bus) mode.

Option switch 4 — Reserved
> This switch is reserved; leave this option switch set to Off (the default).

Unit ID switch

The unit ID switch has 10 settings. You can use these settings (0 through 9) to set an ID for the expansion unit. System-management software, such as IBM Netfinity Director, uses this expansion unit ID when it provides data and alerts for the expansion unit.

Important information for IBM ServeRAID:

If you are using a ServeRAID software version earlier than the 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.

Installing the expansion unit in a rack

The EXP300 expansion unit requires 3U (5.25 in) of Electronic Industries Association (EIA) rack-mounting space.

Important: Review the documentation that comes with your rack enclosure for safety and cabling considerations. When installing your expansion unit in a rack, take the following precautions:

- Install the expansion unit in a maximum 35 degree C environment.
- To ensure proper air flow, do not block the air vents; usually 15 cm (6 inches) of air space is sufficient.

  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.

- To ensure stability, take precautions to prevent uneven loading of the rack. Loading of the rack should begin at the bottom.
- Turn off the power to your rack.
- When multiple components are installed in a rack, take precautions to prevent overloading of the power outlets.
- The expansion unit should always be connected to a properly grounded outlet.
- Refer to the rack documentation for instructions on removing the rack enclosure doors and side panels.

Use the rack-mounting template and installation instructions that come with the expansion unit to locate the rack-mounting holes and to install the unit in a rack cabinet. If you do not have the template and instructions, you can use the following steps to install your expansion unit:

1. Use the following illustration of the front and rear rack mounting flanges to determine the appropriate rack-mounting holes for installing cage nuts or clip nuts to secure the Netfinity EXP300 rails. From left to right, the illustration shows the front and rear flanges respectively.

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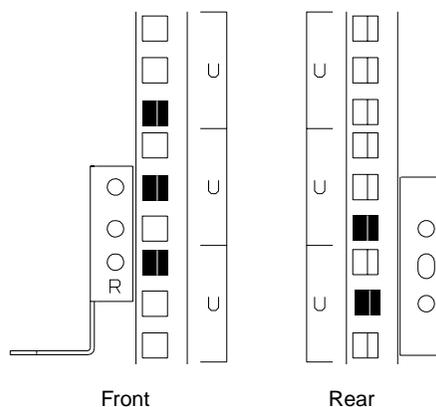
Note: Use clip nuts if your rack has holes. If your rack has square holes, you can use the rack-insertion tool or a flat-blade screwdriver to install cage nuts.

Cage nut

Clip nut
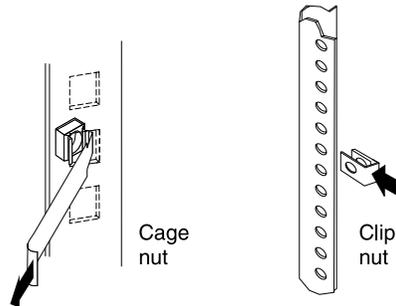
2. On the rail marked *R*, loosen the four screws **2** .

3. Hold the rail against the outside of the right rack-mounting flange, and loosely insert the two front M6 screws **1** .

4. Extend the rail outside of the rear rack-mounting flange; then, install and tighten two rear M6 screws **3** .

5. Tighten the two front screws **1** ; then, tighten the four screws **2** .

   Repeat step 2 through step 5 to install the rail marked *L* on the left side of the rack.
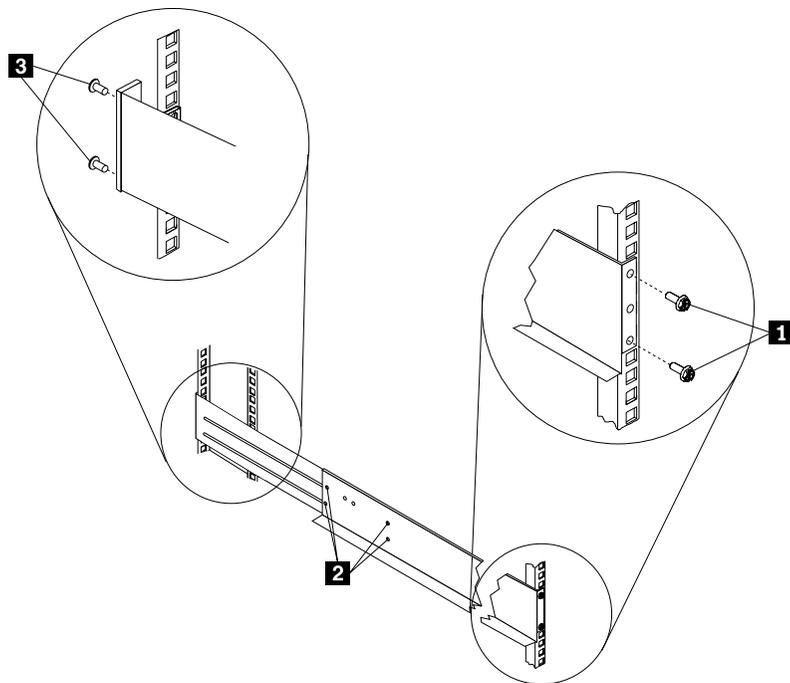
6. Loosely insert one M5 screw **1** into each rail.
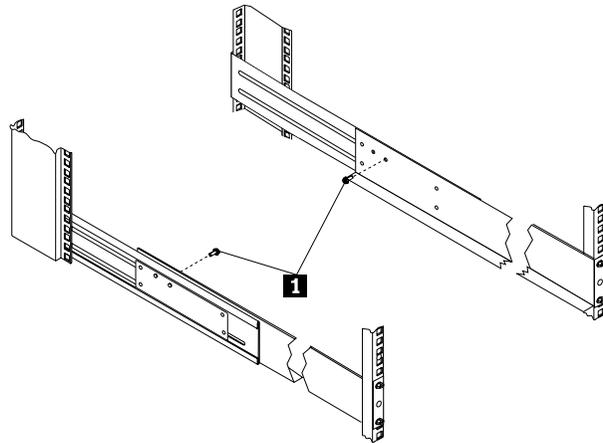
Statement 4
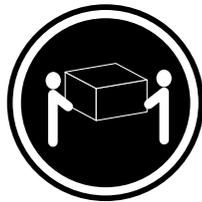
≥18 kg (37 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)
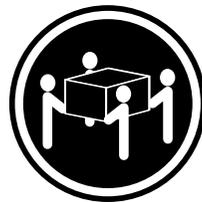
CAUTION:
Use safe practices when lifting.

7. Slide the expansion unit into the rack, and insert the M6 screws **1** . Do not overtighten the M6 **1** screws.
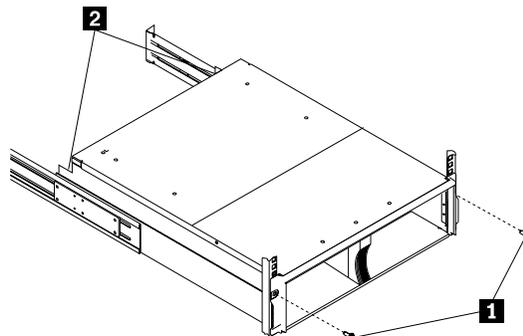
8. Tighten the rear screws **2** .

9. Verify that option switches 1 and 2 (inside the switch card) are set to Off. See "Setting the interface options and ID settings" on page 11 for more information.

10. Install hard disk drives and power supplies in the EXP300 expansion unit according to "Chapter 3. Installing and replacing devices," on page 25; then, return here to complete the installation.

11. Continue with "Completing the installation" on page 19.

Installing the expansion unit in a NetBAY enclosure

NetBAY enclosures are stackable and each can store a different device, such as the EXP300 expansion unit. You also can attach a server to the top of the enclosure. Refer to the NetBAY documentation for details on installing other devices.

Note: Because of the depth of the NetBAY3E enclosure, it might be difficult to set the expansion unit option switches once installed. Verify that internal option switches 1 and 2 are set to Off, and that internal option switch 3 and the unit ID switch are set properly for your environment. See "Setting the interface options and ID settings" on page 11 for more information.

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

1. Remove the rear plate of the enclosure **1** .
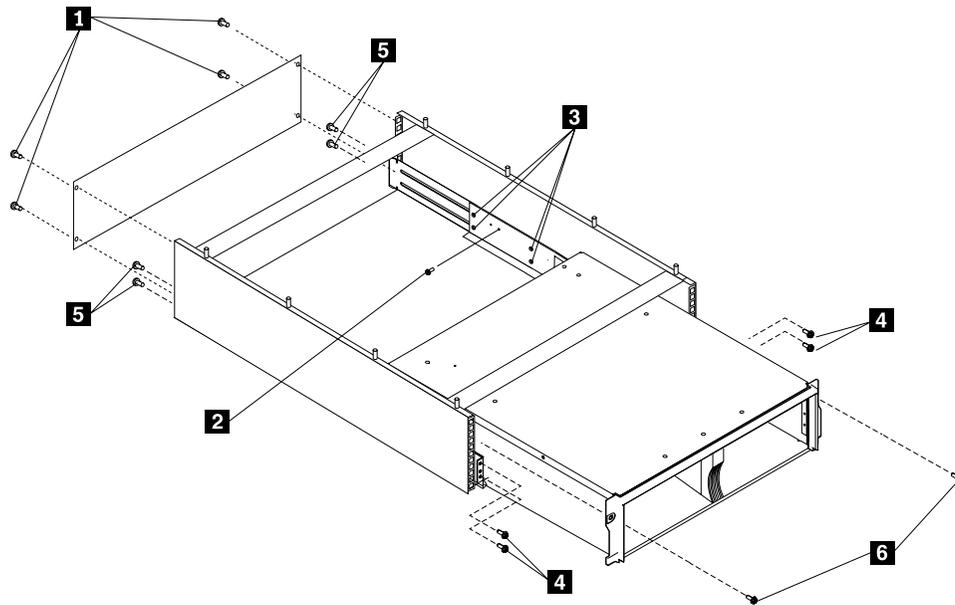
2. Use the following illustration of the front and rear rack-mounting flanges to determine the appropriate enclosure mounting holes for installing cage nuts to secure your device and rails. From left to right, the illustration shows the front and rear flanges respectively.

Front   Rear
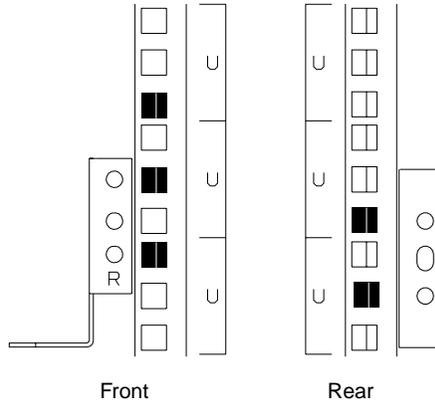
3. On the rail marked *L*, loosen the four screws **3** .

4. Hold the rail against the outside of the left enclosure-mounting flange, and loosely insert the two M6 screws **4** .

5. Extend the rail outside of the rear enclosure mounting flange; then, install and tighten the two rear M6 screws **5** .

6. Tighten the two front screws **4** ; then, tighten the four screws **3** .

   Repeat step 3 through step 5 to install the rail marked *R* on the right side of the enclosure.

7. Loosely insert an M5 screw **2** into each rail.

Statement 4
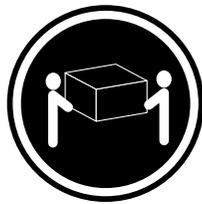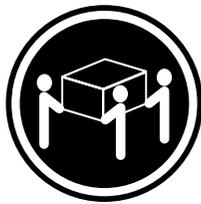
≥18 kg (37 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)
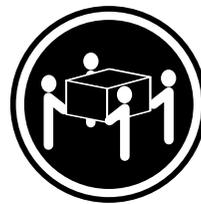
CAUTION:
Use safe practices when lifting.

8. Slide the expansion unit into the enclosure.

9. Insert two M6 screws **6** . Do not over tighten the M6 **6** screws.

10. Tighten the rear screws **2** .

11. Install hard disk drives and power supplies in the EXP300 expansion unit according to "Chapter 3. Installing and replacing devices," on page 25; then, continue with "Completing the installation" on page 19.

Completing the installation

After you install the hard disk drives and power supplies, follow the instructions in this section 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 one sheet of 10 labels (0-9) and one sheet of 4 labels (SCSI ID) labels.

Note: If you are installing the EXP300 expansion unit in a tower, refer to the information provided with the Rack-to-Tower Conversion Kit to set the option switches and install the SCSI ID labels.

Complete the following steps to install the SCSI identification labels:

To install the label:

1. Locate the SCSI ID label for your configuration.

   Note: For a dual-bus configuration, the SCSI ID label includes an arrow with a 1 and a 2 pointing to each bus. Use the single-bus label if internal option switch 3 is set to Off. Use the dual-bus label if internal option switch 3 is set to On.

   a. Orient the label so that the printed numbers are legible from left-to-right.

   b. Peel the backing away from the adhesive side of the label.

   c. Carefully butt the edge of the SCSI ID label up against the edge of the serial number label so that the 14 printed ID numbers are located beneath each of the drive bays.

   d. Apply the label to the front of the unit, as shown in the following illustrations.

   Single-bus configuration

Expansion unit ID label   SCSI ID label   Serial number label

Dual-Bus configuration

Expansion unit ID label   SCSI ID label   Serial number label
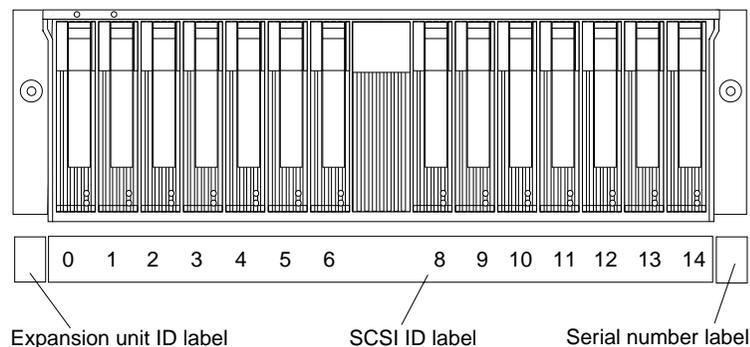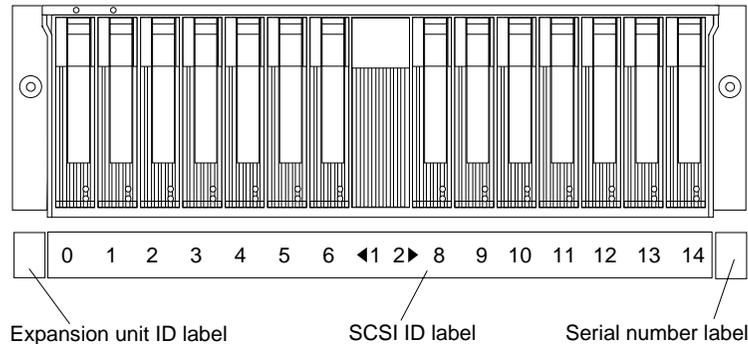
  2. Install the expansion unit ID label.

    a. Verify the setting of the expansion unit number switch (0-9).

    b. Apply the expansion unit ID label that matches the setting for the unit ID switch in the blank label area directly to the left of the SCSI ID label.

  3. 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 21 for the initial startup of the expansion unit.

SCSI cabling information

The IBM Netfinity EXP300 comes with two ESM boards. There are two 68-pin SCSI Very High Density Connector Interface (VHDCI) connectors. From left to right as seen from the back, these connectors are for SCSI bus 2 and SCSI bus 1. See "Rear controls, indicators, and connectors" on page 6 for the location of these connectors. There are three ways to configure these buses.

Attention: A loss of data can occur if you change the position of internal switch 1 or internal switch 3 after storing data on the drives. Please contact the IBM HelpCenter for assistance if you want to change the configuration of your expansion unit from a rack (internal switch 1 Off) to a tower (internal switch 1 On) or from a tower to a rack orientation. See "Getting help, service, and information" on page 37" for more information.

- To configure each bus independently:

    1. Verify that option switch 3 (inside the switch card) is set to On. See "Setting the interface options and ID settings" on page 11 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 14-drive SCSI bus:

    1. Verify that Option Switch 3 (inside the switch card) is set to Off. See "Setting the interface options and ID settings" on page 11 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 13 drives on a single SCSI bus when using IBM ServeRAID controllers:

    Note: When clustering with IBM ServeRAID adapters, you must configure all 13 disk drives on a single SCSI bus. The drive bay with SCSI ID=6 is automatically disabled to avoid an ID conflict with one of the ServeRaid controllers.

1. Verify that internal option switch 3 is set to Off. See "Setting the interface options and ID settings" on page 11 for more information.

2. Attach one external SCSI cable from the controller in server 1 to the SCSI-bus 1 connector.

3. Verify that the drive bay with SCSI ID=6 contains a filler panel.

4. Verify that one of the ServeRAID controllers is set to SCSI ID=6.

5. Attach a second external SCSI cable from the controller in server 2 to the SCSI-bus 2 connector.

SCSI cable restriction

The SCSI controller inside your server must have a dedicated SCSI channel for the expansion unit. If an external channel is being used for the expansion unit, its corresponding internal channel must not be used for other devices.

Power cabling

The expansion unit uses two or four power cords, depending on your country. 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.

Attach the power supply power cords as follows:

1. Connect the power cord to the power supply.

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

3. Go to "Turning the expansion unit on and off" below for information about the initial startup of the expansion unit.

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 "Turning on the expansion unit after an emergency" on page 23.

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 cables are properly attached.

    b. Both power cords are plugged into the back of the expansion unit and into properly grounded electrical outlets.

     c. All hard disk drives are locked securely in place.

     d. All switches are set correctly: the internal option switches 1 through 4, external option switches 1 through 5, and the unit ID switch on the expansion unit. See "Setting the interface options and ID settings" on page 11 for more information.

2. Check the system documentation for all the hardware devices you intend to turn on and determine the proper power-on sequence.

    Note: Be sure to turn on the IBM Netfinity EXP300 expansion unit before or at the same time as you turn on the server.

3. Turn on each device, based on this power-on sequence.

4. Turn on both power supplies on the back of the unit.

The expansion unit might take a few seconds to turn on. During this time, you might see the fault (amber) and the power (green) LEDs on the expansion unit turn on and off intermittently. When the power-on sequence is complete, only the power (green) LEDs on the front and back should remain on. If one or more fault (amber) LEDs remain lit, refer to "Troubleshooting" on page 35.

Attention: If you have data stored on the drives, label the drives before you remove them. Then, when you replace the drives, install each one in the same drive bay from which you removed it. Failure to do so will result in a loss of data.

Turning off the expansion unit

Attention: Except in an emergency situation, 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 turn on correctly later. Refer to "Troubleshooting" on page 35.

Statement 5
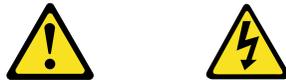
CAUTION:
The power control button on the device and the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2
1
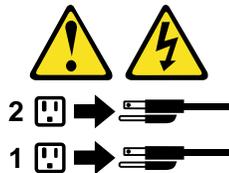
The expansion unit is designed to run continuously, 24 hours a day. Turn off the power only when at least one of the following is true:

• 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 "Turning off the expansion unit in an emergency" below.

Use the following procedure to turn off the expansion unit:

1. Power down the server attached to the expansion unit.
2. Make sure that all amber fault LEDs are off. If any fault LEDs are lit (drives, power supplies, or ESM boards), correct the problem before you turn off the power. For guidance, refer to "Troubleshooting" on page 35.
3. Turn off both power supplies.

Turning off the expansion unit in an emergency

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, refer to "Troubleshooting" on page 35.

Use the following procedure to turn off the expansion unit during an emergency situation:

1. Power down the server attached to the expansion unit.
2. If you have time, stop all activity and check the LEDs (front and back). Make note of any fault LEDs that are lit so that you can correct the problem when you turn on the power again.
3. Turn off all power supplies; then, unplug the power cables from the expansion unit.

Turning on the expansion unit after an emergency

Use the following procedure to restart the expansion unit if you turned off the power supplies during an emergency shutdown, or if a power failure or a power outage occurred:

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

   Note: Be sure to turn on the IBM Netfinity EXP300 before or at the same time you turn on the system unit.

4. Turn on each device, based on the power-on sequence.
5. Turn on both power supplies on the back of the IBM Netfinity EXP300.
6. Only the power (green) LEDs on the front and back should be on. If one or more of the fault (amber) LEDs are on, refer to "Troubleshooting" on page 35 for instructions.
7. Use your installed software application as appropriate to check the status of the expansion unit.

Chapter 3.   Installing and replacing devices

This chapter provides instructions for installing or replacing customer replaceable units (CRUs), such as hot-swap drives, ESM boards, the bridge card, the switch card, and power supplies.

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 an 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 cover or on any metal surface.
- When possible, wear an electro-static discharge (ESD) protective ground strap.

Working with hot-swap drives

> **Before you begin**
> - Read the safety and handling guidelines provided in "Safety" on page v and "Handling static-sensitive devices."
> - 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.

This section explains how you can increase the expansion unit capacity by adding more drives or replacing existing drives with larger capacity drives.

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

Hot-swap hardware
You can replace a failed hard disk drive without turning off the expansion unit. Therefore, you can continue 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 Ultra160 and IBM Ultra2 SCSI hard disk drives. These IBM drives come pre-installed in a drive tray, ready for installation. (Do not detach the drive from the tray.) This drive and tray assembly is called a *drive customer replaceable unit (CRU)*. You can install the drive CRUs directly into the 14 drive bays on the front of the expansion unit. Be sure 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 "Installed-device records" on page 39.

Attention: If you re-install a drive in the wrong bay, you could lose data.

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

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

Filler panels
Expansion units are shipped without a full set of drives (14). They contain filler panels in the unused drive bays. Before installing new drives, you must remove the filler panels, which should be saved. Each of the 14 bays must always contain either a filler panel or a drive CRU.

Hard disk drives
You can install only slim hot-swap drive CRUs in the EXP300 expansion unit.

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 turned on.

Note: If you are replacing a drive, see "Replacing hot-swap drives" on page 28.

1. Read the instructions that come with the drive CRU.

2. Check for fault LEDs. If any amber LEDs are lit, refer to "Troubleshooting" on page 35.

Drive CRU   Filler panel

Activity LED   Fault LED   Latch   Tray handle
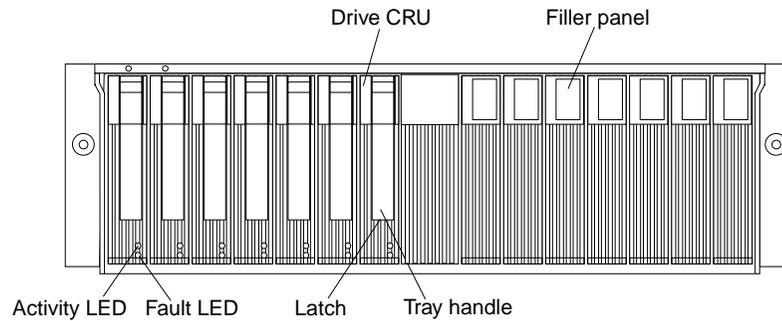
3. Determine the bay into which you want to install the drive.

4. Remove the filler panel.

   a. Insert a finger into the square hole at the top of the filler panel to grip and pull the panel out of the drive bay.

   b. Save the filler panel 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**.
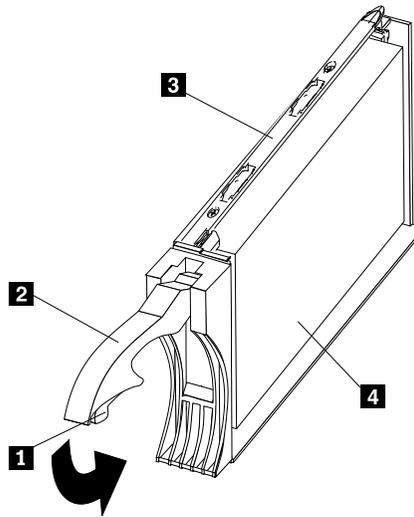
   a. Release the blue latch **1** on the drive CRU by pressing on the inside of the bottom of the tray handle **2**.

   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. 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 after the drive-state change.

  7. 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 boards, 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.

To replace a hot-swap drive:

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 flashing. Hot swap a drive CRU only when its amber fault LED is lit (not flashing) or when the drive is inactive (activity LED is off).

2. Remove the drive CRU.

   a. Press on the inside of the bottom of the tray handle **2** to release the blue latch **1**.

   b. Pull the handle **2** on the tray **3** out into the open position.

   c. Lift the drive tray 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, and then slide it completely out of the expansion unit.

3. Install the new drive CRU.
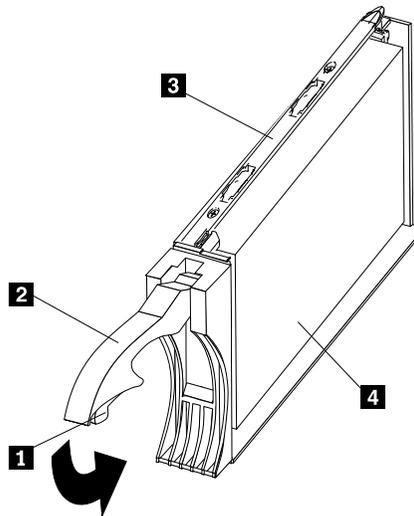
   a. Gently push the drive CRU into the empty bay until the tray handle **2** touches the expansion unit tray.

   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 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 after the drive-state change.

Working with cards and boards

Before you begin

- Read the safety and handling guidelines provided in "Safety" on page v and "Handling static-sensitive devices" on page 25.

- 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.

The expansion-unit bridge card, switch card, and ESM boards are customer replaceable units (CRUs). This section contains step-by-step instructions for removing and replacing each device.

Replacing a bridge card

To replace the bridge card CRU in the EXP300 expansion unit, follow the instructions for removing the bridge card and installing a bridge card.

Removing a bridge card

Attention: Before removing the EXP300 bridge card, you must turn off the expansion unit. Refer to "Turning the expansion unit on and off" on page 21 for detailed instructions.

Complete the following steps to remove the EXP300 bridge card:

1. Turn off the expansion unit. Refer to "Turning the expansion unit on and off" on page 21.

2. Remove the drive CRUs or filler panels from the left and right of the bridge card bay. Refer to "Replacing hot-swap drives" on page 28.

3. Squeeze the bridge-card cover **1** clips, and pull the bridge card cover **1** off.

4. Lift the tray handle **2** , and pull the tray **3** that contains the bridge card out of the bridge card bay.
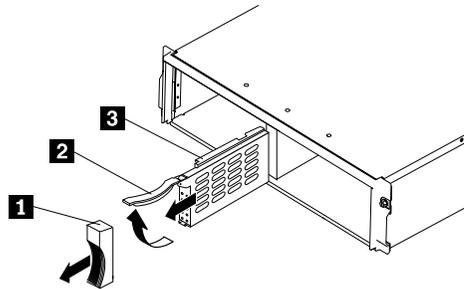
Installing a bridge card

Attention: Make sure the expansion unit is turned off before installing a bridge card. Refer to "Turning the expansion unit on and off" on page 21.

Complete the following steps to install the EXP300 bridge card:

1. Make sure the expansion unit is turned off.

2. Hold the bridge card tray **3** so the tray handle **2** is at the top of the bridge card tray and pointing outward.

3. Slide the tray **3** that contains the bridge card into the bridge card bay.

4. Push the tray handle **2** down, locking the bridge-card tray into place.

5. Replace the bridge card cover **1** by squeezing each of the four tabs, locking the cover into place.

6. Turn on the expansion unit. Refer to "Turning the expansion unit on and off" on page 21.

Replacing the switch card

To replace the switch card CRU in the EXP300 expansion unit, follow the instructions for removing the switch card and installing the switch card.

Removing the switch card

Attention: Before removing the switch card, be sure to turn off the expansion unit. Refer to "Turning the expansion unit on and off" on page 21. Make note of the switch card settings so you can set the new card to the same settings. Failure to do so will result in loss of data.

There is one switch card located between the two power supply/fan units at the back of the unit. Complete the following steps to remove the switch card:

1. Turn off the expansion unit.
2. Locate the blue push pin **2** at the bottom of the switch card tray.
3. Pull out the blue push pin **2** .
4. Pull up on the switch-card tray handle **1** .
5. Slide the tray that contains the switch card out of the switch card bay.
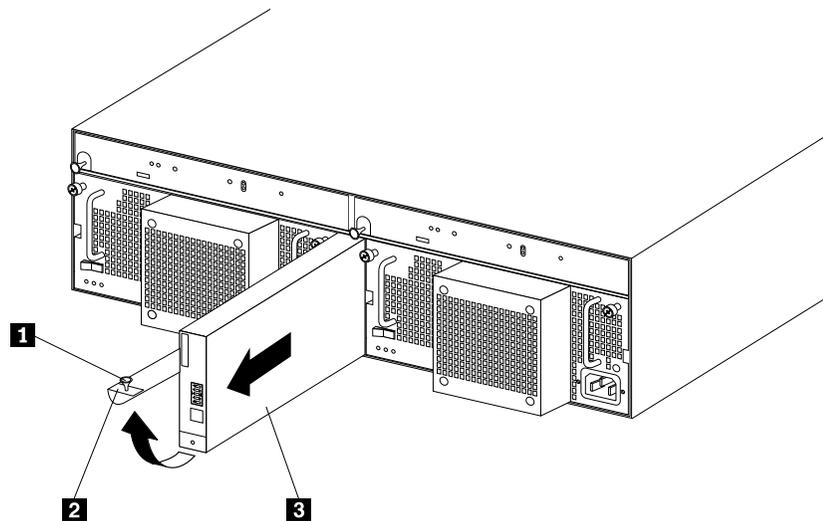
Installing a switch card

Attention: Before installing a new switch card, make sure that the switch card settings are the same as the settings on the switch card being replaced, and that the expansion unit is turned off. Refer to "Turning the expansion unit on and off" on page 21. Failure to do so will result in loss of data.

There is one switch card located between the two power supply/fan assemblies at the back of the unit. Complete the following steps to install the switch card:

1. Make sure the expansion unit is turned off.
2. Hold the switch card so the blue push pin **1** is at the bottom of the card and the tray handle **2** is to the left of the card.
3. Hold the tray handle **2** up and slide the card **3** into the bay until it stops.
4. Push the tray handle **2** all the way down; then, push in the push pin **1** .

Replacing an ESM board

To replace an ESM board CRU in the EXP300 expansion unit, follow the instructions for removing an ESM board and installing an ESM board.

Removing an ESM board

There are two hot-swap ESM boards at the back of the unit. You can remove the ESM board and SCSI cable without turning off power to the EXP300. Complete the following steps to remove an EXP300 ESM board:

1. Power down the server attached to the ESM Board.
2. Disconnect the SCSI cable **1** from the ESM Board.
3. Locate the orange push pin **4** to the left of each ESM board.
4. Pull the orange push pin **4** out.
5. Holding the pin, pull the tray handle **3** out and to the right.
6. Slide the ESM board **2** out of the expansion unit.
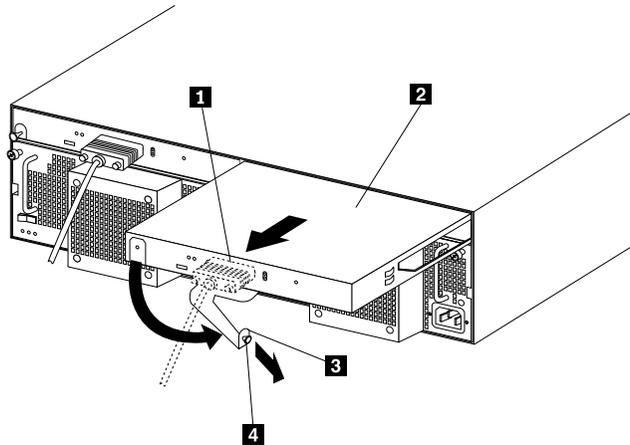
Installing an ESM board

There are two hot-swap ESM boards at the back of the unit. You can install the ESM board and SCSI cable without turning off power to the EXP300. Complete the following steps to install an EXP300 ESM board:

1. Hold the board so the tray handle **3** is attached to the bottom of the tray, and the tray handle **3** is fully extended.
2. Slide the ESM board **2** into the bay, and move the handle **3** to the closed position (left) until it clicks.
3. Push in the orange push pin **4**.
4. Connect the SCSI cable **1** to the ESM board.
5. Power on the server attached to the ESM board.

Working with hot-swap power

Before you begin

• Read the safety and handling guidelines provided in "Safety" on page v and "Handling static-sensitive devices" on page 25.

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

- The power supplies must always be installed in the proper place to maintain proper expansion unit cooling.
- Use only the supported power supplies for your specific expansion unit.

Removing a hot-swap power supply/fan unit

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

1. Turn off the power supply.
2. Unplug the power supply cord from the electrical outlet.
3. Disconnect the power cord from the power supply.
4. Loosen the power supply thumbscrews **1** .
5. Grasp the handles **2** on each side of the power supply, and pull the unit out of the expansion unit.
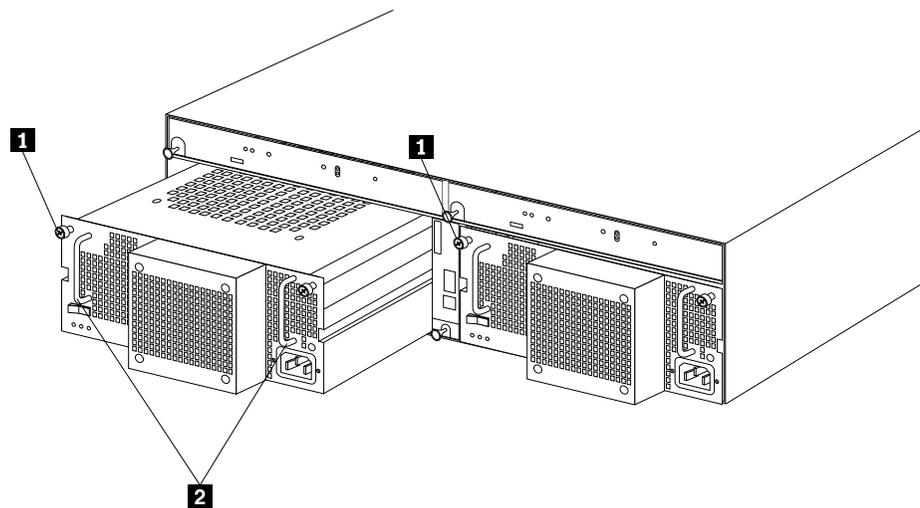
Installing a hot-swap power supply/fan unit

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

1. Ensure that the power supply you are installing is turned off.
2. Grasp the handles **2** and slide the power supply into the expansion unit.
3. Tighten the power supply thumbscrews **1** .
4. Connect the power cord to the power supply.
5. Plug the supply power cord into a properly grounded electrical outlet.

   If you just installed a second (redundant) supply, the fault (amber) LED will light because its power switch is turned off.

6. Turn on the power supply.

   If you just installed a second (redundant) supply, after you turn on the power, the fault (amber) LED will turn off and the ac and dc power (green) LEDs will turn on.

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.

Troubleshooting

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 the failed drive. Refer to "Replacing hot-swap drives" on page 28.
	ESM board	Board failure	Replace failed board. Refer to "Replacing an ESM board" on page 31.
	Front panel	General machine fault	Indicates that a Fault LED somewhere on the expansion unit has been turned on. Check for amber LEDs and CRUs, Refer to "Rear controls, indicators, and connectors" on page 6.
Amber LED on and green LED off	Power-supply CRUs	Power is turned off	Turn on all power supplies. Refer to "Rear controls, indicators, and connectors" on page 6.
Amber and green LEDs on	Power-supply CRUs	Power supply failure	Replace the failed power supply CRU. Refer to "Replacing an ESM board" on page 31.
All green LEDs off	All CRUs	The expansion unit is turned off	Check that all expansion unit power cables are plugged in and the power is on. If applicable, check that the main circuit breakers for the rack are turned on.

If the external switch 1 is set to Off, the SCSI controller must be cabled to the EXP300 and turned on. |
		AC power failure	Check the main circuit breaker and ac outlet.
		Power supply failed	Replace the power supply CRU. Refer to "Removing a hot-swap power supply/fan unit" on page 33.
		Midplane failure	Have the expansion unit serviced.
Amber LED flashing	Drive CRUs	Drive rebuild or identity is in process	No corrective action is needed.
	Power supply CRU	Fan failure	Replace the power supply CRU.

Problem indicator	Component	Possible cause	Possible solutions
Amber LED on and green dc power LED off	Power supply CRU	Power supply failure	If the power switch is on, replace the power supply CRU. Refer to "Removing a hot-swap power supply/fan unit" on page 33.
Amber LED on and green ac power LED off	Power supply CRU	No ac power to power supply. Check the ac power cord (cable) or breaker	If ac power is good at the source, replace the power cord CRU. If the power supply has failed, replace the power supply CRU. Refer to "Removing a hot-swap power supply/fan unit" on page 33.
Green LED on	Drive CRU ID=6	Cluster configuration	If not currently cluster configured, power cycle the Netfinity EXP300 to re-enable ID=6.
One or more green LEDs off	One or two drive CRUs	No activity to the drives	No action is required.
	All drive CRUs or those on one bus	No activity to the drives	No action is 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. Replace the ESM board. Refer to "Replacing an ESM board" on page 31.
		Midplane failure	Have the expansion unit serviced.
	Front panel	Power supply	Make sure the cables are plugged in and power supplies are turned on.
		Hardware failure	If any other LEDs are turned on, have the expansion unit serviced.
Intermittent or sporadic power loss to the expansion unit	Some or all CRUs	Defective ac power source or partially plugged power cable	Check the ac power source. Resecure all installed power cables and power supplies. If applicable, check the power components (power units, UPS, and so on). Replace defective power cables.
		Power supply failure	Check for a fault LED on the power supply and replace the failed CRU. Refer to "Installing a hot-swap power supply / fan unit" on page 33.
		Midplane failure	Have the expansion unit serviced.

Problem indicator	Component	Possible cause	Possible solutions
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 3 (inside the switch card) are set to the appropriate positions. **Attention:** Change switch positions only when your host server and expansion unit is turned off.
		ESM board failure	Have the expansion unit serviced.
	Bridge card	Bridge card failure	All high address or all low address hard-disk drive failed; check the bridge card CRU and replace if necessary. See "Replacing a bridge card" on page 30.
Random errors	Subsystem	Midplane failure	Have the expansion unit serviced.

> **Note:** If you cannot find the problem in the troubleshooting chart, 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 can also 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.

Identification numbers

Record and retain the following information.

Product name:	IBM Netfinity EXP300
Machine:	3531
Model number:	_____
Serial number:	_____

The serial number is located on the front bottom right corner of the bezel and on the inside bottom surface on the rear of the machine.

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.

Drive location	Drive part and model numbers	Drive serial number	SCSI bus (1,2)	SCSI ID (0-6 or 8-14)
Bay 1				
Bay 2				
Bay 3				
Bay 4				
Bay 5				
Bay 6				
Bay 7				
Bay 8				
Bay 9				
Bay 10				
Bay 11				
Bay 12				
Bay 13				
Bay 14				

Appendix B. Product warranties and notices

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

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

- **Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)**

  "IBM Statement of Warranty Worldwide except Canada, Puerto Rico, Turkey, United States (Part 1 – General Terms)" on page 44.

- **Worldwide Country-Unique Terms**

  ("Part 2 - Worldwide Country-Unique Terms" on page 46)

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 EXP300**

Warranty Period* - **Three Years**

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

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. (In Toronto, call 416-383-3344.) 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 EXP300

Warranty Period* - Three Years

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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.

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. 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.

Part 2 - Worldwide Country-Unique Terms

<u>ASIA PACIFIC</u>

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.

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

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 fulfills 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**. In Toronto, call **416-383-3344**.

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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A product is Year 2000 Ready if the product, when used in accordance with its associated documentation, is capable of correctly processing, providing and/or receiving date data within and between the 20th and 21st centuries, provided all other products (for example, software, hardware, and firmware) used with the product properly exchange date data with it.

This IBM PC hardware product has been designed to process four-digit date information correctly within and between the 20th and 21st centuries. If your IBM computer is on when the century changes, you should turn it off and then back on again once, or restart the operating system, to ensure that the internal clock resets itself for the new century.

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	Wake on LAN

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Important notes

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

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

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

Electronic emission notices

Federal Communications Commission (FCC) Statement

Federal Communications Commission (FCC) Class A Statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

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

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

Taiwan electrical emission statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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

Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, 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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