

IBM Netfinity EXP15

**Installation and User's Handbook**





IBM Netfinity EXP15

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**Note**

Before using this information and the product it supports, be sure to read the general information under Appendix B, "Product Warranties and Notices" on page 77.

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### Caution and Danger Statements



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*Important:*

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

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

Be sure to read all caution and danger statements before performing any of the instructions.

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### Instruções de Cuidado e Perigo (Português do Brasil)

*Importante:*

Todas as instruções de cuidado e perigo deste manual são iniciadas por um número. Este número é utilizado para fazer a referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado e perigo que podem ser encontradas na publicação *Safety Information* (Informações sobre Segurança).

Por exemplo, se uma instrução de cuidado é iniciada pelo número 1, as traduções para aquela instrução de cuidado aparecem na publicação *Safety Information* sob a instrução 1.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

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## 注意和危险声明 (简体中文)

### 重要事项:

本书中的所有注意和危险声明之前都有编号。该编号用于英语的注意或危险声明与 *Safety Information* 一书中可以找到的翻译版本的注意或危险声明进行交叉引用。

例如，如果一个注意声明以编号 1 开始，那么对该注意声明的翻译出现在 *Safety Information* 一书中的声明 1 中。

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

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## Napomene opasnosti i upozorenja (hrvatski)

### Važno

Sva napomene upozorenja i opasnosti u ovoj knjizi započinju brojem. Taj se koristi za usporedbu izvornih napomena na engleskom jeziku s prijevodom koji se nalazi u *Sigurnosnim Uputama (Safety Information)*.

Na pr. ako napomena upozorenja počinje s brojem 1, prijevod tog teksta se nalazi u *Sigurnosnim Uputama (Safety Information)* kao napomena br. 1

Obavezno pročitajte sve napomene upozorenja i opasnosti prije nego započnete s radovima prema ovim uputama.

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## Instrukce Nebezpečí a Pozor (Česky)

### Pozor:

Všechny bezpečnostní instrukce v této knize začínají číslem. Tato čísla jsou používána pro nalezení odpovídajícího překladu anglické bezpečnostní instrukce v knize *Safety Information*.

Například pokud bezpečnostní instrukce začíná číslem 1, naleznete odpovídající překlad v knize *Safety Information* pod číslem 1.

Ujistěte se, že jste si před začátkem provádění jakékoli instrukce nejdříve přečetli všechny bezpečnostní instrukce.

---

## Sikkerhedsforskrifter mærket Pas på! og Fare! (dansk)

### Vigtigt:

Alle sikkerhedsforskrifter i dette hæfte begynder med et tal. Dette tal bruges som krydshenvisning fra en engelsk sikkerhedsforskrift mærket CAUTION (Pas på!) eller DANGER (Fare!) til de oversatte forskrifter, der findes i dette hæfte (*Safety Information*).

Hvis f.eks. en sikkerhedsforskrift mærket Pas på! hedder Forskrift 1, er denne en oversættelse af den engelske forskrift nummer 1 i hæftet.

Læs alle sikkerhedsforskrifter mærket Pas på! og Fare!, før du følger nogen af instruktionerne.

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## Turvaohjeet (suomi)

*Tärkeää:*

Kaikkien tämän *Safety Information* -kirjan turvaohjeiden alussa on numero, jonka avulla englanninkielistä VAARA-ilmoitusta (DANGER) tai varoitusta (CAUTION) vastaava suomenkielinen turvaohje löytyy kätevästi.

Jos varoitus alkaa esimerkiksi numerolla 1, vastaavalla suomenkielisellä käännöksellä on sama numero, ja se löytyy jäljempänä tästä kirjasta.

Lue kaikki turvaohjeet, ennen kuin aloitat ohjeissa kuvatut toimet.

---

## Consignes Attention et Danger (Français)

*Important:*

Toutes les consignes Attention et Danger indiquées dans ce document sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites situées dans le livret *Safety Information*.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans le livret *Safety Information*.

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

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## Sicherheitshinweise (Deutsch)

### *Wichtig:*

Alle Sicherheitshinweise in dieser Broschüre beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises, die in der Broschüre mit den Sicherheitshinweisen (*Safety Information*) enthalten sind.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die Übersetzung für diesen Sicherheitshinweis in der Broschüre *Safety Information* unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

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## Δηλώσεις προσοχής και κινδύνου (Ελληνικά)

### Σημαντικό:

Όλες οι δηλώσεις προσοχής και κινδύνου στο παρόν εγχειρίδιο αρχίζουν με έναν αριθμό. Ο αριθμός αυτός χρησιμοποιείται για την παραπομπή μεταξύ αγγλικών και μεταφρασμένων δηλώσεων προσοχής και κινδύνου που βρίσκονται στο εγχειρίδιο *Safety Information*.

Για παράδειγμα, αν μια δήλωση προσοχής αρχίζει με τον αριθμό 1, οι μεταφράσεις για τη συγκεκριμένη δήλωση προσοχής βρίσκονται στο εγχειρίδιο *Safety Information* κάτω από τον τίτλο Δήλωση 1.

Βεβαιωθείτε ότι διαβάσατε όλες τις δηλώσεις προσοχής και κινδύνου πριν πραγματοποιήσετε τις εργασίες που περιγράφονται στις οδηγίες.

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## Figyelmeztetések és veszély ismertetések (Magyar)

### Fontos:

A könyvben szereplő mindegyik figyelmeztetés és veszély ismertető egy számmal kezdődik. Ez egy hivatkozási szám, mely összeköti a Biztonsági információk (Safety Information) című kötetben található ismertető angol nyelvű verzióit a fordított verziókkal.

Például ha egy figyelmeztetés 1-essel kezdődik, a fordítása a Biztonsági információk (Safety Information) című kötetben az 1. ismertető alatt található.

Feltétlenül olvassa végig a figyelmeztetéseket és veszély ismertetőket, mielőtt nekikezd bármelyik útmutató végrehajtásához.

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## Avvisi di attenzione e di pericolo (Italiano)

### Importante:

Tutti gli avvisi di attenzione e di pericolo riportati in questo manuale iniziano con un numero. Tale numero contrassegna gli avvisi in lingua inglese e le corrispondenti versioni tradotte che sono riportate nelle informazioni di sicurezza (*Safety information*).

Ad esempio, se un avviso di attenzione inizia con il numero 1, la corrispondente versione tradotta è riportata nella pubblicazione *Safety Information* come l'avviso numero 1.

Accertarsi di leggere tutti gli avvisi di attenzione e di pericolo prima di effettuare qualsiasi operazione.

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## 注意と危険に関する記述(日本語)

### 重要:

この本では、番号の後に注意と危険に関する記述が掲載されています。この番号は英語の注意と危険に関する記述と小冊子「Safety Information」に記載されている翻訳版の記述との相互参照のために使用します。

たとえば、もし注意の記述が番号 1 で始まる場合は、この注意の記述は小冊子「Safety Information」の記述 1 にあります。

作業を始める前に、すべての注意と危険に関する記述をお読みください。

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## 주의 및 위험 경고문(한글)

### 중요:

이 책에 나오는 모든 주의 및 위험 경고문은 번호로 시작됩니다. 이 번호는 *Safety Information* 책에 나오는 영문판 주의 및 위험 경고문과 한글판 주의 및 위험 경고문을 상호 참조하는데 사용됩니다.

예를 들어 주의 경고문이 번호 1로 시작되면 *Safety Information* 책에서 이 주의 경고문은 경고문 1번 아래에 나옵니다.

지시를 따라 수행하기 전에 먼저 모든 주의 및 위험 경고문을 읽도록 하십시오.

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## Изјави за предупредување и опасност (македонски)

### Важно:

Сите изјави за предупредување и опасност во оваа книга почнуваат со број. Овој број е употребен за поврзување на англиските изјави за предупредување и опасност со преведените верзии на изјавите за предупредување и опасност кои може да се најдат во книгата *Безбедносни информации (Safety Information)*.

На пример, ако изјавата за предупредување почнува со бројот 1, преводот на таа изјава за предупредување се појавува во книгата *Safety Information* под изјава 1.

Прочитајте ги сите изјави за предупредување и опасност пред да изведете било која инструкција

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## Veiligheidsinstructies (Nederlands)

### *Belangrijk:*

Alle veiligheidsinstructies in dit boekje beginnen met een nummer. Met dit nummer wordt verwezen naar de Engelse instructie en alle vertalingen in dit boekje *Safety Information*.

Als een instructie bijvoorbeeld begint met nummer 1, kunt u de Engelse versie en alle vertalingen in dit boekje *Safety Information* eveneens vinden onder instructie 1.

Lees alle instructies in dit boekje voordat u installatie- of onderhoudsprocedures uitvoert.

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## Advarsels- og faremerknader (norsk)

### Viktig:

Alle advarsels- og faremerknader i denne boken begynner med et nummer. Dette nummeret brukes som kryssreferanse mellom en engelsk advarsels- eller faremerknad og den oversatte versjonen av merknaden som du kan finne i boken om sikkerhetsinformasjon (*Safety Information*).

Hvis for eksempel en advarselsmerknad begynner med nummeret 1, finner du oversettelsen av advarselsmerknaden i boken *Safety Information* under merknad 1.

Pass på at du leser alle advarsels- og faremerknader før du utfører noen av instruksjonene.

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## Ostrzeżenia i uwagi o niebezpieczeństwie (polski)

### Ważne:

Wszystkie uwagi o niebezpieczeństwie i ostrzeżenia przed niebezpieczeństwem w tej książce zaczynają się numerem. Numer ten jest używany do porównania angielskiej wersji uwag i ostrzeżeń z ich tłumaczeniem, które można znaleźć w książce *Uwagi dotyczące bezpieczeństwa (Safety Information)*.

Na przykład, jeśli uwaga zaczyna się numerem 1, to w książce *Uwagi dotyczące bezpieczeństwa (Safety Information)*, znajduje się jej tłumaczenie zaczynające się też numerem 1.

Należy przeczytać wszystkie uwagi i ostrzeżenia przed wykonaniem jakiegokolwiek instrukcji.

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## Notas de Cuidado e de Perigo (Português)

### *Importante:*

Todas as notas de cuidado e de perigo, incluídas neste manual, começam por um número. Este número é utilizado para, a partir de uma nota de cuidado ou perigo, em Inglês, identificar a respectiva tradução, a qual pode ser encontrada no manual *Safety Information* (Informações sobre Segurança).

Por exemplo, se uma nota de cuidado começa pelo número 1, a respectiva tradução é apresentada no manual *Safety Information*, identificada como nota número 1.

Não deixe de ler todas as notas de cuidado e perigo, antes de executar qualquer das instruções.

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## Замечания "Осторожно" и "Опасно" (Русский)

### **Важное замечание:**

Все замечания, помеченные в этой книге словами "Осторожно" ("Caution") и "Опасно" ("Danger"), пронумерованы. По этим номерам вы сможете найти перевод замечаний "Осторожно" или "Опасно" в брошюре *Safety Information* (Информация по технике безопасности).

Так, если вам нужен перевод замечания "Caution" ("Осторожно") под номером 1, то вы найдете его в брошюре *Safety Information* (Информация по технике безопасности) тоже под номером 1.

Перед тем, как выполнять какие-либо инструкции, обязательно прочтите все замечания, помеченные в этой книге словами "Осторожно" ("Caution") и "Опасно" ("Danger").

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## **Inštrukcie Nebezpečenstvo a Pozor (Slovensky)**

### **Pozor:**

Všetky bezpečnostné inštrukcie v tejto knižke za inajú íslo. Tieto ísla sú používané pre hľadanie zodpovedajúceho prekladu anglickej bezpečnostnej inštrukcie v knižke *Safety Information*.

Napríklad ak bezpečnostné inštrukcie za inajú íslo 1, nájdete zodpovedajúci preklad v knižke *Safety Information* pod íslo 1.

Uistite sa, že ste si pred začiatkom vykonávania akejkoľvek inštrukcie najprv prečítali všetky bezpečnostné inštrukcie.

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## **Navedbe svaril in nevarnosti (slovensko)**

### **Vážno:**

Vse navedbe svaril in nevarnosti v tej knjigi se začinjajo s številko. To številko uporabljamo za navzkrižno povezavo angleške navedbe svarila ali nevarnosti s prevedenimi verzijami navedbe svarila ali nevarnosti, ki jo lahko najdemo v knjigi *Informacije o varnosti (Safety Information)*.

Na primer, če se navedba svarila začne s številko 1, se prevod za to navedbo svarila pojavi v knjigi *Informacije o varnosti (Safety Information)* pod navedbo 1.

Obvezno preberite vse navedbe svaril in nevarnosti, preden začnete izvajati katerokoli navodilo.

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## Declaraciones sobre precauciones y peligros (español)

### *Importante:*

Todas las declaraciones de precaución y peligro contenidas en este manual empiezan por un número. Dicho número se emplea para establecer una referencia cruzada entre de una declaración de precaución o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en el manual *Información de seguridad (Safety Information)*.

Por ejemplo, si una declaración de peligro empieza con el número 1, las traducciones de esta declaración de precaución aparecen en el manual *Información de seguridad (Safety Information)* bajo Declaración 1.

Lea atentamente todas las declaraciones de precaución y peligro antes de llevar a cabo cualquier operación.

---

## Varningsmeddelanden (Svenska)

### *Viktigt:*

Alla varningsmeddelanden i den här boken inleds med ett nummer. Med hjälp av numren kan du identifiera meddelandenas översättningar, som finns i boken *Safety Information*.

Om t ex ett varningsmeddelande har nummer 1 hittar du översättningen av det i *Safety Information* också som meddelande nummer 1.

Läs alla varningsmeddelanden innan du börjar utföra några åtgärder.

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## 注意及危險聲明 (中文)

### 重要資訊：

本書中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在「安全資訊」(Safety Information)一書中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在「安全資訊」(Safety Information)一書的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

1



**DANGER**

**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.**

**To avoid shock hazard:**

- **The power cord must be connected to a properly wired and earthed receptacle.**
- **Any equipment to which this product will be attached must also be connected to properly wired receptacles.**

**When possible, use one hand to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**

**Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, connect and disconnect cables as described following when installing, moving, or opening covers of this product or attached devices.**

<b>To Connect</b>	<b>To Disconnect</b>
<ol style="list-style-type: none"><li>1. Turn Everything OFF.</li><li>2. First, attach all cables to devices.</li><li>3. Attach signal cables to receptacles.</li><li>4. Attach power cord(s) to outlet.</li><li>5. Turn device ON.</li></ol>	<ol style="list-style-type: none"><li>1. Turn Everything OFF.</li><li>2. First, remove power cord(s) from outlet.</li><li>3. Remove signal cables from receptacles.</li><li>4. Remove all cables from devices.</li></ol>

NOTE: In the UK, by law, the telephone cable must be connected after the power cord.	NOTE: In the UK, the power cord must be disconnected after the telephone cable.
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## About This Book

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This book provides instructions for installing and replacing options in your IBM Netfinity EXP15 Storage Expansion Unit. It also provides information on troubleshooting your expansion unit. If you have not yet set up your expansion unit, refer to Chapter 2, “Installation Setup” on page 13 for detailed information.

### How This Book is Organized

Chapter 1, “Introduction,” introduces and describes the expansion unit. This chapter also includes an overview of the expansion unit's features and components.

Chapter 2, “Installation Setup,” specifies the preparations to complete before the installation and explains the overall installation process.

Chapter 3, “Rack Installation,” describes how to install the expansion unit in a server rack.

Chapter 4, “Installing and Replacing Devices,” contains step-by-step instructions for installing and removing options, such as internal drives and customer replaceable units (CRUs). In addition, this chapter contains instructions for turning the expansion unit on and off.

Chapter 5, “Solving Problems,” contains the problem symptoms and error messages that are specific to your expansion unit. This chapter also provides instructions on how to obtain service and technical assistance for your expansion unit and other IBM products that you might plan to use.

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

Appendix B, “Product Warranties and Notices,” contains product notices, warranties, and trademarks.

## Related Publications

### Notices Used in This Book

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

- **Notes**

These notices provide important tips, guidance, or advice.

- **Attention**

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

- **Caution**

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

### 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 the United Kingdom, call 01705-565000 or 0161-9056001.
- 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.



## Welcome and Thank You

### Welcome and Thank You

We appreciate your decision to purchase an IBM Netfinity EXP15 Storage Expansion Unit. This expansion unit allows you to expand the storage capabilities of your system.

The expansion unit comes with a limited three-year on-site warranty. In addition, the Startup Support program provides coverage to customers during the first 90 days after installation at no additional charge.\*

This comprehensive program enhances IBM's support for setup, installation, configuration, and problem determination. It provides assistance for popular network operating systems and network adapters from IBM and non-IBM vendors. In the U.S. and Puerto Rico, call IBM at 1-800-772-2227; in Canada, call 1-800-565-3344; or in the United Kingdom, call 01705-565000 or 0161-9056001 if you need assistance.

In all other countries, contact the IBM support organization that services your area, your IBM marketing representative, or your IBM reseller.

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

**Welcome and Thank You**

# Chapter 1. Introduction

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The IBM® Netfinity® EXP15 Storage Expansion Unit is a compact unit that provides high-capacity small computer system interface (SCSI) disk storage. It delivers fast, high-volume data transfer, retrieval, and storage functions across multiple drives, to multiple hosts. The expansion enclosure is designed for continuous, reliable service; its modular, redundant disk drives, power supplies, and fans use hot-swap technology for easy replacement without shutting down the system.

The expansion unit supports Fast Wide and Ultra SCSI for both low voltage differential (LVD) and single-ended (SE) host SCSI interfaces. The drive interface is single-ended (SE). Designed for easy installation and integration into a wide range of system environments, the expansion unit is available in a variety of configurations.

Take a moment to record your expansion unit serial number in the table in “Record the Identification Numbers” on page 75, then refer to the Chapter 2, “Installation Setup” on page 13 for instructions for setting up your expansion unit.

This chapter contains an overview of the expansion unit features and components.

## 5



≥32 kg (70.5 lbs)

**CAUTION:**  
Use safe lifting practices when lifting your machine.

<b>This chapter contains:</b>	
Features at a Glance . . . . .	3
Front Controls . . . . .	4

Rear Controls, Indicators, and Connectors . . . . .	5
ESM Board User Controls . . . . .	5
Power Supply Controls, Indicators, and Connectors . . . . .	7
Fan Controls and Indicators . . . . .	8
Expansion Bays . . . . .	9
System Management Software Support . . . . .	11
Getting Help on the World Wide Web . . . . .	12
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## Features at a Glance

The following table summarizes the features of the expansion unit.

<p><b>General</b></p> <ul style="list-style-type: none"> <li>• Modularized Components:             <ul style="list-style-type: none"> <li>- High-capacity disk drives</li> <li>- Environmental services monitor (ESM) board</li> <li>- Power supplies</li> <li>- Cooling fans</li> </ul> </li> <li>• Technology:             <ul style="list-style-type: none"> <li>- Supports disk array technology</li> <li>- Supports clustering</li> <li>- SCSI (LVD or SE) host interface</li> <li>- Redundant data storage, cooling system, and power system</li> <li>- Hot-swap technology for drives, power supplies and fans</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• User Interface:             <ul style="list-style-type: none"> <li>- Built-in power, activity and fault indicators</li> <li>- Identification labeling on customer replaceable units (CRUs), rear indicator lights, switches and connectors</li> <li>- Easy-to-replace drives, power supplies, and fans</li> </ul> </li> </ul> <p><b>Disk Drive Storage</b></p> <ul style="list-style-type: none"> <li>• Current Capabilities:             <ul style="list-style-type: none"> <li>- Max. drives per expansion unit: 10</li> <li>- Drives per drive channel: 5</li> <li>- Drive channels per expansion unit: 2</li> <li>- Drive channels can be chained together</li> </ul> </li> </ul>	<p><b>ESM Board</b></p> <ul style="list-style-type: none"> <li>• Technology and Interfaces:             <ul style="list-style-type: none"> <li>- Model: SCSI, LVD single-ended.</li> <li>- SCSI bus interface: Two 68-pin, VHDCI connectors for incoming and outgoing SCSI bus cables</li> </ul> </li> </ul>
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*Note:* For a list of the operating specifications, such as weight, height, and heat output, see Table 1 on page 24.

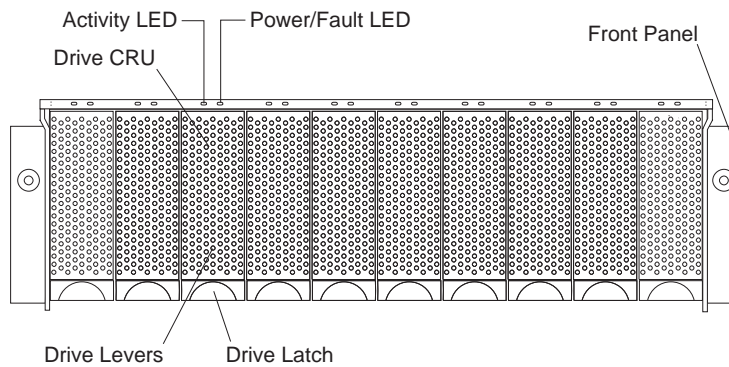
One of the features listed in the previous table is clustering. Clustering is a means of sharing SCSI buses and disk drives among SCSI controllers to provide redundancy of SCSI controllers and servers. This redundancy is important if a hardware component fails. If a hardware component failure occurs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

Clustering requires additional hardware and specialized software. The specialized software provides a seamless environment to the user, making a hardware component failure virtually unnoticeable to the user. For more information about clustering, visit the following IBM Web site:

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

### Front Controls

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



**Drive CRU:** These ten bays, found on the front of the expansion unit, are each able to house one drive. The CRU contains the tray, lever, latch, and the hard disk drive.

**Drive LEDs:** There are twenty LEDs (two for each drive) located on the front panel above the drive bays.

**Activity LEDs:** These ten green lights, found on the left side of each pair of lights, indicate drive activity when flashing.

**Power/Fault LEDs:** The power/fault LEDs are on the right side of each pair of lights.

- Green light indicates the drive is installed.
- Amber light indicates a drive failure.
- Amber and green flashing light indicates a drive rebuild.

**Drive Levers:** These multi-purpose levers are used to remove and insert the drives in place.

**Drive Latch:** This multi-purpose latch is used to release and lock the drives in place.

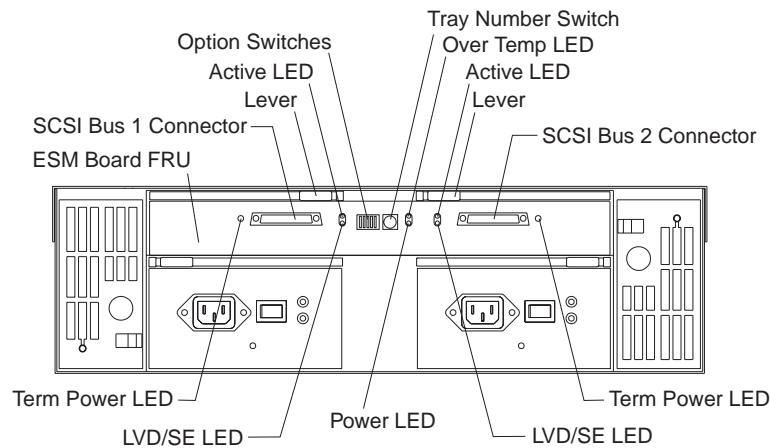
## Rear Controls, Indicators, and Connectors.

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

## Rear Controls, Indicators, and Connectors

The four CRUs (customer replaceable units) and one environmental services monitor (ESM) board are accessible from the back of the expansion unit. These components contain several user controls, indicators, and connectors.

### ESM Board User Controls



**ESM Board FRU:** This board contains the SCSI controls, switches, and LEDs.

**SCSI Bus Connectors:** These 68-pin VHDCI connectors are for attaching your SCSI cables.

**Levers:** Use the locking handles for removing and inserting the ESM boards into the expansion unit.

*Note:* The levers are used by the service technicians only to remove the ESM board.

## Rear Controls, Indicators, and Connectors.

**Option Switches:** Switch 1 controls the configuration of the SCSI bus. Push the switch OFF or down to combine the internal SCSI buses or push the switch ON or up for two separate five-drive SCSI buses. Switches 2–5 are reserved and must remain OFF or down.

**Tray Number Switch:** This switch sets the expansion box ID using values of 0–9. The ID is used in conjunction with system management software.

**Term Power LED:** This green light is on if termination (term) power is present. (When the term power is present indicator is on, it indicates that the other end of the cable is connected to a powered-on controller.) Each external bus has a separate term power LED.

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

**Power LED:** This green light is on when there is power to the ESM board.

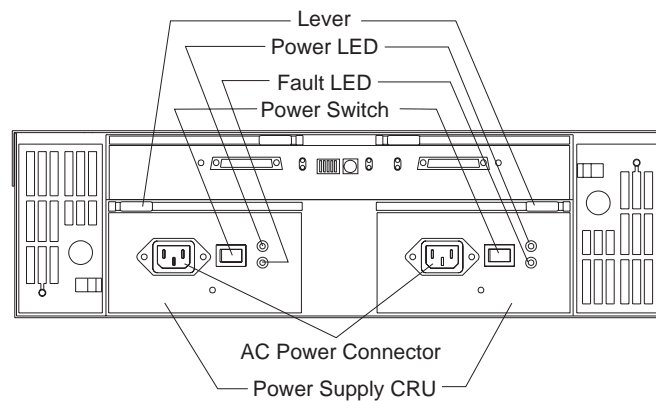
**Over Temp LED:** This amber light is on if the expansion unit overheats.

**Active LED:** This green light flashes when there is activity on the external SCSI bus. Each external bus has a separate active LED.



## Rear Controls, Indicators, and Connectors.

### Power Supply Controls, Indicators, and Connectors



**Levers:** Use the locking handles to remove or install power supplies.

**Power LEDs:** These green LEDs are on when the power switches are turned on.

**Fault LEDs:** These amber LEDs are on after a power supply failure or if one power supply is turned on and the other power supply is turned off.

**Power Switches:** Use these switches to turn the power supplies on and off.

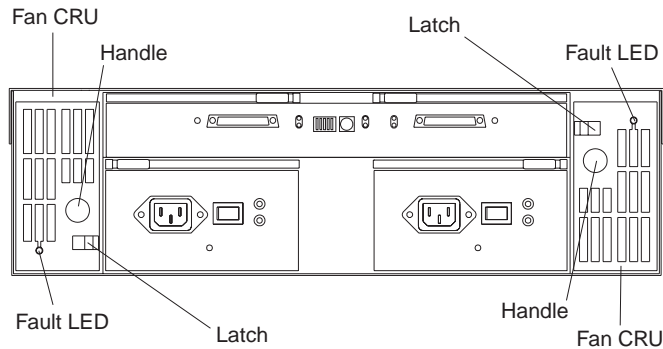
**Power connectors:** The power cords for the power supplies connect here.

**Power Supply CRU:** The two hot swap and redundant power supplies are located here.

## Rear Controls, Indicators, and Connectors.

### Fan Controls and Indicators

The fans in your IBM Netfinity EXP15 are hot swap and redundant. This means that your IBM Netfinity EXP15 will continue to operate if a fan fails. It also means that you can remove and replace the fan while the IBM Netfinity EXP15 is on and accessing drives.



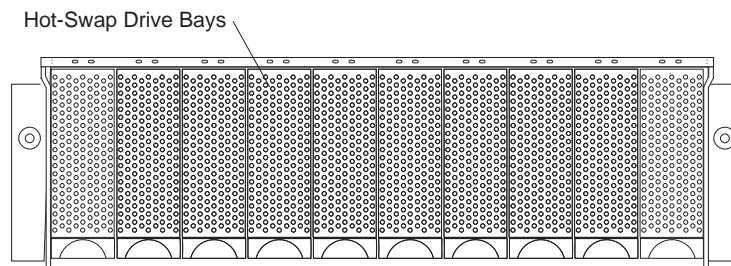
**Fault LEDs:** These amber LEDs are on when a fan fails.

**Latches and handles:** Use the latches and handles to remove or install the fans.

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

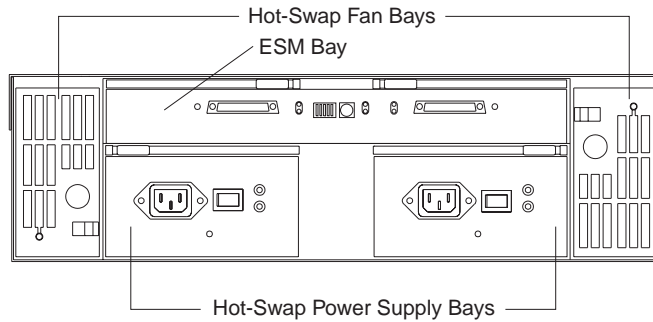
## Expansion Bays

The following illustrations show the location of the bays in your expansion unit. For information on installing and replacing devices in these bays, refer to Chapter 4, “Installing and Replacing Devices” on page 35.



**Hot-Swap Drive Bays:** The expansion unit supports up to ten Ultra SCSI hard disk drives.

## Expansion Bays



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

**ESM Board Bay:** The environmental services monitor (ESM) board provides a SCSI interface to the drives, and monitors the overall status of the expansion unit. It is mounted in a field replaceable unit (FRU), a component designed for servicing by qualified service technicians only.

**Hot-Swap Power Supply Bays:** Your expansion unit has two interchangeable hot-swap and redundant power supplies.

*Note:* The hot-swap feature enables you to remove and replace hard disk drives, power supplies, and fans without turning off the expansion unit.

## System Management Software Support

The IBM Netfinity EXP15 supports software alert functions through the system monitor of Netfinity Manager Version 5.1 or later. The following alerts are supported:

- Disk drive disabled
- Power supply bad
- Fan fault
- IBM Netfinity EXP15 over temperature

Refer to the *Netfinity Manager User's Guide, Version 5.1.2* or later for more information on setting up system management software.

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

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

## IBM Start Up Support

### Getting Help on the World Wide Web

You can obtain up-to-date information about your IBM Netfinity EXP15, a complete listing of the options that are supported on your model, and information about other IBM server products by accessing the IBM home page at the following address:

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

### IBM Start Up Support

The IBM Start Up Support program provides comprehensive telephone assistance 24 hours a day, seven days a week during your first 90 days after installation.\* Assistance is available for IBM and non-IBM network operating systems, network-interface adapters, and other optional peripherals.

For more information about this exceptional program, or for assistance with the installation of your server:

- In the U.S. or Puerto Rico, call 1-800-772-2227.
- In Canada, call 1-800-565-3344.
- In the United Kingdom, call 01705-565000 or 0161-9056001.

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

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

## Chapter 2. Installation Setup

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This section specifies the preparations you must complete before beginning the installation, and explains the overall installation process.

**This chapter contains:**

Preparatory Tasks and Assumptions . . . . .	14
Inventory Checklist . . . . .	15
Preparing the Rack . . . . .	16
Power Cord Routing Information . . . . .	16
Support Rail Installation Information . . . . .	16
Preparing the Expansion Unit . . . . .	19
Expansion Unit Preparation Information . . . . .	19
Handling Static-Sensitive Devices . . . . .	20
Set the Expansion Unit Interface Options . . . . .	21

## Preparatory Tasks and Assumptions

The instructions in this book assume:

- You are installing the expansion unit in a 19-inch wide, rack.  
The rack might also contain:
  - Industry standard EIA railing inside the rack for mounting the hardware
  - One or two independent power sources (distribution boxes, uninterruptible power supply, and so on)
  - A host controller unit
  - Additional expansion units
- You have already installed the other components in the rack, and moved the rack near its permanent operating location.
- You have already installed and configured the host controllers and appropriate host adapters.
- There are 68-pin SCSI cables attached to the host controllers and are ready for final connection to the expansion unit.
- The rack and installation site meet all area, environmental, power, and site requirements for the expansion unit. Refer to the expansion unit requirements listed in Chapter 3, “Rack Installation” on page 23.



## Inventory Checklist

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

### Hardware:

- IBM Netfinity EXP15 Storage Expansion Unit
- Power cords (2)
- Rack-mounting hardware kit (1)
  - Two rails (right and left assembly)
  - Eight black M6 screws

### Publications:

- IBM Netfinity EXP15 Installation and User's Handbook*
- IBM Safety Booklet*

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

## Preparing the Rack

This section contains information about power cord routing and support rail installation.

### Power Cord Routing Information

The expansion unit uses two power cords. You can connect these power cords to the primary power units inside the rack, such as an ac distribution unit or uninterruptible power supply (UPS), or to an external source, such as remote power units, a UPS, or wall outlet. Both power cords can use the same power source or a separate power source, as long as they meet the power requirements defined in Table 1 on page 24.

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. If you intend to connect the expansion unit to the cabinet's internal power unit, consider connecting and routing the expansion unit power cords in the cabinet before you install the expansion unit.

### Support Rail Installation Information

To install the expansion unit in a rack, use the mounting hardware (provided with your hardware kit) to:

- Provide a level, stable support for the expansion unit chassis
- Support the expansion unit weight
- Properly position the expansion unit in the rack to allow proper air circulation around and through the expansion unit

The exact placement of the mounting hardware in the rack will depend on how your rack is constructed and where (vertically) you intend to install the expansion unit.

Use this procedure to set up the rack and prepare to install the expansion unit.

*Note:* During this installation, you might need to access the interior of the rack to attach mounting hardware or to route power and SCSI cables. Also, you must have enough room around

the outside of the rack to lift and install the expansion unit into the rack. Three U-level spacing is required to install the expansion unit in the rack.

1. Turn off the power.

*Note:* If applicable, make sure that all main power switches in the rack are turned off. If the rack does not have a master circuit breaker that disables all incoming power, unplug the cabinet's primary power cable from the external ac power source.

2. As necessary, remove the front, back, and side panels (or doors) from the rack.

*Note:* Removing the exterior panels from the rack might make it easier to install the hardware.

3. Retrieve the power cords from the expansion unit shipping container.

*Note:* The expansion unit is shipped with two, identical power cords.

4. Line up the mounting hardware in the rack to verify its placement.

*Note:* Make sure that there is enough open space above the mounting hardware to accommodate the expansion unit and to provide sufficient airflow. See Chapter 3, "Rack Installation" on page 23 for instructions on mounting hardware.

5. Determine the power-up sequence for your system.

*Note:* Read your hardware and software documentation provided with the devices (in the rack and on the SCSI buses) that you intend to power-up with the expansion unit. Find the information regarding the start up procedure for each device. Based on this information, determine the sequence in which you must turn on the expansion unit and other devices in the rack or attached to the SCSI buses in this system.

6. Plug the power cords into properly grounded electrical outlets.

*Note:* Plug the power cords into the appropriate ac electrical outlets inside the rack, or into an external UPS or receptacle. If the ac power source has several outlets, make sure that you plug the power cords into outlets that power up at the same time.

7. Route the other ends of the power cords so that they are easily accessible to the rear of the expansion unit once it is installed.
8. Unplug the cables and power cords from the electrical outlets, but keep them routed in the rack.
9. Complete all other preparations.

*Note:* Perform all other preparatory tasks that might be necessary to ensure that the rack is ready for this installation (such as installing other hardware devices, cabling, or power units).

## Preparing the Expansion Unit

This section explains how to prepare the expansion unit for installation by removing the internal drives and setting the interface options.

### Expansion Unit Preparation Information

It is easier to lift the expansion unit and set it onto the support rails in the rack if you remove all customer replaceable units (CRUs) first. A fully loaded expansion unit weighs approximately 39 kg (86 lb). If you remove all the CRUs, you can reduce the overall weight. For information about removing CRUs, go to Chapter 4, “Installing and Replacing Devices” on page 35.

The following are CRUs in your expansion unit.

- Up to ten drives
- Two power supplies
- Two fan units

5



≥32 kg (70.5 lbs)

#### **CAUTION:**

**Use safe lifting practices when lifting your machine.**

*Note:* The expansion unit is shipped with the decorative bezel attached to the front of the unit with two white screws and nuts in order to protect the light pipes located above the trays. Leave the decorative bezel in place until you are ready to mount the unit in the rack.

### Before you begin

- Read “Handling Static-Sensitive Devices.”
- If you have data stored on the drives, label the drives before you remove them. You must replace the drives in the exact slots from which you removed them.

## Handling Static-Sensitive Devices

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

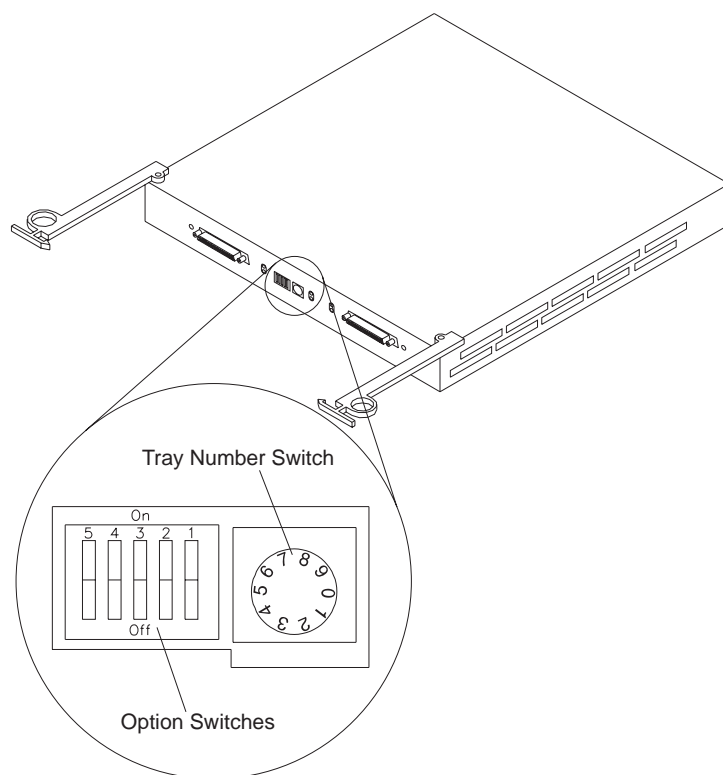
*Note:* When you are adding an internal option, do not open the static-protective package containing the option until you are instructed to do so.

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

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

## Set the Expansion Unit Interface Options

There is a set of option switches located on the back of the expansion unit. You can use these switches to select interface options. Drive SCSI IDs identify each drive in the expansion unit.



Switches 2 through 5 are Reserved. Leave these switches in the OFF (or down) position.

Your expansion unit supports up to two external SCSI buses and up to two internal SCSI buses. When the expansion unit is configured to have all 10 disk drives in a single SCSI bus, either external cable connector can be used. This configuration is the default state (OFF or down) of Switch 1. See “Drive Numbering” on page 39 for detailed information on matching SCSI IDs to drive bay positions.

When Switch 1 is OFF (or down), the five disk drives of internal SCSI bus 1 have the SCSI addresses of 0–4 and the five disk drives of the internal SCSI bus 2 have the SCSI addresses of 8–12. With this switch setting, however, the controller sees SCSI bus 1 and SCSI bus 2 as a single SCSI bus. The System-management SCSI Accessed Fault Tolerant Enclosure (SAF-TE) processor has the SCSI addresses 14 and 15.

When Switch 1 is ON (or up), two independent internal SCSI buses are created. Each bus supports up to five disk drives. External SCSI bus 1 maps to internal SCSI bus 1 and external SCSI bus 2 maps to internal SCSI bus 2. The five disk drives of internal SCSI bus 1 have the SCSI addresses of 0–4 and the five disk drives of internal SCSI bus 2 have SCSI addresses of 0–4. In each case, the system-management processor for each SCSI bus has SCSI address 15.

There is also a Tray Number switch on the back of the expansion unit. Use this switch to name the expansion unit. The rotary switch allows you to dial a number from 0–9, which names the expansion box. System-Management software, such as IBM Netfinity Manager, uses this number when it provides data and alerts on the expansion unit.



## Chapter 3. Rack Installation

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This chapter provides instructions for installing an IBM Netfinity EXP15 Storage Expansion Unit in a rack.

Your expansion unit comes with a rack-mounting hardware kit. Review the preinstallation information in “Before You Begin”; then, continue with “Installing the Expansion Unit in a Rack” on page 25.

**This chapter contains:**

Before You Begin . . . . .	23
Operating Specifications . . . . .	24
Installing the Expansion Unit in a Rack . . . . .	25
Removing the Expansion Unit from a Rack . . . . .	32

### Before You Begin

- You will need a flat-blade and a Phillips screwdriver.  
*Note:* Some of the installation procedures require three people.
- Review the safety and handling guidelines specified under “Safety Information” on page v. These guidelines will help you work safely while working with your expansion unit and options.
- Review the documentation that comes with your rack enclosure for safety or cabling considerations. Ensure that your planned installation is within the rack’s guidelines for heat generation, electrical requirements, air flow, and mechanical loading.
- To ensure rack stability, plan the installation of servers and expansion units in the rack starting from the bottom.
- Verify that the rack can meet the operating parameters, as detailed in Table 1 on page 24.

## Operating Specifications

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

<p><b>Size (with front panel and without mounting rails)</b></p> <ul style="list-style-type: none"> <li>• Depth: 57.9 cm (22.8 in.)</li> <li>• Height: 13.2 cm (5.20 in.)</li> <li>• Width: 48.2 cm (18.97 in.)</li> </ul> <p><b>Weight</b></p> <ul style="list-style-type: none"> <li>• Typical expansion unit fully loaded: 39 kg. (86 lbs.)</li> </ul> <p><b>Electrical Input</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50 to 60 Hz) is required</li> <li>• Input Voltage:             <ul style="list-style-type: none"> <li>- Low range:                 <ul style="list-style-type: none"> <li>- Minimum: 90 V ac</li> <li>- Maximum: 127 V ac</li> </ul> </li> <li>- High range:                 <ul style="list-style-type: none"> <li>- Minimum: 198 V ac</li> <li>- Maximum: 257 V ac</li> </ul> </li> <li>- Input kilovolt-amperes (kVA) approximately:                 <ul style="list-style-type: none"> <li>- Minimum configuration: 0.06 kVA</li> <li>- Maximum configuration: 0.36 kVA</li> </ul> </li> </ul> </li> </ul>	<p><b>Environment</b></p> <ul style="list-style-type: none"> <li>• Air temperature:             <ul style="list-style-type: none"> <li>- expansion unit on: 10° to 35° C (50° to 95° F) Altitude: 0 to 914 m (3000 ft.)</li> <li>- expansion unit on: 10° to 32° C (50° to 90° F) Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.)</li> </ul> </li> <li>• Humidity:             <ul style="list-style-type: none"> <li>- 10% to 80%</li> </ul> </li> </ul>	<p><b>Acoustical Noise Emissions Values</b> For open bay (0 drives installed) and typical system configurations (8 hard drives installed).</p> <ul style="list-style-type: none"> <li>- Sound Power (idling):             <ul style="list-style-type: none"> <li>- 6.2 bels (open bay)</li> <li>- 6.4 bels (typical)</li> </ul> </li> <li>- Sound Power (operating):             <ul style="list-style-type: none"> <li>- 6.2 bels (open bay)</li> <li>- 6.5 bels (typical)</li> </ul> </li> <li>- Sound Pressure (idling):             <ul style="list-style-type: none"> <li>- 47 dBA (open bay)</li> <li>- 49 dBA (typical)</li> </ul> </li> <li>- Sound Pressure (operating):             <ul style="list-style-type: none"> <li>- 47 dBA (open bay)</li> <li>- 50 dBA (typical)</li> </ul> </li> </ul> <p>These levels are measured in controlled acoustical environments according ISO 7779 and are reported in accordance with ISO 9296. The declared sound power levels indicate an upper limit, below which a large portion of machines operate. Sound pressure levels in your location might exceed the average 1-meter values stated because of room reflections and other nearby noise.</p>
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Table 1. Expansion Unit Operating Specifications

## Installing the Expansion Unit in a Rack

### Before you begin

- Turn off the expansion unit.
- Refer to your rack documentation for additional information on preparing the rack.

In this section, you will use the right and left rail assembly brackets and eight (black) hex head screws (provided with your hardware kit).

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≥32 kg (70.5 lbs)

### CAUTION:

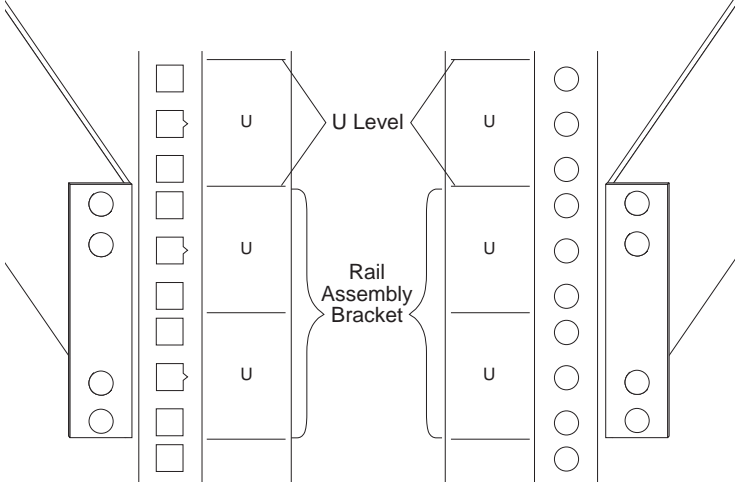
Use safe lifting practices when lifting your machine.

*Note:* If your rack has round mounting holes, the upper and lower alignment pins must be removed and can be discarded.

## Installing the Expansion Unit in a Rack

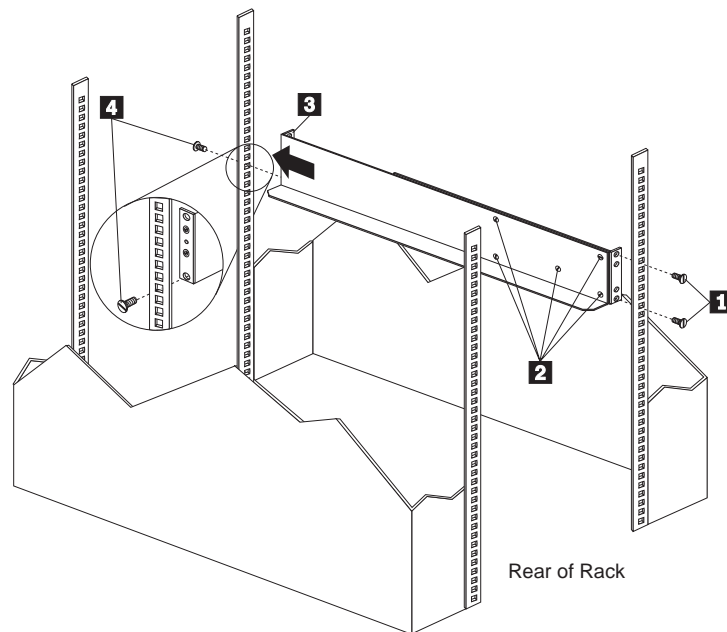
To install the expansion unit into a rack with square or round mounting holes:

1. From the rear of the rack, locate the desired position on the rack based on the even EIA (U level) space.



## Installing the Expansion Unit in a Rack

2. Align the rail assembly (provided with your hardware kit) to the rear of the rack.
  - a. Install two of the eight (black) hex head screws **1** (provided with your hardware kit) in the top and bottom positions, starting with the top.
  - b. Loosely tighten the screws.



3. Loosen the five screws (four large screws and one small screw) **2** located on the interior of the rail assembly; then slide the front rail assembly forward **3** until it makes contact with the front rack rail.

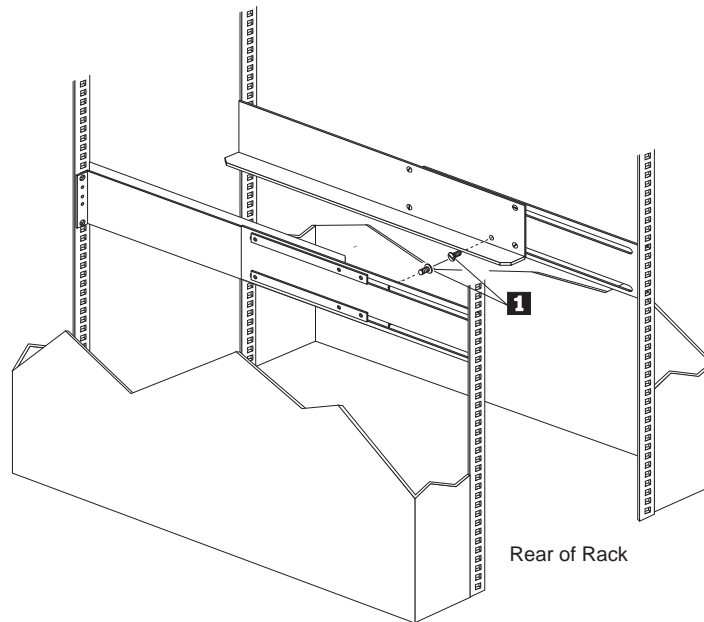
*Note:* Make sure the front rail position matches the rear rail position.

4. From the front of the rack, thread one (black) hex head screw **4** into the bottom position of the rail assembly and tighten firmly.

## Installing the Expansion Unit in a Rack

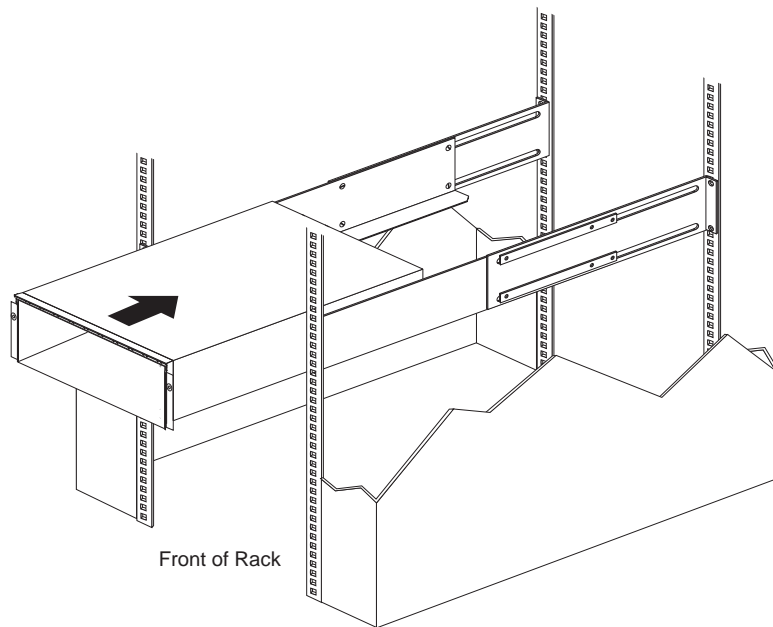
*Note:* Before tightening, make sure the pins are located correctly in the rail holes.

5. Firmly tighten the screws on the rear of the rack and the four interior screws on the rail assembly.
6. Repeat the rail assembly procedure on the opposite side of the rack.
7. Remove the two small 6-32 screws **1** on the interior side of the rails. Save these screws so that you can use them later.



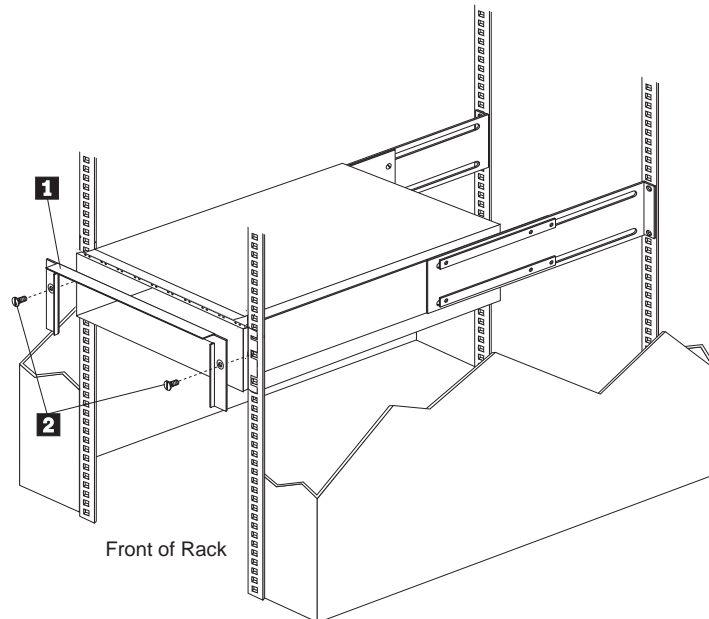
## Installing the Expansion Unit in a Rack

8. Slide the expansion unit into the rack.



## Installing the Expansion Unit in a Rack

9. Remove the decorative bezel.
  - a. Remove and discard the two white screws and nuts **2** from the decorative bezel **1** on the front of the expansion unit.
  - b. Carefully attach the bezel to the front of the expansion unit. The decorative bezel is mounted correctly when the alignment pins match with the holes in the expansion unit.



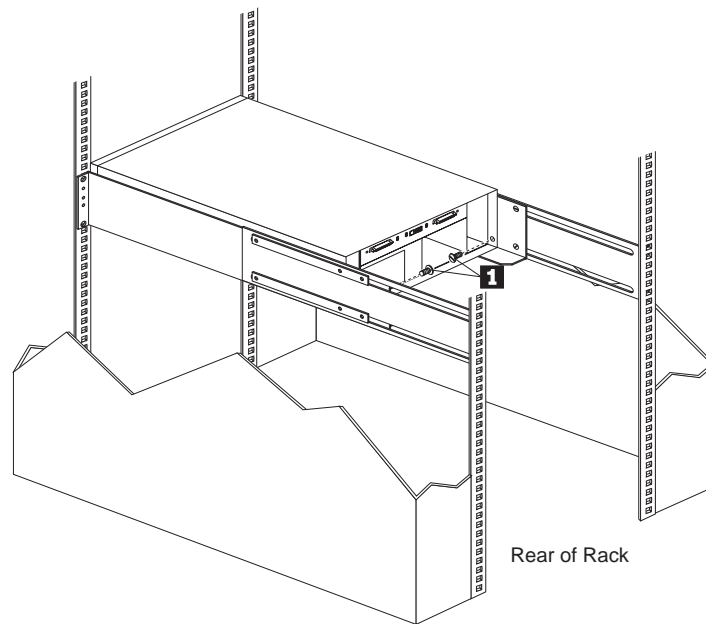
- c. Insert the remaining two (black) hex head screws **2**, one on each side, and hand tighten.

*Note:* To avoid cracking the bezel, be careful not to cross-thread the screws or over tighten them.



## Installing the Expansion Unit in a Rack

10. From the rear of the rack, reinsert the two 6-32 screws **1** on the rear of the expansion unit and tighten the screws firmly.



11. Install the CRUs.

*Note:* Refer to Chapter 4, “Installing and Replacing Devices” on page 35 for instructions on installing the CRUs into the expansion unit.

12. Connect the power cord to the rear of each power supply. Remove the nut and wrap the clamp around the power cord approximately eight inches from the end. Reattach the nut and tighten securely.

*Note:* The purpose of this clamp is to prevent the accidental unplugging of the power cord from the power supply.

For information about cable management, visit the following IBM World Wide Web site:

<http://www.pc.ibm.com/support/>

## Removing the Expansion Unit from a Rack

### Removing the Expansion Unit from a Rack

#### Before you begin

- Read “Handling Static-Sensitive Devices” on page 20.
- Turn off both power supply switches on the rear of your expansion unit.
- Follow any additional installation and safety instructions that come with the rack.

5



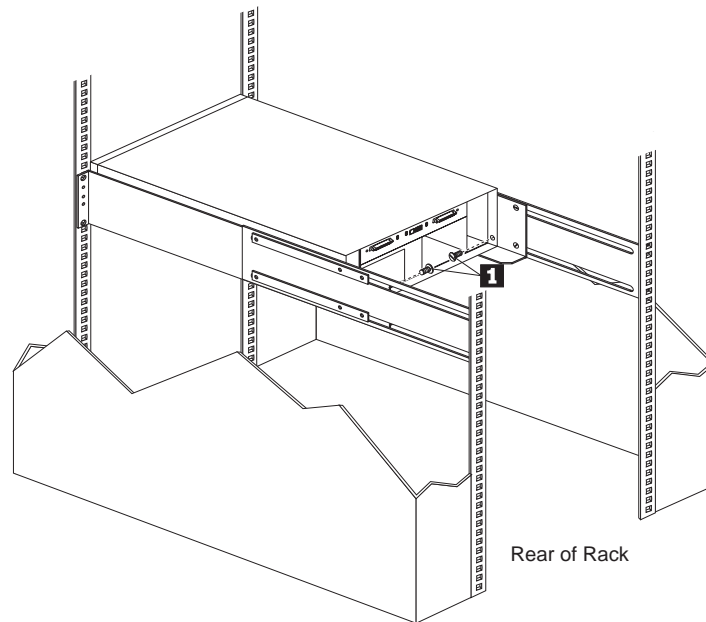
≥32 kg (70.5 lbs)

**CAUTION:**  
Use safe lifting practices when lifting your machine.

## Removing the Expansion Unit from a Rack

To remove the expansion unit from the rack:

1. Remove the hot-swap power supply (see “Working with Hot-Swap Power Supplies” on page 49).
2. Remove the fan (see “Replacing a Hot-Swap Fan” on page 53).
3. Remove the two 6-32 screws **1** from the rear of the expansion unit.
4. Remove the drives. Be sure to label the drives according to the order in which you remove them from the expansion unit.

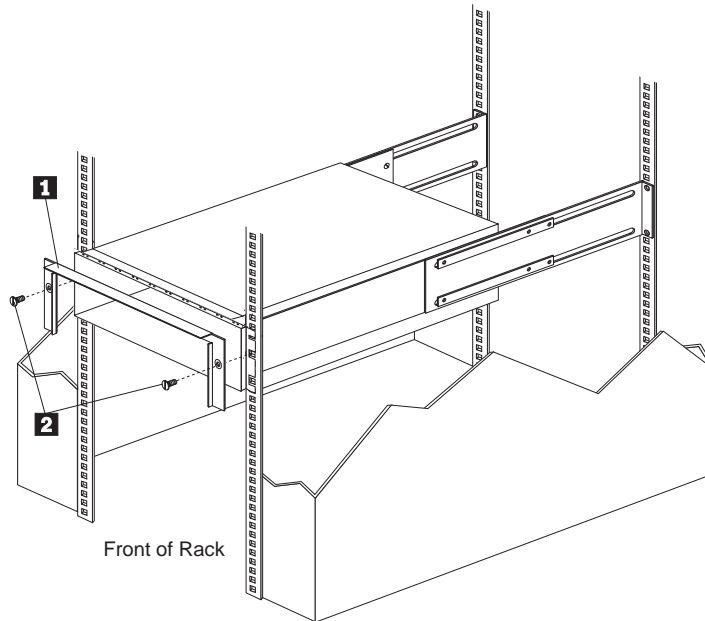


## Removing the Expansion Unit from a Rack

5. Remove the top (black) hex head screws **2** from each side of the decorative bezel on the front of the expansion unit.



**Attention:** Do not remove the bottom (black) hex head screws. These secure the rails that support your expansion unit.



6. Remove the bezel **1**.

**Attention:** When handling the expansion unit avoid touching the light pipes to prevent damage to your expansion unit.

7. Slide the expansion unit out of the rack.

## Chapter 4. Installing and Replacing Devices

---

This chapter provides instructions to help you add options to your expansion unit. Some option-removal instructions are provided in case you need to remove hot-swap drives or customer replaceable units (CRUs).

**This chapter contains:**

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Preparing to Add Options	36
Working with Internal Disk Drives	37
Drive Numbering	39
Installing Hot-Swap Drives	41
Installing Additional Hot-Swap Drives	42
Replacing Internal Hot-Swap Drives	45
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Cable Restrictions	48
Clustering Considerations	48
Working with Hot-Swap Power Supplies	49
Working with the Hot-Swap Cooling Fans	51
Replacing a Hot-Swap Fan	53
Turning the Expansion Unit On and Off	54
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## Preparing to Add Options

### Before You Begin

- Become familiar with the safety and handling guidelines specified under “Safety Information” on page v and “Handling Static-Sensitive Devices” on page 20. These guidelines will help you work safely while working with your expansion unit.
- Make sure you have an adequate number of properly grounded electrical outlets for your expansion unit, server, monitor, and any other options you intend to install.
- Place your system in a location that is dry. Rain or spilled liquids might damage your expansion unit.
- Back up all important data before you make changes to storage devices, such as hard disk drives.

If you are installing the expansion unit in a rack, be sure that the rack provides adequate space around the expansion unit to allow the expansion unit cooling system to work properly. Refer to the documentation that comes with the rack.

### Preparing to Add Options

#### Before you begin

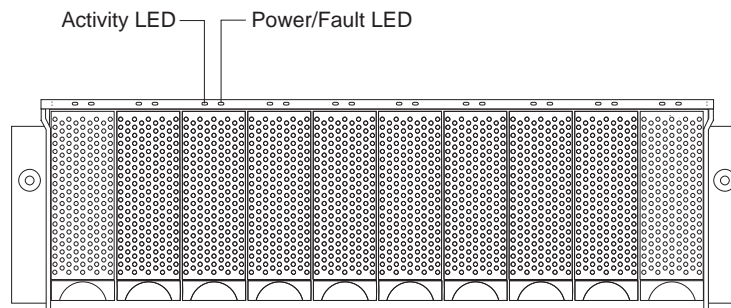
- Be sure your current system configuration is working properly.
- Read “Handling Static-Sensitive Devices” on page 20.
- If you are installing the expansion unit in a rack unit, refer to the documentation that comes with the rack for additional safety and operating information.

## Working with Internal Disk Drives

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

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

All hard disk drives are housed in portable drive trays that plug directly into one of ten drive bays on the front of the expansion unit. Above each drive bay on the expansion unit front panel there are two LEDs, which indicate the status for that particular drive.



## Working with Internal Disk Drives

The following table summarizes the LED states on your hot-swap drives and their definitions.

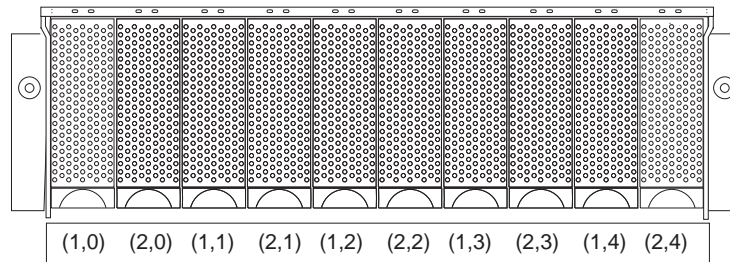
LED	LED State	Definitions
Activity LED	Green	Flashes during read/write or inquiry operations to the drive.
Power/Fault LED	Green	On when a drive is present.
Power/Fault LED	Amber/Green	Green and amber flashes to indicate a drive rebuild is under way.
Power/Fault LED	Amber	Amber is on to indicate a drive failure.



## Drive Numbering

There are *two SCSI channels* (1, 2) in the expansion unit. Each channel uses five SCSI ID numbers. Each disk drive within the expansion unit has a unique channel number and SCSI ID number, based on its physical location in the expansion unit.

When a drive is plugged into the midplane, its channel number and SCSI ID are set automatically. See the following illustration for bus and SCSI ID values when option switch 1 is set to the ON (up) state. Use the option switch on the ESM board to change the ID settings.



The first number represents the channel number and the second is the SCSI ID.

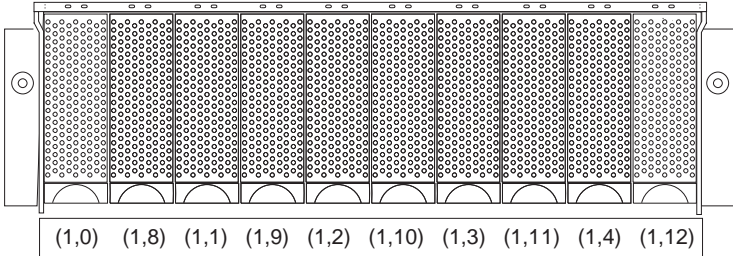
**Important information for IBM ServeRAID users:**

The view configuration screens show bay numbers, not SCSI IDs. To calculate the bay number, add 1 to the SCSI ID.

*Attention:* A blank label is provided in each drive tray behind the drive latch. Use this label to record the address location information for each drive before you remove it. Also, record the address location information in Table 5 on page 75. (If you install a drive in the wrong bay, you will lose data.)

**Working with Internal Disk Drives**

If the two channels are daisy chained using option switch 1 in the off position, then the SCSI IDs are as shown and the drives are all on the same channel.



## Installing Hot-Swap Drives

### Before you begin

- Read “Handling Static-Sensitive Devices” on page 20.
- Read the instructions that come with the internal drive.
- Handle the drive-tray assembly carefully

Here are a few things to consider when installing drives:

- **Remove empty drive trays.** Expansion units shipped without a full set of drives (10) contain blank drive trays in the unused drive bays. Before installing new drives, you must remove the blank trays, which should be saved for future use. Each of the ten bays must always contain either a blank tray or a tray with a disk drive.
- Install IBM supported SCSI drives only.

**Attention:** 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. Failure to replace the drives in their correct bays can result in loss of data.

## Working with Internal Disk Drives

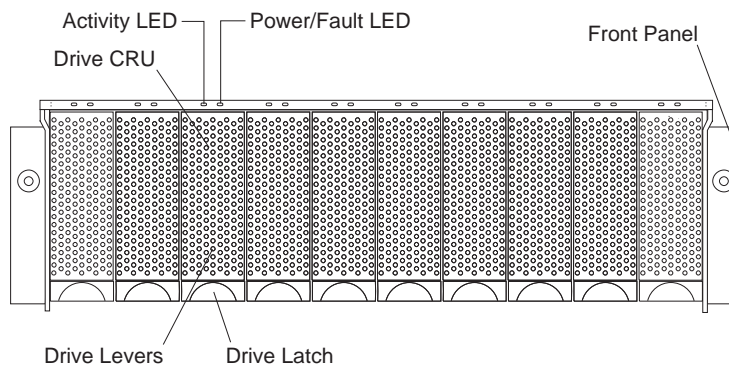
### Installing Additional Hot-Swap Drives

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

#### Before you begin

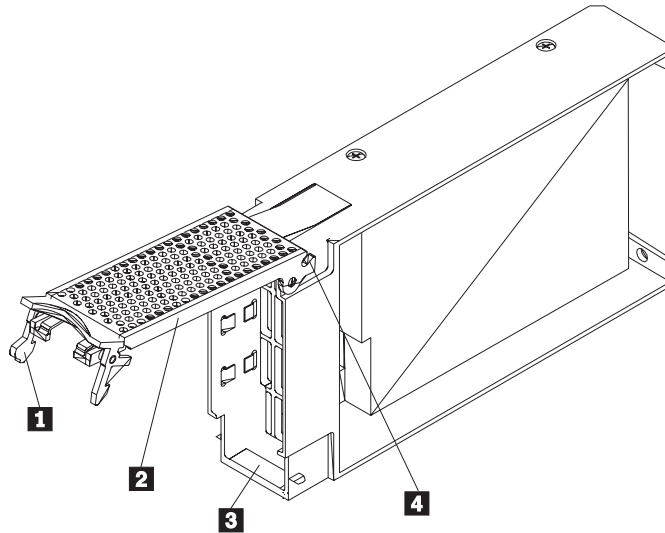
- Read “Handling Static-Sensitive Devices” on page 20.
- Read the instructions that come with the internal drive.
- Handle the drive-tray assembly carefully

1. Check for Fault LEDs. If any amber LEDs are lit, refer to Table 2 on page 60.



## Working with Internal Disk Drives

2. Remove the blank drive tray:
  - a. Pull out the bottom of the drive latch **1** to release the lever.
  - b. Lift the drive lever **2** all the way up and slide the blank tray out of the bay.



3. Install the drive:
  - a. Pull up on the drive latch **1** to open the drive lever **2**.
  - b. Label the drive **3** according to the instructions in “Drive Numbering” on page 39.
  - c. Slide the drive into the empty bay.
  - d. Make sure the hooks **4** on the top edge of the drive lever **2** engage the metal lip on the chassis.
  - e. Lower the drive lever **2** and lock the drive latch **1** in place.
4. Check the LEDs.
  - a. When drives are ready for use, the green Activity LED is off and the green Power/Fault LEDs are on.

## Working with Internal Disk Drives

- b. If the Power/Fault light is amber, remove the drive from the unit and wait 10 seconds; then, reinstall the drive. If your SCSI adapter is the IBM ServeRAID, go to the *ServeRAID User's Guide* for additional information and procedures on changing the state of the drive from the current Default state to any other state (for example, HSP, RDY, rebuild drive to ONL, and so on). The amber LED should go off within 10 seconds of the drive state change (to something other than DDD).

If your SCSI adapter is the IBM ServeRAID II, in some cases the drive will automatically reset to either a hot spare (HSP) or be rebuilt (ONL). See the *ServeRAID II User's Guide* for additional information. If the state change in the ServeRAID II configuration does not change automatically (amber LED does not go off), then refer to the *ServeRAID II User's Guide* for directions on how to perform a manual drive state change. The amber LED should go off within 10 seconds of a drive state change (to something other than DDD).

If the state change in the RAID configuration does not change automatically, refer to your *RAID Controller User's Guide* for directions on how to perform a drive state change.

- c. Configure the drives using the appropriate disk array software.

## Replacing Internal Hot-Swap Drives

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

*Attention:* Failure to replace drives in their correct bay might result in loss of data.

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

### Before you begin

- Read “Handling Static-Sensitive Devices” on page 20.
- Be sure to handle the drives carefully.
- Determine the location of the drive that you want to remove.

1. Remove the drive. (For additional information and artwork showing the removal and installation of drives, see “Installing Additional Hot-Swap Drives” on page 42.)
  - a. Pull on the bottom of the drive latch to release the drive lever.
  - b. Lift the drive lever and pull the drive partially out of the bay.
  - c. Wait at least 20 seconds before fully removing the drive from the expansion unit to allow for spin down. (Allowing for spin down avoids possible damage to your drive.)
  - d. Verify that the drive is labeled correctly, then pull it out of the expansion unit.
2. Install the new drive.
  - a. Pull up on the drive latch to open the drive lever and insert the drive.

## Working with Internal Disk Drives

- b. Lock the drive latch in place.
3. Check the LEDs.
  - a. When the drives are ready for use, the green Activity LEDs are off and the Power/Fault LEDs are on (green).
  - b. If the Power/Fault light is amber, pull up on the drive latch and lift the drive lever to pull the drive partially out of the bay. Wait at least 20 seconds before fully removing the drive from the expansion unit to allow for spin down. If your SCSI adapter is the IBM ServeRAID; go to the ServeRAID User's Guide for additional information and procedures on changing the state of the drive from the current Default state to any other state (for example, HSP, RDY, rebuild drive to ONL, and so on). The amber LED should go off within 10 seconds of the drive state change (to something other than DDD).

If your SCSI adapter is the IBM ServeRAID II, in some cases, the drive will automatically reset to either a hotspare (HSP) or be rebuilt (ONL). See the ServeRAID II User's Guide for additional information. If the state change in the ServeRAID II configuration does not change automatically (amber LED does not go off), then refer to the ServeRAID II User's Guide for directions on how to perform a manual drive state change. The amber LED should go off within 10 seconds of a drive state change (to something other than DDD).

If the state change in the RAID configuration does not change automatically, refer to your *RAID Controller User's Guide* for directions on how to perform a drive state change.

4. Return to normal operation.



## Working with SCSI Components

This section contains information about SCSI configurations and cable restrictions.

### SCSI Configurations

The IBM Netfinity EXP15 comes with an electronics board that interfaces between the external SCSI cables and the hot-swap backplane. There are a total of two 68-pin SCSI very high density connector interface (VHDCI) connectors. From left to right as seen from the back, these connectors are: SCSI bus 1 and SCSI bus 2. (See “Rear Controls, Indicators, and Connectors” on page 5 for the location of these connectors.) There are several ways to use these buses.

- **To configure each bus independently:**
  1. Attach one external SCSI cable from the controller in the server to the SCSI bus 1 connector.
  2. Attach a second external SCSI cable from the controller in the server to the SCSI bus 2 connector.
  3. Set Switch 1 to the ON (or up) position.
- **To configure the expansion unit as a single 10-drive SCSI channel:**
  1. Attach one external SCSI cable from the controller in the server to either SCSI bus connector.
  2. Set Switch 1 (of 5) in the OFF (or down) position.
- **To configure the expansion unit as a cluster of 10 drives on a single channel when using IBM ServeRAID adapters:**
  1. Attach one external SCSI cable from the controller in the server to the SCSI bus 1 connector.
  2. Attach a second external SCSI cable from the controller in the server to the SCSI bus 2 connector.
  3. Set Switch 1 to the OFF (or down) position.

*Note:* When clustering with an IBM ServeRAID adapter, you must configure all ten disk drives as a single SCSI bus.

- **To configure the expansion unit as a cluster when using the Netfinity Fiber Channel RAID Controller:**
  1. Configure each bus independently.
  2. Configure the expansion unit as a single 10-drive SCSI channel.

## Cable Restrictions

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

*Note:* A SCSI channel from a SCSI controller must be dedicated to the IBM Netfinity EXP15. This means that the corresponding internal SCSI connector must be left unused.

## Clustering Considerations

If IBM ServeRAID Controllers are used in a cluster configuration, the term power LED on the rear of the expansion unit is useful when servicing the cluster. The ServeRAID controller provides the term power signal. If a term power LED is not on, it indicates that a particular EXP15 expansion unit is not attached to a powered-on controller. It is useful to know which external EXP15 expansion unit is attached to which server when the hardware is being serviced.

## Working with Hot-Swap Power Supplies

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

- Both power supplies must always be in place, even if one is not functioning properly, to maintain proper cooling.
- Only use the supported power supplies for your specific expansion unit.
- Refer to Table 2 on page 60 for information on LEDs.

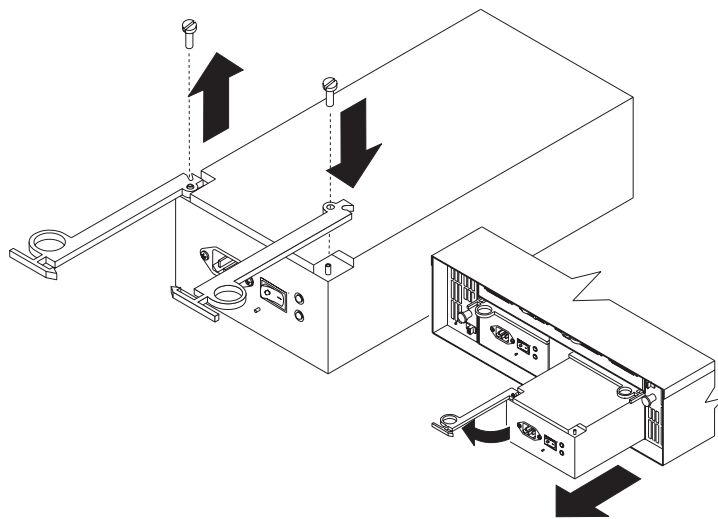
**Attention:** Always follow these instructions when installing or removing a hot-swap power supply.

### To remove a hot-swap power supply:

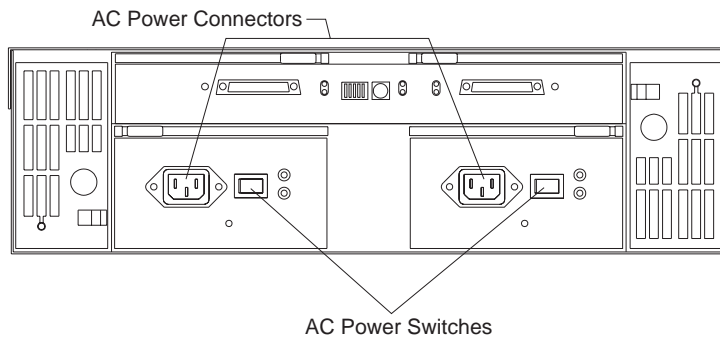
1. Turn the power supply switch to the OFF position.
2. Unplug the power supply cord from the electrical outlet.
3. Disconnect the power cord from the power supply.
4. Remove the nut and clamp from the rear of the power supply.
5. Remove the power supply from the expansion unit.
  - a. Grasp the power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

**To install a hot-swap power supply:**

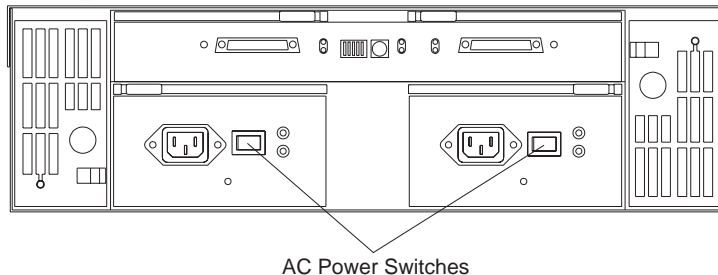
*Note:* When replacing a power supply due to a failure, insure that the power supply latch is mounted on the side of the supply that faces the middle of the machine. If not, remove the lever screw, flip the lever over and tighten the screw on the opposite side.



1. Ensure that the ac power switch on the power supply is in the OFF position.



2. Install the power supply in the expansion unit.
  - a. Slide the power supply into the expansion unit. Be sure the LEDs are on the right side and the lever is pulled straight out as you slide the power supply into the expansion unit.
  - b. Close the lever until the pull-ring latch locks in place. Make sure the lever engages the expansion unit chassis and cannot be pulled out.
3. Wrap the clamp around the power cord about eight inches from the end.
4. Attach the nut and tighten it securely.
5. Connect the power cord to the power supply.



6. Plug the supply power cord into a properly grounded electrical outlet. The amber LED stays on when the power switch is turned off.
7. Turn the power supply switch to the ON position. The amber LED goes off and the green LED goes on when the power supply switch is turned on.

## Working with the Hot-Swap Cooling Fans

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

The fans are interchangeable and customer replaceable and do not require preventive maintenance. The fans help maintain proper air

circulation across the components inside the expansion unit. Air flows through the expansion unit from the front to the back.

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

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

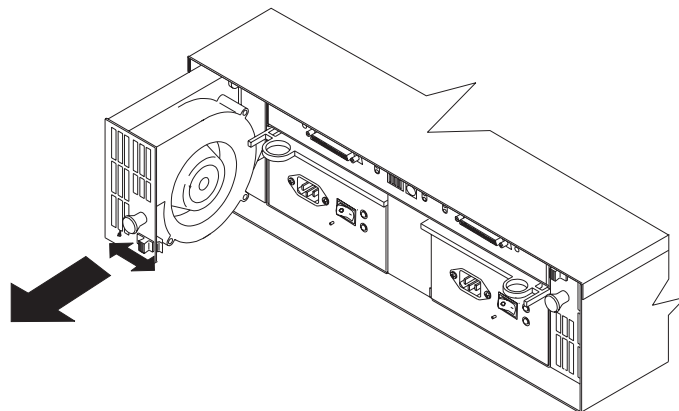
*Note:* Refer to Table 2 on page 60 for more information on LEDs.

## Replacing a Hot-Swap Fan

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

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

The Fault LEDs should turn off after a few seconds; if they remain on, refer to Table 2 on page 60.

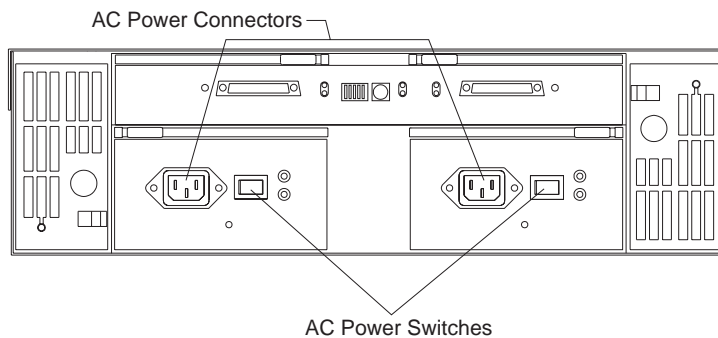


## Turning the Expansion Unit On and Off

### Turning the Expansion Unit On and Off

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

*Note:* If you are turning on the expansion unit after an emergency shutdown or power outage, refer to “Restore Power After an Emergency” on page 58.



### Turning On the Power

Use this procedure to turn on the power for the initial start-up of the expansion unit.

1. Verify that:
  - a. All communication and power cables are plugged into the back of the expansion unit and an ac power outlet.
  - b. All hard disk drives are locked securely in place.
  - c. The option switch on the expansion unit is set correctly.
  - d. Check the system documentation for all the hardware devices you intend to power up and determine the proper start up sequence.

*Note:* Be sure to power on the IBM Netfinity EXP15 prior to or at the same time as the system unit.

2. Turn on the power to each device, based on this powerup sequence.



## Turning the Expansion Unit On and Off

3. Turn on *both* power-supply switches on the back of the expansion unit.

*Note:* The expansion unit may take a few seconds to power up. During this time, you might see the amber and green LEDs on the expansion unit turn on and off intermittently. When the power up sequence is complete, only the green LEDs should remain on. If you still have one or more amber LEDs on, refer to Table 2 on page 60.

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

## Turning the Expansion Unit On and Off

### Turning Off the Power

**Attention:** Except in an emergency, never turn off the power if any Fault LEDs are lit on the expansion unit, especially on the drives. Correct the fault before you attempt to turn off the power, using the proper troubleshooting or servicing procedure. This will ensure that the expansion unit will power up correctly later. For guidance, refer to Table 2 on page 60.

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

- Instructions in a hardware or software procedure require you to turn off the power.
- A factory representative or service technician tells you to turn off the power.
- A power outage or emergency situation occurs (see “Performing an Emergency Shutdown” on page 57).

Use this procedure to turn off the power.

1. Make sure that all I/O activity has stopped. If applicable, logically disconnect from the host controller.
2. Make sure that all amber Fault LEDs are off. If any Fault LEDs are lit (drives, power supplies, or fans), correct the problem before you turn off the power. For guidance, refer to Table 2 on page 60.
3. Turn off *both* power supply switches on the back of the expansion unit.

## Performing an Emergency Shutdown

### Performing an Emergency Shutdown

**Attention:** Emergency situations might include: fire, flood, extreme weather conditions, or other hazardous circumstances. If a power outage or emergency situation occurs, always turn off all power switches on all computing equipment. This will help safeguard your equipment from potential damage due to electrical surges when power is restored. If the expansion unit loses power unexpectedly, it might be due to a hardware failure in the power system or midplane (see Table 2 on page 60).

Use this procedure to shut down during an emergency.

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

## Restore Power After an Emergency

### Restore Power After an Emergency

*Note:* The following instructions assume that you turned off the power supply switches during an emergency situation or after a power outage occurred.

Use this procedure to restart the expansion unit after a power failure or emergency shut down.

1. After the emergency situation is over or power is restored to the building, check the expansion unit for damage.

*Note:* If there is no visible damage, continue with Step 2, otherwise, have your system serviced. See Chapter 6, “Getting Help, Service, and Information” on page 63.

2. After you have checked for damage, plug in the expansion unit power cords and turn on *both* power switches.
3. Only the green LEDs on the front and back should be on. If one or more of the amber Fault LEDs are on, refer to Table 2 on page 60 for instructions.
4. Refer to your software application to check the software status of the expansion unit.

## Chapter 5. Solving Problems

---

This chapter contains information to help you solve some of the simpler problems you might have with your expansion unit.

**This chapter contains:**

Overview of Problem Causes . . . . .	59
Troubleshooting Charts . . . . .	60

### Overview of Problem Causes

System problems can be caused by hardware, software, or user error. (An example of a user error is pressing the wrong key.) You might be able to solve the problem yourself or provide helpful information to a service technician.

## Troubleshooting Charts

# Troubleshooting Charts

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

Problem Indicator	Component	Possible Cause	Possible Solutions
Amber LED on	Front Panel	Drive failure	Replace failed drive.
	Fan CRU	Fan failure	Replace failed fan.
	ESM board	Subsystem is overheated	Check fans for faults. Replace failed fan if necessary.
		Environment too hot	Check the ambient temperature around the expansion unit. Cool as necessary.
	Defective LED or hardware failure	If you cannot detect a fan failure or overheating problem, have the expansion unit serviced.	
Amber LED on, green LED off	Power supply CRU	Power switch turned off	Turn on the power switch.
Amber and green LEDs on	Power supply CRU	Power supply failure	Replace failed power supply CRU.
Amber/green LEDs off	Drive CRU	CRU not plugged in	Make sure that the drive is inserted and locked in place correctly. If you remove a drive from its bay, always wait at least 10 seconds before you plug it back into the expansion unit.
		Drive failure	If the drive is locked in place and its Power/Fault LED remains off, replace the drive.
All green LEDs off	All CRUs	Subsystem power off	Check that both expansion unit power cords are plugged in and both power switches are on. If applicable, check that the rack's main circuit breakers are turned on.
		ac power failure	Check the main circuit breaker and ac outlet.
		Power supplies failed	Replace both power supplies.
		Midplane failure	Have the expansion unit serviced.
Power/Fault LED off	One or more drive CRUs	Bad disk drive or bad midplane	Replace disk drive or have serviced by technician.

Table 2. Expansion Unit Troubleshooting Chart

## Troubleshooting Charts

Problem Indicator	Component	Possible Cause	Possible Solutions
Intermittent or sporadic power loss to the expansion unit	Some or all CRUs	Defective ac power source or partially plugged power cord	Check the ac power source to the rack. Reseat all power cables and both power supplies. If applicable, check the rack's power components (power units, UPS, and so on). Replace defective power cords.
		Power supply failure	Check for a fault LED on the power supplies and replace the failed CRU.
		Midplane failure	Have the midplane replaced (service technician only).
One or more green LEDs off	Power supply CRUs	Power cord unplugged or switch turned off	Make sure the cord is plugged in and the switch is turned on.
		Power supply CRU unplugged	Turn off the power switch. Make sure the power supply is plugged in properly and locked in place. Turn the power on again.
	One or two drive CRUs	No activity to the drives	No action required.
	All drive CRUs or those on one bus	No activity to the drives	No action required.
		Damaged or loose SCSI cables	Check SCSI bus cables and connections.
		ESM board failure	Use RAID management software to check the SCSI bus status. Have the ESM board replaced (service technician only).
		Midplane failure	Have the midplane replaced (service technician only).
	Several CRUs	Hardware failure	Replace the affected CRUs. If this doesn't correct the problem, have the ESM board replaced followed by the midplane (service technician only).

Table 3. Expansion Unit Troubleshooting Chart

## Troubleshooting Charts

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. If drives are daisy chained to the same SCSI bus, Option switches 1 and 2 must be set to different SCSI ID settings.
		ESM board failure	Have the ESM board replaced (service technician only).
	SCSI bus	Cable too long	If the external SCSI controller is SE (check LEDs), make sure the cable length is appropriate.
Random errors	Subsystem	Midplane failure	Have the midplane replaced (service technician only).

*Table 4. Expansion Unit Troubleshooting Chart*

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

If you already have run the server test program, or if running the test does not reveal the problem, have the system serviced. (See Chapter 6, “Getting Help, Service, and Information” on page 63.)



## Chapter 6. Getting Help, Service, and Information

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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.

For example, IBM maintains pages on the World Wide Web where you can get information about IBM products and services, find the latest technical information, and download device drivers and updates. Some of these pages are:

<a href="http://www.ibm.com">http://www.ibm.com</a>	Main IBM home page
<a href="http://www.pc.ibm.com">http://www.pc.ibm.com</a>	IBM Personal Computing
<a href="http://www.pc.ibm.com/support">http://www.pc.ibm.com/support</a>	IBM Personal Computing Support
<a href="http://www.pc.ibm.com/us/desktop/">http://www.pc.ibm.com/us/desktop/</a>	IBM Commercial Desktop (U.S.)
<a href="http://www.pc.ibm.com/us/intellistation/">http://www.pc.ibm.com/us/intellistation/</a>	IBM IntelliStation (U.S.)
<a href="http://www.pc.ibm.com/us/netfinity/">http://www.pc.ibm.com/us/netfinity/</a>	IBM Netfinity and PC Servers (U.S.)
<a href="http://www.pc.ibm.com/us/options/">http://www.pc.ibm.com/us/options/</a>	IBM Options (U.S.)

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

Help is also available from bulletin boards and online services, as well as by fax and telephone. This section provides information about these sources.

Services available and telephone numbers listed are subject to change without notice.

### Service Support

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. See “Getting Help by Telephone” on page 68 for HelpCenter telephone numbers in other countries.

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.

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

If possible, be at your computer when you call.

The following items are not covered:

- Replacement or use of non-IBM parts or nonwarranted IBM parts  
*Note:* All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the IBM Statement of Limited Warranty for a full explanation of IBM's warranty terms.

## **Before You Call for Service**

Many computer problems can be solved without outside assistance, by using the online help or by looking in the online or printed documentation that comes with your computer or software. Also, be sure to read the information in any README files that come with your software.

Most computers, operating systems, and application programs come with documentation that contains troubleshooting procedures and explanations of error messages. The documentation that comes with your computer also contains information about the diagnostic tests you can perform.

If you receive a POST error code when you turn on your computer, refer to the POST error-message charts in your hardware documentation. If you do not receive a POST error code, but suspect a hardware problem, refer to the troubleshooting information in your hardware documentation or run the diagnostic tests.

If you suspect a software problem, consult the documentation (including README files) for the operating system or application program.

## **Getting Customer Support and Service**

Purchasing an IBM PC hardware product entitles you to standard help and support during the warranty period. If you need additional support and services, a wide variety of extended services are available for purchase that address almost any need.

## **Using Electronic Support Services**

If you have a modem, you can get help from several popular services. Bulletin boards and online information services provide assistance through question-and-answer message areas, live chat rooms, searchable databases, and more.

Technical information is available on a wide range of topics, such as:

- Hardware setup and configuration
- Preinstalled software
- OS/2, DOS, and Windows
- Networking
- Communications
- Multimedia

In addition, the latest device driver updates are available.

The IBM Bulletin Board System (BBS) can be reached 24 hours a day, 7 days a week. Modem speeds of up to 14 400 baud are supported. Long distance telephone charges might apply. To access the IBM BBS:

- In the U.S., call 1-919-517-0001.
- In Canada:
  - In Montreal, call 514-938-3022.
  - In Toronto, call 905-316-4255 or 416-956-7877.
  - In Vancouver, call 604-664-6464.
- In the U.K., call 01256 336655.

Commercial online services that contain information about IBM products include:

- CompuServe  
Use the following GO words: APTIVA, IBMPS2, ThinkPad, PowerPC, ValuePoint, IBMSVR, or IBMOBI.
- PRODIGY  
Use the Jump command; type **IBM** and select **PC Product Support**.
- America Online  
Use the “Go to” keyword **IBM Connect**.

## Using the World Wide Web

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

support. The address for the IBM Personal Computing home page is:

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

You can find support information for your IBM products, including supported options, on the IBM Personal Computing Support page at:

<http://www.pc.ibm.com/support>

If you select Profile from the support page, you can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable Files. You will have the information you need, all in one place. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products. You also can access online support forums, which are community sites monitored by IBM support staff.

For information about specific Personal Computer products, visit the following pages:

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

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

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

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

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

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

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

## Getting Information by Fax

If you have a touch-tone telephone and access to a fax machine, in the U.S. and Canada you can receive by fax marketing and technical information on many topics, including hardware, operating systems,

and local area networks (LANs). You can call the IBM Automated Fax System 24 hours a day, 7 days a week. Follow the recorded instructions, and the requested information will be sent to your fax machine.

To access the IBM Automated Fax System, do the following:

- In the U.S., call 1-800-426-3395.
- In Canada, call 1-800-465-3299.

## Getting Help Online

Online Housecall is a remote communication tool that allows an IBM technical-support representative to access your PC by modem. Many problems can be remotely diagnosed and corrected quickly and easily. In addition to a modem, a remote-access application program is required. This service is not available for servers. There might be a charge for this service, depending on the request.

For more information about configuring your PC for Online Housecall:

- In the U.S., call 1-800-772-2227.
- In Canada, call 1-800-565-3344.
- In all other countries, contact your IBM reseller or IBM marketing representative.

## Getting Help by Telephone

During the warranty period, you can get help and information by telephone through the IBM PC HelpCenter. Expert technical-support representatives are available to assist you with questions you might have on the following:

- Setting up your computer and IBM monitor
- Installing and setting up IBM options purchased from IBM or an IBM reseller
- 30-day, preinstalled-operating-system support
- Arranging for service (on-site or carry-in)
- Arranging for overnight shipment of customer-replaceable parts

In addition, if you purchased an IBM PC Server or IBM Netfinity Server, you are eligible for IBM Start Up Support for 90 days after installation. This service provides assistance for:

- Setting up your network operating system
- Installing and configuring interface cards
- Installing and configuring network adapters

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

If possible, be at your computer when you call.

In the U.S. and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m.<sup>1</sup>

Country		Telephone number
Austria	Österreich	1-546 585 075
Belgium - Dutch	Belgie	02-717-2504
Belgium - French	Belgique	02-717-2503
Canada	Canada	1-800-565-3344
Denmark	Danmark	03-525-6905
Finland	Suomi	9-22-931805
France	France	01-69-32-40-03

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<sup>1</sup> Response time will vary depending on the number and complexity of incoming calls.

<b>Country</b>		<b>Telephone number</b>
Germany	Deutschland	069-6654-9003
Ireland	Ireland	01-815-9207
Italy	Italia	02-4827-5003
Luxembourg	Luxembourg	298-977-5060
Netherlands	Nederland	020-504-0531
Norway	Norge	2-305-3203
Portugal	Portugal	01-791-5147
Spain	España	091-662-4270
Sweden	Sverige	08-632-0063
Switzerland - German	Schweiz	01-212-1810
Switzerland - French	Suisse	022-310-0418
Switzerland - Italian	Svizzera	091-971-0523
United Kingdom	United Kingdom	01475-555555
U.S.A. and Puerto Rico	U.S.A. and Puerto Rico	1-800-772-2227

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

## Getting Help Around the World

If you travel with your computer or need to move it to another country, you can register for International Warranty Service. When you register with the International Warranty Service Office, you will receive an International Warranty Service Certificate that is honored virtually worldwide, wherever IBM or IBM resellers sell and service IBM PC products.



For more information or to register for International Warranty Service:

- In the U.S. or Canada, call 1-800-497-7426.
- In Europe, call 44-1475-893638 (Greenock, U.K.).
- In Australia and New Zealand, call 61-2-9354-4171.

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

## **Purchasing Additional Services**

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

### **Enhanced PC Support Line**

Enhanced PC Support is available for desktop and mobile IBM computers that are not connected to a network. Technical support is provided for IBM computers and IBM or non-IBM options, operating systems, and application programs on the Supported Products list.

This service includes technical support for:

- Installing and configuring your out-of-warranty IBM computer
- Installing and configuring non-IBM options in IBM computers
- Using IBM operating systems in IBM and non-IBM computers
- Using application programs and games
- Tuning performance
- Installing device drivers remotely
- Setting up and using multimedia devices
- Identifying system problems
- Interpreting documentation

You can purchase this service on a per-call basis, as a multiple-incident package, or as an annual contract with a

10-incident limit. For more information about purchasing Enhanced PC Support, see “Ordering Support Line Services” on page 72.

## 900-Number Operating System and Hardware Support Line

In the U.S., if you prefer to obtain technical support on a pay-as-you-go basis, you can use the 900-number support line. The 900-number support line provides support for IBM PC products that are out of the warranty period.

To access this support, call 1-900-555-CLUB (2582). You will be notified of the charge per minute.

## Network and Server Support Line

Network and Server Support is available for simple or complex networks made up of IBM servers and workstations using major network operating systems. In addition, many popular non-IBM adapters and network interface cards are supported.

This service includes all of the features of the Enhanced PC Support Line, plus:

- Installing and configuring client workstations and servers
- Identifying system problems and correcting problems on the client or the server
- Using IBM and non-IBM network operating systems
- Interpreting documentation

You can purchase this service on a per-call basis, as a multiple-incident package, or as an annual contract with a 10-incident limit. For more information about purchasing Network and Server Support, see “Ordering Support Line Services.”

## Ordering Support Line Services

Enhanced PC Support Line and Network and Server Support Line services are available for products on the Supported Products list. To receive a Supported Products list:

- In the U.S.:

1. Call 1-800-426-3395.
  2. Select document number 11683 for Network and Server support.
  3. Select document number 11682 for Enhanced PC support.
- In Canada, contact IBM Direct at 1-800-465-7999, or:
    1. Call 1-800-465-3299.
    2. Select the HelpWare catalog.
  - In all other countries, contact your IBM reseller or IBM marketing representative.

For more information or to purchase these services:

- In the U.S., call 1-800-772-2227.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your HelpCenter.

## Warranty and Repair Services

You can upgrade your standard hardware warranty service or extend the service beyond the warranty period.

Warranty upgrades in the U.S. include:

- Carry-in service to on-site service  
If your warranty provides carry-in repair service, you can upgrade to on-site repair service, either standard or premium. The standard upgrade provides a trained servicer within the next business day (9 a.m. to 5 p.m., local time, Monday through Friday). The premium upgrade provides 4-hour average response, 24 hours a day, 7 days a week.
- On-site service to premium on-site service  
If your warranty provides for on-site service, you can upgrade to premium on-site service (4-hour average on-site response, 24 hours a day, 7 days a week).

You also can extend your warranty. Warranty and Repair Services offers a variety of post-warranty maintenance options, including ThinkPad EasyServ Maintenance Agreements. Availability of the services varies by product.

For more information about warranty upgrades and extensions:

- In the U.S., call 1-800-426-4968.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your IBM reseller or IBM marketing representative.

## **Ordering Publications**

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

- In the U.S., Canada, and Puerto Rico, call 1-800-879-2755.
- In other countries, contact your IBM reseller or IBM marketing representative.

## Appendix A. Records

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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, if you should require technical assistance.

### Record the Identification Numbers

Record and retain the following information.

Product Name	IBM Netfinity EXP15
Machine Type	3520
Model Number	_____
Serial Number	_____

*Table 5. Identification Record*

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

### Installed Device Records

Use the following tables 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.

## Installed Device Records

Expansion Unit Disk Drive Location	Disk Drive Part Number and Model Number	Disk Drive Serial Number	Expansion Unit SCSI Channel (1,2)	SCSI Address (0-4) or (8-12)	Adapter Number	Adapter Channel Number (1:6)
Bay 1	_____	_____	_____	_____	_____	_____
Bay 2	_____	_____	_____	_____	_____	_____
Bay 3	_____	_____	_____	_____	_____	_____
Bay 4	_____	_____	_____	_____	_____	_____
Bay 5	_____	_____	_____	_____	_____	_____
Bay 6	_____	_____	_____	_____	_____	_____
Bay 7	_____	_____	_____	_____	_____	_____
Bay 8	_____	_____	_____	_____	_____	_____
Bay 9	_____	_____	_____	_____	_____	_____
Bay 10	_____	_____	_____	_____	_____	_____

Table 6. Internal Drives and Devices

## Appendix B. Product Warranties and Notices

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

**This appendix contains:**

Warranty Statements . . . . .	78
United States, Canada, and Puerto Rico . . . . .	78
United Kingdom . . . . .	81
Notices . . . . .	85
Year 2000 Readiness and Instructions . . . . .	85
Trademarks . . . . .	87
Industry Canada Class A Emission Compliance Statement . . . . .	88
United Kingdom Telecommunications Safety Requirements . . . . .	89
European Community Directive Conformance Statement . . . . .	89
Australia and New Zealand Class A Statement . . . . .	89
Taiwanese Electromagnetic Interference (EMI) Statement . . . . .	89
Power Cords . . . . .	90

## Product Warranties and Notices

### Warranty Statements

The following warranty statements are for the United States, Canada, Puerto Rico, and the United Kingdom.

#### United States, Canada, and Puerto Rico

The following is the statement of limited warranty for the United States, Canada, and Puerto Rico.

International Business Machines Corporation

Armonk, New York, 10504

#### Statement of Limited Warranty

*The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally 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. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. If you have any questions, contact IBM or your reseller.*

**Machine:** IBM Netfinity EXP15

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

*\*Contact your place of purchase for warranty service information.*

#### Production Status

Each 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 warranty terms apply.

#### 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 receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if authorized by IBM, will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

For IBM or your reseller to provide warranty service for a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many of these transactions involve the removal of parts and their return to IBM. You



## Product Warranties and Notices

represent that all removed parts are genuine and unaltered. A part that replaces a removed part will assume the warranty service status of the replaced part.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair it or replace it with one that is at least functionally equivalent, without charge. The replacement may not be new, but will be in good working order. If IBM or your reseller is unable to repair or replace the Machine, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user. However, for Machines which have a life-time warranty, this warranty is not transferable.

### Warranty Service

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

IBM or your reseller will provide certain types of repair and exchange service, either at your location or at IBM's or your reseller's service center, to restore a Machine to good working order.

When a type of 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. 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 ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange.

You agree to:

1. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
2. where applicable, before service is provided —
  - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
  - b. secure all programs, data, and funds contained in a Machine, and
  - c. 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.

### Extent of Warranty

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

## Product Warranties and Notices

The warranties may be voided by misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, removal or alteration of Machine or parts identification labels, or failure caused by a product for which IBM is not responsible.

THESE WARRANTIES 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.

### **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 only for:

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 or loss, up to the greater of U.S. \$100,000 or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR LOSSES OR 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 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 EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

## Product Warranties and Notices

### United Kingdom

IBM warrants this IBM product to be in good working order and conforms to its officially published IBM specifications for a period of three years from the date of first purchase by an end-user customer.

*Note:* Batteries for Mobile products are limited to 1 year warranty.

Your sales receipt or authorised dated and stamped warranty service certificate is proof of your entitlement to warranty service.

If this product is not in good working order, IBM will, at its option, repair or replace this product at no additional charge except as set forth below. Repair parts and replacement products will be provided on an exchange basis and will be either new, equivalent to new or reconditioned. All replaced parts and products become the property of IBM. This warranty does not cover the repair of damage to the product resulting from:

- Accident, disaster, misuse and abuse
- Use of parts not manufactured or sold by IBM
- Modification of the product
- Service provided by anyone other than IBM or an authorised IBM service provider.

IBM does not warrant that the functions in any preloaded program will meet your requirements or that the operations of the preloaded program will be uninterrupted or error free.

There is no other warranty whether express or implied. In case the exclusion of certain warranties would be precluded by applicable law, such warranties would be limited in duration to the warranty period stated above.

### *Warranty Performance*

Warranty service may be obtained by returning the product during warranty period to an authorised IBM service provider and by providing proof of your warranty service entitlement. You are responsible for any associated transportation charges and insurance during shipment and return.

## Product Warranties and Notices

For a product purchased in a group A country (as defined), warranty service may be obtained from any authorised IBM service provider in any group A country; similarly for a product purchased in a group B country, warranty service may be obtained from any authorised IBM service provider in any group B country.

### *Group A Countries*

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland Italy, Ireland, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

### *Group B Countries*

Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czechia, Russia, Armenia, Bellarus, Georgia, Kirghizia, Hungary, Kazakhstan, Macedonia, Moldova, Poland, Romania, Slovakia, Serbia-Montenegro, Slovenia, Ukraine.

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Some IBM products are sold with a service entitlement which is delivered on the customers premises (on-site). If the product you have purchased carries with it an entitlement to IBM on-site service, this service is provided during the warranty period subject to the following terms and conditions:

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- You must contact a local authorised IBM service provider and be prepared to supply proof of warranty entitlement. The authorised IBM service provider will attempt to resolve your problem over the telephone. If this is not possible, a trained service engineer will be dispatched to your location to repair the IBM product.
- The service representative must be provided with full access to the equipment reported as faulty.
- The equipment must be located within 50 kilometers (or more depending on country) of the authorised IBM service provider.

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Tel + 44 1475 893638

Fax + 44 1475 893732

Alternatively customers may register for International Warranty Service via their local IBM Office.

## Product Warranties and Notices

*Notes:*

1. International Warranty Service is not available on IBM Options unless they are installed in or connected to an IBM System Unit which is registered for International Warranty Service.
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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.

## Product Warranties and Notices

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## Federal Communications Commission (FCC) Statement

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

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

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

## Industry Canada Class A Emission Compliance Statement

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

### **Avis de conformité à la réglementation d'Industrie Canada**

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

## United Kingdom Telecommunications Safety Requirements

### Notice to Customers

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

## European Community Directive Conformance Statement

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

A declaration of Conformity with the requirements of the Directive has been signed by IBM United Kingdom Limited, PO BOX 30 Spango Valley Greenock Scotland PA160AH.

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

## Australia and New Zealand Class A Statement

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

## Taiwanese Electromagnetic Interference (EMI) Statement

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

## Power Cords

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

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

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

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

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

IBM power cords for a specific country are usually available only in that country:

<b>IBM Power Cord Part Number</b>	<b>Used in These Countries</b>
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
62X1045	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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