

Netfinity 3000

User's Handbook



Netfinity 3000

User's Handbook

Note

Before using this information and the product it supports, be sure to read the general information under Appendix B, "Product warranties and notices" on page 275.

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Contents

| | |
|--|-------|
| Tables | vii |
| Caution and danger statements | ix |
| Instruções de Cuidado e Perigo (Português do Brasil) | ix |
| Sikkerhedsforskrifter mærket Pas på! og Fare! (dansk) | xi |
| Turvaohjeet (suomi) | xii |
| Consignes Attention et Danger (Français) | xii |
| Sicherheitshinweise (Deutsch) | xiii |
| Avvisi di attenzione e di pericolo (Italiano) | xiv |
| Veiligheidsinstructies (Nederlands) | xvi |
| Advarsels- og faremerknader (norsk) | xvii |
| Notas de Cuidado e de Perigo (Português) | xviii |
| Declaraciones sobre precauciones y peligros (español) | xx |
| Varningsmeddelanden (Svenska) | xx |
| Safety information | xxiii |
| Lithium battery notice | xxv |
| Laser compliance statements | xxvi |
| About this book | xxix |
| How this book is organized | xxix |
| Notices used in this book | xxx |
| Related publications | xxxi |
| Chapter 1. Introducing your Netfinity 3000 server | 1 |
| Features at a glance | 3 |
| What your IBM Netfinity 3000 server offers | 4 |
| Reliability, availability, and serviceability features | 7 |
| Controls and indicators | 8 |
| Input/output connectors | 11 |
| Internal view | 15 |
| External view | 16 |
| Chapter 2. Getting started | 17 |
| Questions or problems? | 19 |
| Arranging your workspace | 20 |
| Using the stabilizing feet | 23 |
| Cabling the server | 24 |
| Starting the server | 26 |
| Using the CD-ROM drive | 30 |

| | |
|--|-----|
| Chapter 3. Configuring your server | 33 |
| Configuration overview | 34 |
| The Configuration/Setup Utility program | 36 |
| Using the Configuration/Setup Utility program | 39 |
| Resolving configuration conflicts | 57 |
| Configuring the Ethernet controller | 59 |
| Using the SCSISelect Utility program | 62 |
| | |
| Chapter 4. Installing options | 67 |
| Before you begin | 69 |
| Electrical safety | 70 |
| Handling static-sensitive devices | 71 |
| Preparing to add options | 73 |
| Working with adapters | 79 |
| Working with memory modules | 96 |
| Installing or removing internal drives | 102 |
| Working with microprocessors | 126 |
| Connecting external options | 133 |
| Adding security options | 144 |
| Completing the installation | 148 |
| Updating the server configuration | 153 |
| Network operating system instructions | 154 |
| | |
| Chapter 5. Solving problems | 157 |
| Diagnostic tools overview | 158 |
| Running the diagnostic test programs | 164 |
| Power-on self-test (POST) messages | 165 |
| Power-on self-test (POST) beep codes | 192 |
| SCSI messages | 194 |
| Ethernet controller messages | 196 |
| Troubleshooting | 200 |
| Checking the system for damage | 222 |
| Replacing the battery | 224 |
| | |
| Chapter 6. Getting help, service, and information | 229 |
| Service support | 230 |
| Before you call for service | 232 |
| Getting customer support and service | 232 |
| Purchasing additional services | 238 |
| Ordering publications | 240 |

| | |
|---|-----|
| Chapter 7. Server records and specifications | 243 |
| Recording the identification numbers | 244 |
| Recording installed devices | 245 |
| System specifications | 251 |
| | |
| Appendix A. Ethernet cable specifications | 271 |
| | |
| Appendix B. Product warranties and notices | 275 |
| Warranty Statements | 275 |
| Notices | 286 |
| Electronic emission notices | 289 |
| Power cords | 292 |
| | |
| Glossary | 295 |
| | |
| Index | 309 |

Tables

| | |
|--|-----|
| 1. Memory configurations (unbuffered) | 98 |
| 2. Memory configurations (registered) | 98 |
| 3. Maximum allowable drive sizes | 104 |
| 4. Serial port connector pin-number assignments | 136 |
| 5. Parallel port connector pin-number assignments | 137 |
| 6. Video port connector pin-number assignments | 138 |
| 7. Keyboard and auxiliary-device port connectors pin-number assignments | 139 |
| 8. The 68-pin SCSI port connector pin-number assignments | 141 |
| 9. USB port connector pin-number assignments | 142 |
| 10. Ethernet connector pin-number assignments | 143 |
| 11. Ethernet controller messages | 197 |
| 12. Server identification numbers | 244 |
| 13. Internal and external drives and devices | 245 |
| 14. Configuration/setup program defaults and changes | 246 |
| 15. Monitor default settings and changes | 249 |
| 16. RAM default settings and changes | 250 |
| 17. Adapter-slot configuration information | 250 |
| 18. Cabling specifications for 10BASE-T and 100BASE-TX link segments | 272 |

Caution and danger statements



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.

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.

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。

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.

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.

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.

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.

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.

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.

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.

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。

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.

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

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.

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.

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.

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.

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").

Inštrukcie Nebezpe enstvo a Pozor (Slovensky)

Pozor:

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

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

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

Navedbe svaril in nevarnosti (slovensko)

Važno:

Vse navedbe svaril in nevarnosti v tej knjigi se začenjajo 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 začnja 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.

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.

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。

Safety information

1



DANGER

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

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:

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

To Disconnect:

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

Lithium battery notice

2



CAUTION:

When replacing the lithium battery, use only IBM Part Number 33L3963 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

Laser compliance statements

Some IBM PC Server and Netfinity models are equipped from the factory with a CD-ROM drive. CD-ROM drives are also sold separately as options. The CD-ROM drive is a laser product. The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

3



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

About this book

This book provides instructions on how to configure your IBM Netfinity 3000 server and how to install and remove options. This book also provides information to help you solve many simple problems that might occur.

How this book is organized

Chapter 1, “Introducing your Netfinity 3000 server,” provides detailed information about the features of your server.

Chapter 2, “Getting started,” provides a general introduction to using your server. This chapter includes instructions for starting the server, using the CD-ROM drive, and arranging your workspace.

Chapter 3, “Configuring your server,” describes how to use the Configuration/Setup Utility program to configure your server. This chapter also provides instructions for using various utility programs and resolving configuration conflicts.

Chapter 4, “Installing options,” contains instructions for installing and removing options, such as memory, adapters, and internal drives. Instructions for connecting external options are also included in this chapter.

Chapter 5, “Solving problems,” includes an overview of the diagnostic tools, instructions for testing the server, error codes and messages, and troubleshooting charts. This chapter also contains information about checking the server for damage and replacing the battery.

Chapter 6, “Getting help, service, and information,” provides instructions on how to obtain service and technical assistance for your Netfinity 3000 server and other IBM products that you might plan to use. This chapter also contains information about other publications, products, warranties, and services that IBM offers. Also included are fax numbers, toll-free telephone numbers, and access information for electronic bulletin boards, online services, and the World Wide Web.

Notices used in this book

Chapter 7, “Server records and specifications,” provides a section to record and update important information about your server, including serial numbers, key number, and device records. Whenever you add options to your server, be sure to update the information in these records. In addition to server records, this chapter contains the server specifications, such as product dimensions, environmental operating requirements, the system-board layout, jumper locations and settings, and switch settings. This chapter also contains instructions for setting jumpers and switches.

Appendix A, “Ethernet cable specifications,” provides a description of the cables that you can use to connect the server to an Ethernet, IEEE Standard 802.3 network.

Appendix B, “Product warranties and notices,” contains warranty information, notices, and trademarks.

A glossary and an index follow the appendixes.

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

In addition to this book, the following publications come with your Netfinity 3000 server:

- The *IBM Safety Information* book, which contains translated versions of the English caution or danger statements that are contained in this *User's Handbook*.
- The ServerGuide package, which contains several CD-ROMs, describes the advantages of the IBM ServerGuide software and describes how to use it.
- The Netfinity 3000 *Start Here* booklet contains information about setting up your server, attaching cables, and installing an operating system.

The *IBM Netfinity 3000 Hardware Maintenance Manual Supplement* is available for purchase. This manual contains error codes, advanced diagnostic procedures, and a parts catalog for most models. This manual is intended for trained service technicians. (Diagnostic diskettes or CDs are not included.)

The following publications pertain to the server's Ethernet controller. They are available for purchase.

- *IBM LAN Technical Reference IEEE 802.2 and NETBIOS API*, SC30-3587
- *IBM Transmission Control Protocol/Internet Protocol Version 2.1 for DOS: Programmer's Reference*, SC31-7046
- *IBM LAN Server Command and Utilities*, S10H-9686
- *Guide to LAN Server Books*, S10H-9688
- *DOS LAN Services and User's Guide*, S10H-9684

Related 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.

Chapter 1. Introducing your Netfinity 3000 server

We appreciate your decision to purchase an IBM® Netfinity® 3000 server. Your Netfinity 3000 server is a high-performance server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

Performance, ease of use, reliability, and expansion capabilities were key considerations during the design of your server. These design features make it possible for you to customize the server hardware to meet your business needs of today, while providing flexible expansion capabilities for the future.

Your IBM Netfinity 3000 server comes with a three-year limited warranty and IBM Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your Netfinity 3000 server model and other IBM server products at the following World Wide Web address:

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

Your server serial number and model number are located near the bottom of the front bezel. Write these numbers in the spaces provided in “Recording the identification numbers” on page 244. You will need these numbers when you register your server with IBM. After you register your server, you can receive product information and updates, performance tips, and compatibility information. To register your server, go to the following World Wide Web address:

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

For service, assistance, or additional information about IBM Start Up Support and the World Wide Web, see Chapter 6, “Getting help, service, and information” on page 229.

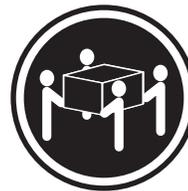
If you have not yet set up your server, see Chapter 2, “Getting started” on page 17 for detailed information about attaching cables and installing an operating system. Be sure to read the publications that come with the IBM ServerGuide™ package before you set up your server.

This chapter contains an overview of the server features and components.

5



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting your machine.

| | |
|--|----|
| This chapter contains: | |
| Features at a glance | 3 |
| What your IBM Netfinity 3000 server offers | 4 |
| Reliability, availability, and serviceability features | 7 |
| Controls and indicators | 8 |
| Server controls | 8 |
| Status indicators | 10 |
| Input/output connectors | 11 |
| Internal view | 15 |
| External view | 16 |

Features at a glance

The following table summarizes the features of the Netfinity 3000 server.

| | | |
|---|---|---|
| <p>Microprocessor</p> <ul style="list-style-type: none"> • Intel® microprocessor (speed and type varies by model) • 100 MHz Front Side Bus (FSB) • Level-1 and level-2 cache memory varies by microprocessor. <p>Memory</p> <ul style="list-style-type: none"> • Three 3.3 V, synchronous, 168-pin dual in-line memory-module (DIMM) sockets • 64 MB, expandable to 768 MB • 100 MHz, synchronous dynamic random-access memory (SDRAM) with error checking and correction (ECC) • Support for 32 MB, 64 MB, and 128 MB unbuffered DIMMs¹ or for 256 MB registered DIMMs¹ • Flash memory for system programs <p>Diskette drive</p> <ul style="list-style-type: none"> • Supports one diskette drive • Standard: One 3.5-inch, 1.44 MB <p>Hard disk drives</p> <ul style="list-style-type: none"> • Number and capacities of hard disk drives vary by model • Server supports up to four internal hard disk drives <p>CD-ROM drive</p> <ul style="list-style-type: none"> • Standard: IDE | <p>Keyboard and auxiliary device</p> <ul style="list-style-type: none"> • Keyboard • Mouse <p>Expansion slot connectors</p> <ul style="list-style-type: none"> • Three dedicated ISA slot connectors • Three dedicated PCI slot connectors • One dedicated Accelerated Graphics Port (AGP) slot connector <p>Expansion bays</p> <ul style="list-style-type: none"> • Standard: One dedicated 5.25-inch drive bay for CD-ROM drive • One 3.5-inch or 5.25-inch drive bay • Four 3.5-inch drive bays • Number of bays empty and available for expansion varies by model <p>Upgradable POST and BIOS</p> <ul style="list-style-type: none"> • POST/BIOS upgrades (when available) to update EEPROM on the system board <p>Security features</p> <ul style="list-style-type: none"> • Bolt-down capability • Chassis-intrusion detector • Power-on and administrator passwords • Security-error indicator • Selectable drive-startup sequence • Side cover lock • Unattended start mode | <p>SCSI features (if a SCSI adapter comes with your model server)</p> <ul style="list-style-type: none"> • 16-bit UltraSCSI adapter <ul style="list-style-type: none"> – One external connector – One internal connector • Server supports up to four internal SCSI hard disk drives <p>Power supply</p> <ul style="list-style-type: none"> • 330 Watts • Auto-sensing function • Built-in overload and surge protection <p>Integrated functions</p> <ul style="list-style-type: none"> • Voltage regulator for microprocessor • Two serial ports • Two universal serial bus (USB) ports • One parallel port • Mouse port • Keyboard port • Full-duplex 10/100 Mbps Ethernet controller <ul style="list-style-type: none"> – 10BASE-T/100BASE-TX port – Integrated Direct Memory Access (DMA) Buffer Management Unit for low microprocessor and bus utilization • AGP function on system board <ul style="list-style-type: none"> – 4 MB synchronous graphics random-access memory (SGRAM), 100 MHz • Systems Management Controller (LM80) |
|---|---|---|

Pressing **F1** at startup enables you to view the configuration information for your server. See “The Configuration/Setup Utility program” on page 36 for details.

What your IBM Netfinity 3000 server offers

The unique design of your IBM Netfinity 3000 server takes advantage of advancements in data storage, networking, and memory management. Your server offers:

- Impressive performance using an innovative approach to uniprocessing

The Netfinity 3000 server supports one Intel microprocessor installed on the system board (speed and type vary by model).

- 100 MHz Front Side Bus (FSB)

The FSB is the microprocessor external bus. This bus includes the interface to system-board components, and level-2 cache memory for some microprocessors. The FSB is also known as the processor/host bus.

- Large system memory

The memory bus in your server supports up to 384 MB of unbuffered system memory, or up to 768 MB of registered system memory.¹ The memory controller provides support for 100 MHz, synchronous dynamic random-access memory (SDRAM) with error checking and correction (ECC).

- Integrated network environment support

Your server supports various network environments. Your Netfinity 3000 server comes with a 10/100 Mbps Ethernet controller on the system board. This Ethernet controller has an interface for connecting 10 Mbps or 100 Mbps transceivers. The server automatically selects between 10BASE-T and 100BASE-TX. The controller provides full-duplex (FDX) operation, which allows simultaneous transmission and reception of data on the Ethernet local area network (LAN).

¹ **Important:** You cannot mix registered and unbuffered DIMMs in your server. To use registered DIMMs, you must remove all unbuffered DIMMs from your server.

- IBM ServerGuide™

Your server includes a copy of the IBM ServerGuide package. You can insert a CD and begin a simplified server installation, with device drivers that have been tested for your server.

You can use the programs on the ServerGuide CDs to:

- Configure supported hardware directly from CD.
- Automate some of the network operating system (NOS) installation steps, through an easy-to-use wizard.
- Detect the supported hardware installed in your server; then, provide thoroughly tested device drivers for that hardware.

Note: Some of these system-specific device drivers are newer than the drivers included with off-the-shelf NOS packages.

- Provide a Replicated Installation path for installing Windows NT Server 4.0 on multiple servers.
- Install popular application programs directly from CD.
- Install IBM Update Connector. Once this program has been installed, you can connect to IBM², and receive any available device drivers, BIOS, and program updates. (This requires Windows NT Server 4.0 and TCP/IP access to the Internet.)

For more information and details about other ServerGuide features, refer to the documentation provided inside your ServerGuide package.

If you decide not to use the ServerGuide software to assist you with the installation of your NOS, you need to download system-specific NOS installation instructions and device drivers from the World Wide Web. Access the IBM site on the World Wide Web at <http://www.ibm.com/pc/support>.

- Your Netfinity 3000 server comes with the *IBM Enhanced Diagnostics* CD. This CD contains the server diagnostic test

² Response time will vary, depending on the number and nature of calls received.

programs, which you can use to test the standard features of your server. You can also use these programs to test some external devices. For more information, see “Running the diagnostic test programs” on page 164.

Your IBM Netfinity 3000 server is designed to be cost-effective, powerful, and flexible. It uses both peripheral component interconnect (PCI) and industry-standard architecture (ISA) bus architectures to provide compatibility with a wide range of existing hardware devices and software applications.

As always, your IBM server meets stringent worldwide certifications for power, electromagnetic compatibility (EMC), and safety. See Appendix B, “Product warranties and notices” on page 275 for additional information.

Reliability, availability, and serviceability features

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

The following is an abbreviated list of the RAS features on the IBM Netfinity 3000 server. Many of these features are explained in the following chapters of this book.

- Advanced Desktop Management Interface (DMI) features
- Built-in, menu-driven configuration programs
- Built-in, menu-driven small computer system interface (SCSI) configuration programs (if a SCSI adapter comes with your server)
- Built-in, menu-driven setup programs
- Cooling fans with speed-sensing capability
- Customer support center 24 hours per day³
- Error checking and correction (ECC) memory
- Error codes and messages
- Menu-driven diagnostic programs on CD
- Netfinity Manager™ and LANDesk® enabled
- Parity checking on the SCSI bus and PCI bus
- Power Managed - Advanced Configuration and Power Interface (ACPI) level
- Power-on self-test (POST)
- Systems Management Controller (LM80) provides additional control for remote systems management
- Upgradable POST and BIOS
- Vital product data (VPD), including serial number information and replacement part numbers, stored in nonvolatile memory, making remote maintenance of your server more efficient.

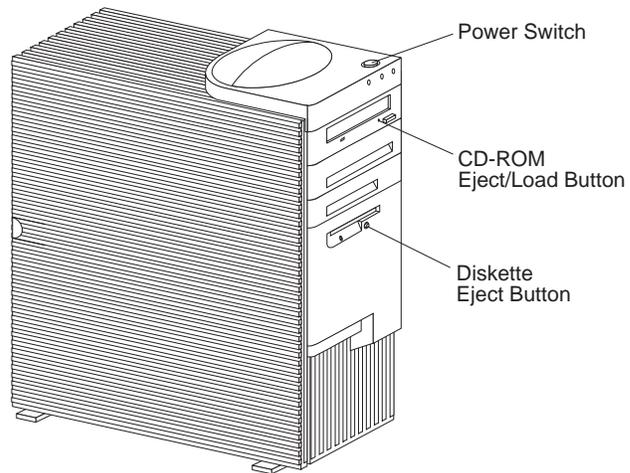
³ Response time will vary, depending on the number and nature of calls received.

Controls and indicators

Controls and indicators

The most commonly used controls and status indicators are on the front of your server.

Server controls



Controls and indicators

Power Switch: Press this switch to turn your server on or off.

Attention:

Do not turn off the server if a drive in-use light is on. This might damage the information stored on a hard disk or on a diskette.

When the power is on, there is a period of time during the power-on self-test (POST), a short test that occurs when the server is turned on, when a single touch of the power switch will not turn off the power. If power must be turned off during POST, press and hold the power switch for 5 seconds or disconnect the power cord. After POST, the power switch works normally, unless the server is in a hang condition. If the server is in a hang condition, press and hold the power switch until the power turns off.

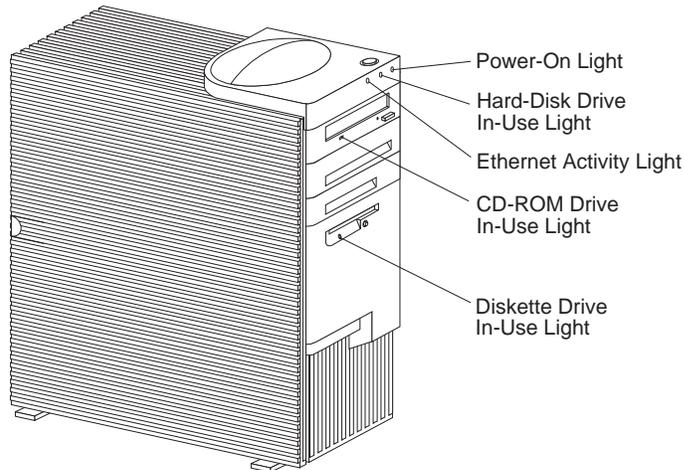
CD-ROM Eject/Load Button: Push this button to release a CD from the CD-ROM drive. See “Using the CD-ROM drive” on page 30 for additional information about the CD-ROM drive controls and indicators.

Diskette Eject Button: Push this button to release a diskette from the diskette drive.

Controls and indicators

Status indicators

The following illustration identifies the indicators located on the front of the server.



-  **Power-On Light:** This light comes on when you turn on your server by pressing the power switch.
-  **Hard Disk Drive In-Use Light:** This light comes on when your server is accessing a SCSI hard disk drive. If this light remains illuminated, it might indicate that either the SCSI bus or the system microprocessor has stopped.
-  **Ethernet Activity Light:** This light comes on when the Ethernet controller is transmitting data to or receiving data from another system in the network.

Input/output connectors

■ Ethernet Diagnostic LEDs:

Your server contains two diagnostic light-emitting diodes (LEDs) on the Ethernet connector that is located at the rear of the server.

- When the green LED is on, it indicates that the Ethernet controller is connected to a hub or switch and is receiving link pulses. This LED is also known as the Link OK light.
- When the amber LED is on, it indicates that the Ethernet network is operating at 100 Mbps. When this LED is off, it indicates that the Ethernet network is operating at 10 Mbps.

For additional information, see “Diagnostic LEDs” on page 218.

CD-ROM Drive In-Use Light: This light comes on when the CD-ROM drive is accessed.

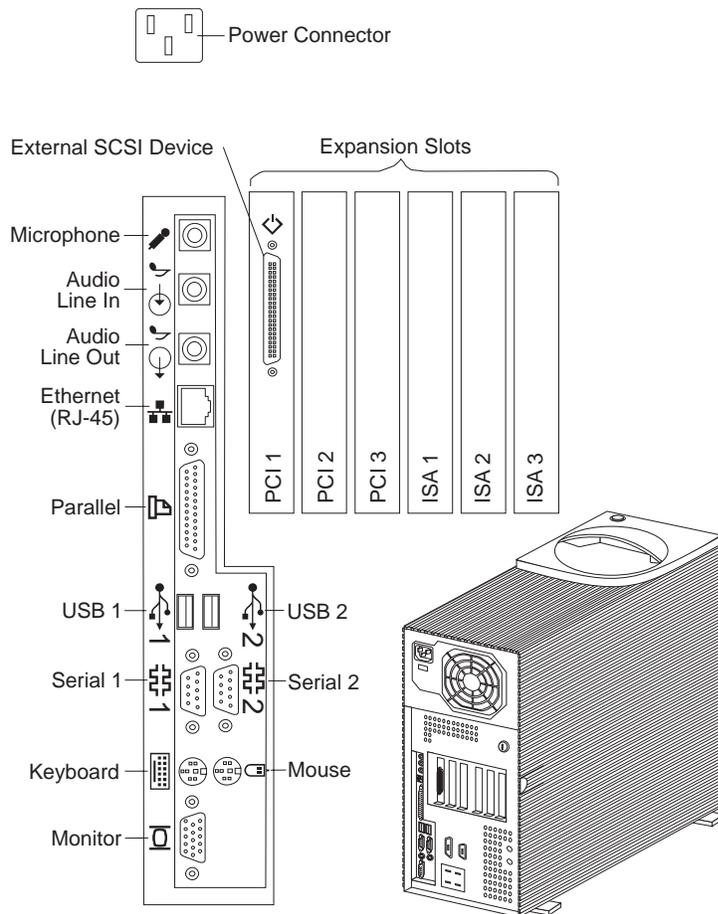
Diskette Drive In-Use Light: This light comes on when the diskette drive is accessed.

Input/output connectors

Input/output (I/O) connectors provide ports for transferring information into and out of your server. You can connect a variety of I/O devices to your server, including a monitor, keyboard, mouse, and printer. For more information on the ports and their specific technologies, see “Connecting external options” on page 133.

At the rear of your server is a panel that provides access to I/O connectors. Adapters installed in expansion slots might also provide I/O connectors. The following illustration shows the I/O connectors that come with your server.

Input/output connectors



Power Connector: The server power cable connects here.

↔ **External SCSI Device Connector** (if a SCSI adapter comes with your server): External SCSI devices attach here. For more information, see “SCSI drives (if your server model comes with a SCSI adapter)” on page 110, “Adding external SCSI devices” on page 133, and “SCSI connectors” on page 140.

Input/output connectors

Expansion Slots: Cables to the external connectors on installed ISA and PCI adapters connect here. For information about expansion slots and adapters, see “Working with adapters” on page 79.



Microphone: This connector is used to attach a microphone to your server when you want to record voice or other sounds on the hard disk. This connector can also be used by speech-recognition software.



Audio Line In: This connector is used to send audio signals from an external device (such as a CD player or stereo) to your server so that the signals can be recorded on the hard disk.



Audio Line Out: This connector is used to send audio signals from your server to external devices, such as stereo-powered speakers with built-in amplifiers, headphones, multimedia keyboards, or the audio line-in jack on a stereo system. To hear audio, you must connect one of these external devices to the audio line-out connector on your server.

Note: The internal speaker in your server is disabled when an external speaker is attached to the audio line-out connector on your server. There is no playback capability through the internal speaker.



Ethernet Connector: An unshielded, twisted-pair (UTP) cable with an RJ-45 connector attaches here to the 10/100 Ethernet controller on the system board.

For information on the Ethernet controller, see “Configuring the Ethernet controller” on page 59. For more information on the Ethernet connector, see “Ethernet connector” on page 143. For information on cables, see Appendix A, “Ethernet cable specifications” on page 271.



Parallel Connector: A signal cable for a parallel device, such as a printer, connects here.

Input/output connectors



Universal Serial Bus (USB) Connectors: I/O devices with universal serial bus (USB) connectors attach to USB connector 1 and connector 2. You need a 4-pin cable to connect a device to these ports.



Serial Connectors: Signal cables for modems or other serial devices attach to the 9-pin serial connectors of serial ports 1 and 2. See “Serial port connectors” on page 135 for port assignment information.



Mouse Connector: The mouse cable connects here. This connector is sometimes called the auxiliary-device port.



Keyboard Connector: The keyboard cable connects here.



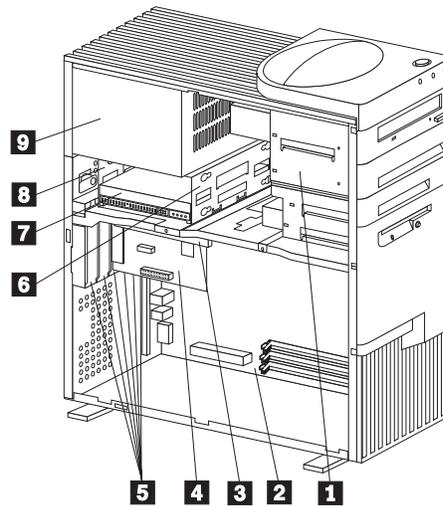
Monitor Connector: The monitor signal cable connects here.

Internal view

The following illustration shows the internal view of your server, with the side panel removed. For information on removing the cover, see “Disconnecting cables and removing the side cover” on page 74. For information about drives, bays, adapters, and microprocessors, see the applicable sections of Chapter 4, “Installing options” on page 67. For information on the system board, see “System Board Illustration” on page 253.

Note: The following illustration is for reference only.

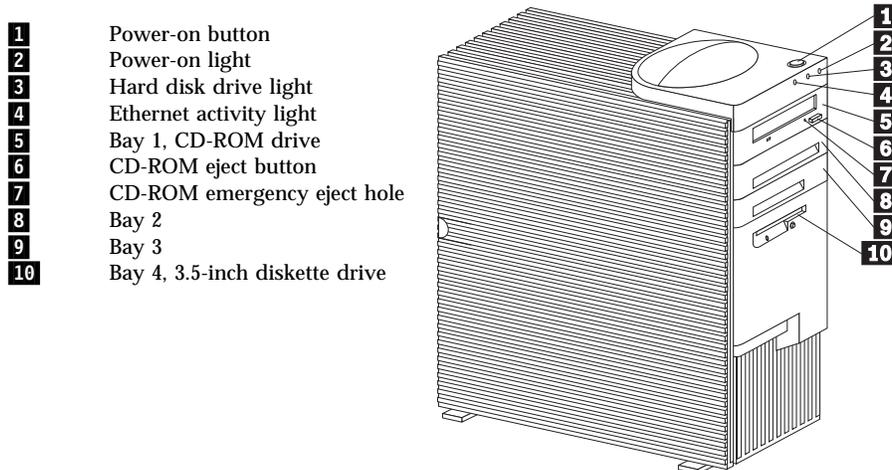
- 1** Drive bay assembly for bays 1 through 4
- 2** System board
- 3** Riser card
- 4** Adapter (if installed)
- 5** Expansion slots
- 6** Drive bay assembly for bays 5 and 6
- 7** Bay 6, hard disk drive
- 8** Bay 5
- 9** Power supply



External view

The following illustration shows the external view of your server.

Note: This illustration is for reference only.



Your server comes with a diskette drive installed in bay 4 and a CD-ROM drive installed in bay 1. If your server comes with a hard disk drive, it is installed in bay 6.

Note: In some models, you might have to remove the front bezel from the CD-ROM drive to access the emergency-eject hole.

Chapter 2. Getting started

This chapter describes how to use your server. In addition, this chapter contains detailed information about attaching cables and installing the operating system. This chapter also includes information on arranging your workspace and instructions for using the CD-ROM drive.

Note: For details about the server controls, status indicators, and I/O connectors, see Chapter 1, “Introducing your Netfinity 3000 server” on page 1.

Before you install hardware and software in your server, you need to determine the hardware, software, and operating system requirements for your operating environment. Refer to your ServerGuide package for details about installing an operating system and other software. See Chapter 4, “Installing options” on page 67 for instructions on installing hardware in your server.

If you have not already done so, unpack and set up your server. If you are not installing any optional hardware now, connect the cables and power cord. Follow the instructions in “Cabling the server” on page 24.

Note: After you unpack your server, locate the keys. At the time of shipment, two keys are attached to the back of the server. Record the key numbers in “Recording the identification numbers” on page 244 then store them in a safe place. If you lose them, you can order additional keys by calling Illinois Lock Company at (847) 537-1800 or 1-800-299-5880 (<http://www.illinoislock.com>) in the U.S.

This chapter contains:

| | |
|--|----|
| Questions or problems? | 19 |
| Arranging your workspace | 20 |
| Comfort | 20 |
| Glare and lighting | 21 |
| Air circulation | 21 |
| Electrical outlets and cable lengths | 22 |
| Using the stabilizing feet | 23 |
| Cabling the server | 24 |
| Starting the server | 26 |
| Using the CD-ROM drive | 30 |

Getting started

Handling a CD 31
Loading and unloading a CD 31

Questions or problems?

The following information is provided in case you need help while you are setting up your server.

- **World Wide Web**

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

<http://www.ibm.com/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 installation⁴. 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 01475-555055.

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

If an item is missing or damaged, contact your place of purchase.

⁴ Service availability will vary by country. Response time will vary depending on the number and nature of calls received.

Arranging your workspace

Arranging your workspace

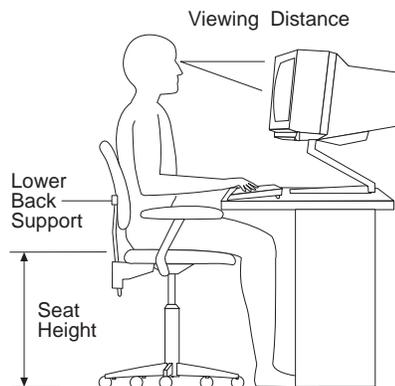
To get the most from your server, arrange both the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

Comfort

Although no single working position is ideal for everyone, here are a few guidelines to help you find a position that suits you best.

Sitting in the same position for a long time can cause fatigue. A good chair can make a big difference. The backrest and seat should adjust independently and provide good support. The seat should have a curved front to relieve pressure on the thighs. Adjust the seat so that your thighs are parallel to the floor and your feet are either flat on the floor or on a footrest.

When using the keyboard, keep your forearms parallel to the floor and your wrists in a neutral, comfortable position. Try to keep a light touch on the keyboard and your hands and fingers relaxed. You can change the angle of the keyboard for maximum comfort by adjusting the position of the keyboard feet.



Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance,

Arranging your workspace

usually 51 to 61 cm (20 to 24 in.), and position it so you can view it without having to twist your body. Also position other equipment you use regularly, such as the telephone or a mouse, within easy reach.

Glare and lighting

Position the monitor to minimize glare and reflections from overhead lights, windows, and other light sources. Even reflected light from shiny surfaces can cause annoying reflections on your monitor screen. Place the monitor at right angles to windows and other light sources, when possible. Reduce overhead lighting, if necessary, by turning off lights or using lower wattage bulbs. If you install the monitor near a window, use curtains or blinds to block the sunlight. You might have to adjust the Brightness and Contrast controls on the monitor as the room lighting changes throughout the day.

Where it is impossible to avoid reflections or to adjust the lighting, an antiglare filter placed over the screen might be helpful. However, these filters might affect the clarity of the image on the screen; try them only after you have exhausted other methods of reducing glare.

Dust buildup compounds problems associated with glare. Remember to clean your monitor screen periodically using a soft cloth moistened with a nonabrasive liquid glass cleaner.

Air circulation

Your server and monitor produce heat. Your server has one or more fans that pull in fresh air and force out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the server and monitor so that nothing blocks the air vents.

Attention:

To allow for air circulation, be sure to maintain the following minimum clearances around the server:

- 102 mm (4 in.) in the front
- 127 mm (5 in.) in the rear

Arranging your workspace

- 51 mm (2 in.) on the left and right sides

Also, make sure the vented air is not blowing on someone else.

Electrical outlets and cable lengths

The location of electrical outlets and the length of power cords and cables that connect to the monitor, printer, and other devices might determine the final placement of your server.

When arranging your workspace:

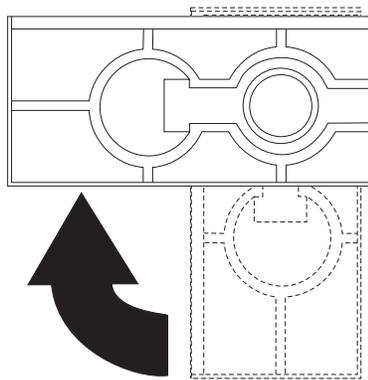
- Avoid the use of extension cords. When possible, plug the server power cord directly into an electrical outlet.
- Keep power cords and cables neatly routed away from walkways and other areas where they might get kicked accidentally.

For more information about power cords, see “Power cords” on page 292.

Using the stabilizing feet

The four feet attached to the bottom cover rotate 90 degrees to provide additional stability for your server.

Before you place the server in an upright position, rotate the four feet a quarter turn away from the server. Then, carefully position the server on its feet.



When you need to access the inside of the server to install options, you might find it easier to place the server on its side, so that the system board is facing you. If you do so, rotate the feet in towards the server, so that they do not detach due to the weight of the server.

What to do next?

- If you need to install internal drives, memory, or adapters, go to Chapter 4, “Installing options” on page 67; then, go to “Cabling the server” on page 24 to complete your installation.
- If you have no additional options to install, go to “Cabling the server” on page 24.

Cabling the server

Cabling the server

Before cabling your server:

- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Place your server in a location that is dry. Rain or spilled liquids might damage your server.

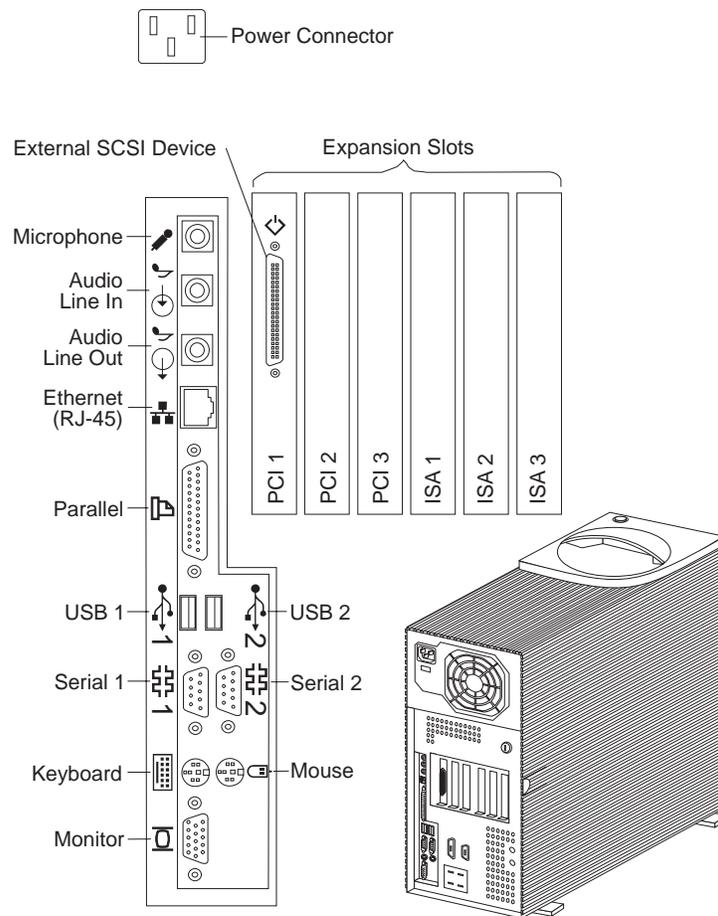
Note: To allow for air circulation, be sure to maintain the clearances in “Air circulation” on page 21.

Cabling the server

To cable the server:

1. Use the following illustration to cable your server.

For information about Ethernet cables, see Appendix A, “Ethernet cable specifications” on page 271.



2. Connect all power cords to electrical outlets.
3. Continue with “Starting the server” on page 26.

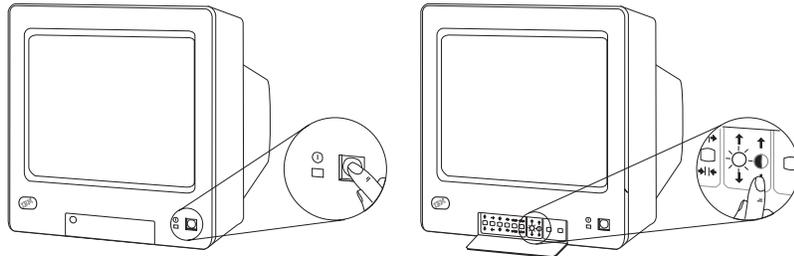
Starting the server

Starting the server

To start the server:

1. If you installed any external devices, such as monitors, printers, plotters, or modems, turn them on now.
2. After you turn on your monitor, adjust the Brightness and Contrast controls to the approximate midpoint.

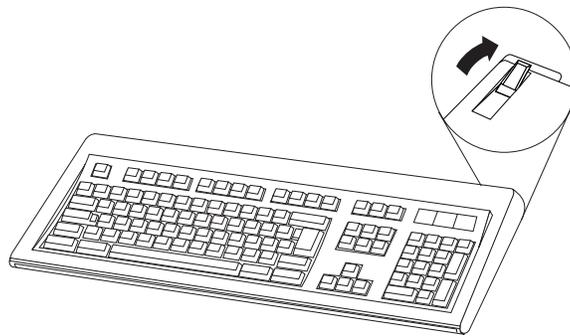
You can readjust these controls and the monitor location for personal viewing comfort after you turn on your server.



Note: The locations of the power switch and the Brightness and Contrast controls on your monitor might be different from those shown here.

Starting the server

3. Adjust the keyboard feet and position the keyboard for personal typing comfort.



5



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

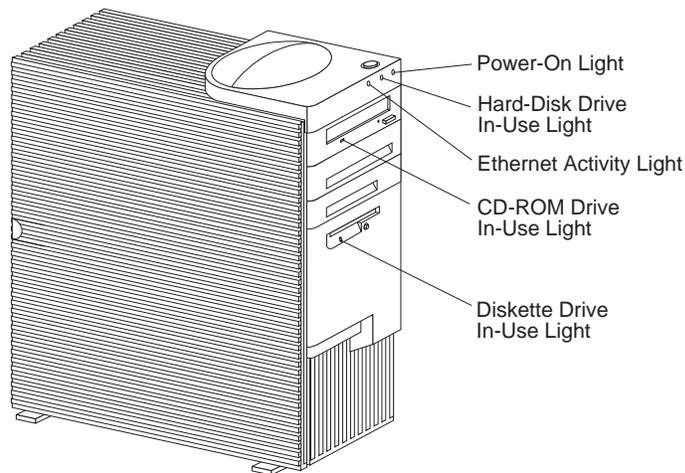
CAUTION:
Use safe practices when lifting your machine.

4. If a removable-media drive contains packing material, a diskette, or a CD, remove it from the drive.

Starting the server

5. Turn on the server.

To turn on the server, press the power switch. The power-on light comes on. The *power-on self-test (POST)* begins.



See “Power-on self-test (POST)” on page 160 for additional information about POST.

6



CAUTION:

The Power Control button on the front of the server does not turn off the electrical current supplied to the server. The server also might have more than one power cord. To remove all electrical current from the server, ensure that all power cords are disconnected from the power source.

Starting the server

Note: If your server does not start when you press the power switch, do the following:

- Make sure that all cables are securely connected to the correct locations.
- Make sure that the server cover is installed properly (pushed all the way on).

If this does not correct the problem, have the system serviced.

6. Check your monitor for POST results. When the test finishes:
 - The screen displays the IBM logo and a number that represents the amount of available server memory.
 - If no operating system is installed, a prompt appears, requesting that you insert a startable CD-ROM or a startable diskette. Refer to your ServerGuide package for information about installing an operating system.
 - If you have set a power-on password, a prompt appears on the screen. If you have set both the power-on and administrator passwords, you can type either password at the password prompt. (See “System Security” on page 43 for instructions on setting and using passwords.) Type your password at the prompt; then, press **Enter**.

Notes:

- a. If you hear more than one beep, check to see if an error message appears. If an error message appears, or if your screen is blank, see Chapter 5, “Solving problems” on page 157.
- b. If your server stops running during testing or normal operation, call for service. Describe the problem to the service technician.

Using the CD-ROM drive

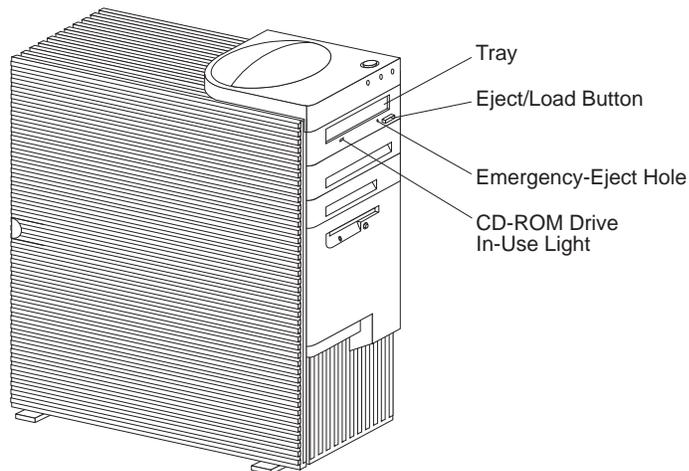
Using the CD-ROM drive

An IDE CD-ROM drive is a standard feature on all Netfinity 3000 servers. CD-ROM drives can play back or read from a CD, but cannot write information to it. CD-ROM drives use industry-standard, 12 cm (4.75-inch) CDs.

Follow these guidelines when using a CD-ROM drive:

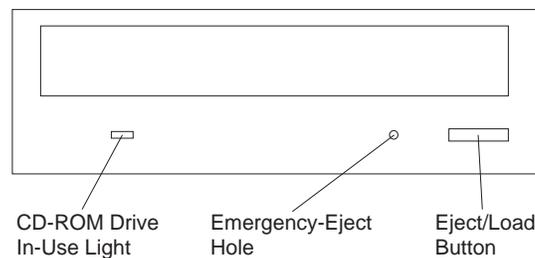
- Do not place the server where the following conditions exist:
 - High temperature
 - High humidity
 - Excessive dust
 - Excessive vibration or sudden shock
 - An inclined surface
 - Direct sunlight
- Do not insert any object other than a CD into the drive.
- Before moving the server, remove any CD from the drive.

The following is an illustration of the front bezel of the server, with the CD-ROM drive location, controls, and indicators.



Using the CD-ROM drive

The following illustration shows the front of the CD-ROM drive.



Handling a CD

When handling a CD, follow these guidelines:

- Hold the CD by its edges. Do not touch the surface.
- To remove dust or fingerprints, wipe the CD from the center to the outside. Wiping the CD in a circular direction might cause loss of data.
- Do not write or stick paper on the CD.
- Do not scratch or mark the CD.
- Do not place or store the CD in direct sunlight.
- Do not use benzene, thinners, or other cleaners to clean the CD.
- Do not drop or bend the CD.

Loading and unloading a CD

Note: Before you load or unload a CD, be sure that you have turned on the server.

To load and unload a CD in a CD-ROM drive:

1. Press the Eject/Load button. The tray slides out of the drive. (Do not manually force the tray open.)
2. Place the CD in the tray with the label facing up.
3. Close the tray by pressing the Eject/Load button, or by gently pushing the tray forward. When the tray is closed, the CD-ROM drive in-use light on the front of the drive will activate to indicate that the drive is in use.

Using the CD-ROM drive

4. To eject the CD, press the Eject/Load button. When the tray slides out, carefully remove the CD.
5. Close the tray by pressing the Eject/Load button, or by gently pushing the tray forward.

Notes:

1. If the tray does not slide out of the drive when you press the Eject/Load button, insert one end of a large paper clip into the emergency-eject hole located above and to the left of the CD-ROM drive in-use light.
2. In some models, you might have to remove the front bezel from the CD-ROM drive to access the emergency-eject hole.

Chapter 3. Configuring your server

This chapter provides information about the configuration and utility programs that come with your server.

The configuration programs are part of the *basic input/output system (BIOS)* that comes with your server. Using these programs, you can set the system date and time, define input and output device parameters, and define system security.

This chapter contains:

| | |
|---|----|
| Configuration overview | 34 |
| The Configuration/Setup Utility program | 36 |
| Using the Configuration/Setup Utility program | 39 |
| System Summary | 40 |
| Product Data | 41 |
| Devices and I/O Ports | 41 |
| Start Options | 42 |
| Date and Time | 43 |
| System Security | 43 |
| Advanced Setup | 54 |
| ISA Legacy Resources | 55 |
| Power Management | 56 |
| Resolving configuration conflicts | 57 |
| Resolving hardware configuration conflicts | 58 |
| Resolving software configuration conflicts | 58 |
| Configuring the Ethernet controller | 59 |
| Using the SCSISelect Utility program | 62 |
| Starting the SCSISelect Utility program | 62 |
| SCSISelect Utility program choices | 62 |

Configuration overview

You play a key role in how your server allocates resources to organize and interconnect hardware devices and software programs. This allocation process is referred to as *configuration*. The steps required to configure your server depend on the number and types of devices and programs that you install.

Your server has connectors for several types of adapters. Because of this flexibility, you can choose from among thousands of adapters and devices that comply with any of the following standards:

- Peripheral Component Interconnect (PCI)
- Industry Standard Architecture (ISA)
- Small Computer System Interface (SCSI)
- Accelerated Graphics Port (AGP)

You can obtain a listing of products that are compatible with your server, and related configuration information, by accessing the following World Wide Web address:

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

Jumpers and switches are used to define certain configuration values on the system board, adapters, and other devices. For details about system-board jumper and switch settings, see Chapter 7, “Server records and specifications” on page 243. If you need to set jumpers or switches on adapters, drives, or other devices, refer to the documentation that comes with the devices for specific information about the appropriate jumper and switch settings.

In general, the greater the number and variety of hardware devices and software programs that you install in your server, the more you will have to interact with your server and your devices to correctly configure your system.

Your server comes with the following hardware configuration utility programs:

- Configuration/Setup Utility program

With the Configuration/Setup Utility program, you can configure system board functions, such as serial and parallel

Configuration overview

port assignments; change interrupt request settings, and change the startup sequence for drives that you install. You can also use this utility program to set passwords for starting the server and accessing the Configuration/Setup Utility program.

- **SCSISelect Utility**

With the built-in SCSISelect Utility program, you can configure the SCSI devices that you install in your server. You can use SCSISelect to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive.

Before installing a new device or program, read the documentation that comes with it. Reading the instructions helps you to determine the steps required for installation and configuration. The following actions are typically, but not always, required to configure your server.

1. Run the Configuration/Setup Utility program and record the current configuration settings.
See “The Configuration/Setup Utility program” on page 36.
2. Set jumpers or switches on the server's system board.
See Chapter 7, “Server records and specifications” on page 243.
3. Set jumpers or switches on the device.
See the device installation instructions.
4. Install the device in the server.
See Chapter 4, “Installing options” on page 67.
Reserve ISA legacy resources for ISA adapters. See “ISA Legacy Resources” on page 55.
5. Resolve configuration conflicts.
See “Resolving configuration conflicts” on page 57.
6. Install software programs, including device drivers.
Refer to the information that comes with your IBM ServerGuide package for more information.

The Configuration/Setup Utility program

The Configuration/Setup Utility program

For most configurations, the server will operate using the default system settings. You need to change the settings only to resolve configuration conflicts or to enable or change device functions.

When you want or need to change the default settings, the Configuration/Setup Utility program provides a convenient way to display and change the settings.

After you run and exit the Configuration/Setup Utility program, configuration information is stored in electrically erasable programmable read-only memory (EEPROM). While the server is powered off, the configuration information remains available for the next system startup.

Always run the Configuration/Setup Utility program if you receive an error message instructing you to do so. If you installed or removed SCSI devices, run the SCSISelect Utility program (see “Using the SCSISelect Utility program” on page 62). Review this chapter and the information that comes with the option before making changes. Also, record the current settings (see Chapter 7, “Server records and specifications” on page 243) before making any changes.

When you restart the server for the first time after working with most options, a message appears, indicating that a configuration change has occurred. You are then prompted to enter the Configuration/Setup Utility program to manually update the configuration settings or to confirm and save the settings that were automatically updated by the system programs.

After you change an option and restart the server, the following screen might appear.

The Configuration/Setup Utility program

| POST Startup Error(s) |
|---|
| <p>The following error(s) were detected when the system was started:</p> <p>162 Configuration Change Has Occurred</p> <p>Select one of the following:</p> <p>Continue Exit Setup</p> |

Note: Depending on the configuration changes that occurred, the error message that you see might be different from the one shown here.

If the preceding screen appears, select **Continue** until you reach the Configuration/Setup Utility program menu; then, go to “Using the Configuration/Setup Utility program” on page 39.

If the preceding screen does not appear, use the following procedures to access the Configuration/Setup Utility program menu.

To start the Configuration/Setup Utility program:

1. Turn on the server and watch the screen.

If your server is already turned on, turn off the server, wait a few seconds until all in-use lights go off, and then turn the server back on. (Do not use **Ctrl+Alt+Del** to restart the server.)

2. When the message Press F1 to enter Configuration/Setup appears, press **F1**. The Configuration/Setup Utility program menu appears. For information about the menus, see “Using the Configuration/Setup Utility program” on page 39.

The Configuration/Setup Utility program

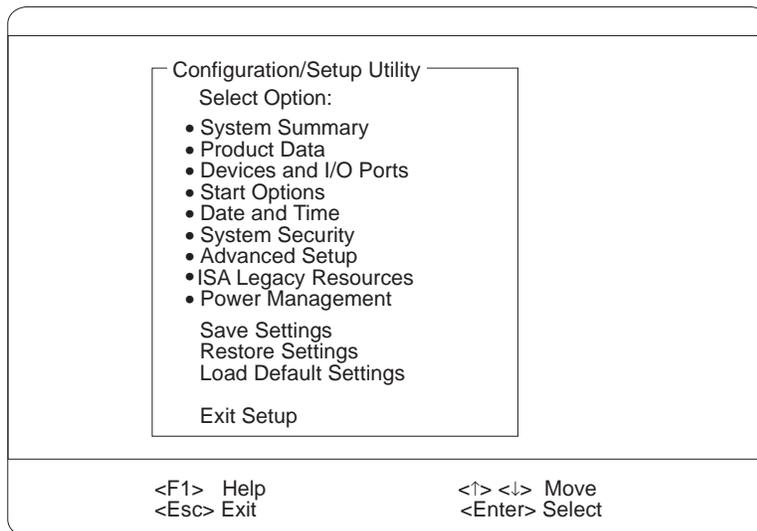
Notes:

1. If an administrator password is *not* set, the Configuration/Setup Utility program starts once you complete the startup procedure.
2. If an administrator password is set, but a power-on password is *not* set, you must enter the administrator password to access the Configuration/Setup Utility program.
3. If you have set both an administrator and a power-on password, you can enter either one. However, to change any settings in the Configuration/Setup Utility program, you must enter the administrator password. If you enter the power-on password, you can *view* limited information in the Configuration/Setup Utility program, but you cannot *change* any settings.
4. If a configuration error occurs, a prompt appears before the operating system starts (see “Resolving configuration conflicts” on page 57).

Using the Configuration/Setup Utility program

Using the Configuration/Setup Utility program

From the Configuration/Setup Utility program Main Menu, you can select the settings that you want to change.



Note: The menu that you see on your server screen might look slightly different from the menu shown here, but it will operate the same way.

Pressing **F1** displays Help information for a selected menu item.

In the Configuration/Setup Utility program menus, you can accept the configuration changes by viewing and saving the changes, or you can make manual changes and then save the settings.

The following is a quick reference for identifying symbols in the Configuration/Setup Utility program.

- A bullet (•) beside a menu item indicates that an additional menu is available.
- Information enclosed in brackets ([]) can be changed. You cannot change information that is not surrounded by [].

Using the Configuration/Setup Utility program

- A right arrowhead (▶) beside a menu item indicates that a configuration change occurred in that category. The ▶ might also appear in subsequent menus.
- An asterisk (*) beside a menu item indicates that a resource conflict exists.

To exit from the Configuration/Setup Utility program:

1. From the Configuration/Setup Utility program, select **Exit Setup** or press **Esc**.
2. The Exit Setup menu appears. You can save your changes, exit from the Configuration/Setup Utility program without saving your changes, or return to the Configuration/Setup Utility program menu. Use the arrow keys to select the desired option; then, press **Enter**.

Note: The choices on some menus might differ slightly, depending on the BIOS version that comes with your server.

Use the following commands to navigate through the screens and make selections:

| Key | Function |
|--------------|---|
| ↑ ↓ | Move between menu items. |
| ← → | Toggle between choices for a menu item. |
| Enter | Select an item. |
| Esc | Exit from a menu after viewing or making changes. |
| F1 | Get help on a selected menu item. |

System Summary

Select this choice to display configuration information, such as the type and speed of the microprocessor, and the amount of memory.

Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields on this screen. If you need to change the configuration settings, you must make the changes from the applicable menu choices.

Using the Configuration/Setup Utility program

Product Data

Select this choice to view the machine type and model, the system serial number, the system board identifier, and the revision level or issue date of the flash EEPROM (BIOS).

Devices and I/O Ports

Software recognizes ports from their port assignments. Each port must have a unique port assignment. The Configuration/Setup Utility program normally handles this, but you might have special hardware or software that requires you to change these assignments.

Select the **Devices and I/O Ports** choice to view or change the assignments for devices and input/output ports.

You can add serial ports by installing a serial adapter in an expansion slot. See the documentation that comes with the serial adapter for information about port assignments.

To display or change the port assignments:

1. From the Configuration/Setup Utility program menu, select **Devices and I/O Ports**; then, press **Enter**.
2. The Devices and I/O Ports menu appears.
3. Select a device or port. If necessary, press **Enter** to display an additional menu.
4. Use the Left Arrow (←) or Right Arrow (→) key to advance through the settings.

Using the Configuration/Setup Utility program

Start Options

Select this choice to view and change settings for device startup sequence, keyboard speed, virus detection, various power-on options, and other features.

You can control the startup sequence of the devices in your server. Each time that you turn on the server, it checks the devices as it looks for the operating system. The order in which the system checks the devices is the device-startup sequence.

Note: The default startup sequence is:

1. CD-ROM drive
2. Diskette drive
3. Hard disk drive

To set the startup sequence:

1. From the Configuration/Setup Utility program menu, select **Start Options**; then, press **Enter**.
2. The Start Options menu appears.
3. Select **Startup Sequence**; then, press **Enter**.
4. Select the sequence and devices from the choices provided.
5. If **Automatic Power On Startup Sequence** is *Enabled*, select the sequence and devices from the choices provided.

To set the power-on status:

1. From the Configuration/Setup Utility program menu, select **Start Options**; then, press **Enter**.
2. The Start Options menu appears.
3. Select **Startup Sequence**; then, press **Enter**.
4. Select **Power-on Status**.
5. Select the power-on status from the choices provided.

Using the Configuration/Setup Utility program

Date and Time

Select this choice to set the system date and time.

The system time is in a 24-hour format: hour/minute/second. The system date is in standard format for your country. For example, in the United States, the format is **MM/DD/YYYY** (Month/Day/Year).

To set the date and time:

1. From the Configuration/Setup Utility program menu, select **Date and Time**; then, press **Enter**.
2. The Date and Time menu appears.
3. Use the Left Arrow (←) or Right Arrow (→) key to advance through each data field.
4. Type the new information; the system saves the information as you enter it.

System Security

Several security features are available to help you secure your server and the information that you store in it. To control access to your server, you can implement the security features, such as adding passwords, and securing IDE devices and diskette drives.

Setting power-on password modes

The power-on password can deter unauthorized access to the system. You do not need to set a power-on password, but doing so allows you to control who can use your server. When a power-on password is set, you must type the password at a prompt that appears as the server starts.

When you set the power-on password, you can choose one of three password prompt modes.

- On** In password prompt On mode, you are prompted for the power-on password when you turn on the server. Until you enter the correct password, the operating system will not start, and the keyboard will remain locked. If you have a mouse connected to the mouse port, the mouse also will remain locked until you enter the power-on password. If

Using the Configuration/Setup Utility program

you have a mouse connected to a serial port, it will be activated when the server is started, regardless of whether a password is set.

Note: If **Remote Administration** is enabled, you cannot select **On**. In this case, select **Dual**. If the power-on password mode is set to **On** when **Remote Administration** is enabled, it resets automatically to **Dual**.

Off In password prompt Off mode (sometimes referred to as unattended start mode), you are not prompted to enter your power-on password when you turn on the server. The server will start the operating system. However, if you have a mouse connected to the mouse port, refer to the following text box.

Using the Configuration/Setup Utility program

Important information for mouse users

This information applies only to those who have a mouse connected to the mouse port; a serial mouse is not affected by the password prompt Off mode.

The password prompt Off mode prevents the server from detecting that a mouse is attached. Because in this mode, the mouse device driver will not be loaded automatically through the CONFIG.SYS or AUTOEXEC.BAT files, an error message will appear to indicate that the mouse port is disabled, and the server will halt. To enable the operating system to load without displaying the error message, follow the instructions that apply to your operating system.

If you are using OS/2®, do one of the following before enabling password prompt Off mode:

- Set the CONFIG.SYS file so that the operating system does not stop on a device-driver error. To do this, put the command PAUSEONERROR=NO near the top of the CONFIG.SYS file.
- or
- Remove the mouse driver statement from the CONFIG.SYS file.

If you are using Windows NT or Windows 95, do the following:

- When the server is started and the mouse port disabled error message appears, type either your power-on or administrator password to enable the keyboard. Then use the keyboard to put a check mark in the **Do not display this message in the future** check box.

Once the operating system starts in password prompt Off mode, the keyboard will remain locked. If you have a mouse connected to the mouse port, it also will remain locked.

Although you are not prompted to type a password in this mode, you can type either your power-on or administrator password anytime after POST has completed, even after the operating system has loaded. If you type a password, the keyboard will unlock, but the mouse connected to the mouse port will remain disabled.

If you enter a password, the keyboard will unlock, but the mouse connected to the mouse port will remain disabled.

Using the Configuration/Setup Utility program

Password prompt Off mode is useful for network environments that cause the server to operate unattended. If a power failure occurs, when power is restored, the server will automatically restart and resume operating in this mode, without operator intervention.

Note: The power-on password prompt Off mode does not support any locally or remotely scheduled shutdowns or restarts.

Dual In the password prompt Dual mode, the startup behavior of the server depends on whether the server is started from the server power switch or by an unattended method, such as a modem or timer.

If you press the power switch to start the server, the server operates the same as it does in password prompt On mode. For further information, refer to the description of password prompt On mode in this section.

If you start the server by an unattended method, such as remotely over a LAN, the server operates in password prompt Off mode. For further information, refer to the description of password prompt Off mode in this section.

If both a power-on and administrator password are set, you can type either password at the password prompt *that appears as you start your server*. However, if you want to change any settings in the Configuration/Setup Utility program, you must type your administrator password at the password prompt *that appears when you try to access the Configuration/Setup Utility program*. If you type your power-on password at this prompt, you will be able to view limited information in the Configuration/Setup Utility program, but you will not be able to change any settings.

The password does not appear on the screen as you type it. If you type the wrong password, you receive a screen message telling you so. If you type the wrong password three times, you must turn the server off and start again. When you type the correct password, the keyboard and mouse will unlock, and the server will begin normal operation.

Using the Configuration/Setup Utility program

Setting and changing a power-on password

Use the Configuration/Setup Utility program to set or change a power-on password.

Attention:

Keep a record of your power-on password in a secure place. When a power-on password has been set, you cannot activate the keyboard and mouse without first using the password. If you lose or forget your password, you cannot change or delete it without removing the server cover and moving a jumper on the system board. See “Erasing lost or forgotten passwords” on page 254 for further information.

To set or change a power-on password:

1. From the Configuration/Setup Utility program menu, select **System Security**; then, press **Enter**.
2. The System Security menu appears.
3. Select **Power-On Password**; then, press **Enter**.
4. The Power-On Password menu appears.
5. To set a power-on password, enter your password in the appropriate data field and press the Down Arrow (↓) key.
You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for this password. Keep a record of the password in a safe place.
6. Enter your password again in the appropriate data field.
7. In the **Password Prompt** data field, select **Off**, **On**, or **Dual**. Press the Left Arrow (←) or Right Arrow (→) key to toggle among selections.
Note: If **Remote Administration** is enabled, you cannot select **On**. In this case, select **Dual**. If the power-on password mode is set to **On** when **Remote Administration** is enabled, it resets automatically to **Dual**.
8. To change a power-on password, select **Change Power-On Password** from the Power-On Password menu, and follow the instructions on the screen.

Using the Configuration/Setup Utility program

Notes:

1. If a power-on password is set and then forgotten, you must remove the server cover and move the *Clear CMOS Request* jumper on the system board. (See “Erasing lost or forgotten passwords” on page 254 for further information.)
2. If a power-on password is set and the password prompt is set to Off, the pointing device (mouse) is disabled until you enter the power-on password.

To delete a power-on password:

1. From the Configuration/Setup Utility program menu, select **System Security**; then, press **Enter**.
2. The System Security menu appears.
3. Select **Power-On Password**; then, press **Enter**.
4. The Power-On Password menu appears.
5. Select **Delete Power-On Password** and follow the instructions on the screen.

Using the Administrator Password menu

The administrator password (sometimes called a supervisor-level password) controls access to some features of the server, including the Configuration/Setup Utility program.

To set or change an administrator password:

1. From the Configuration/Setup Utility program menu, select **System Security**; then, press **Enter**.
2. The System Security menu appears.
3. Select **Administrator Password**; then, press **Enter**.
4. The Administrator Password menu appears.
5. To set an administrator password, enter your password in the appropriate data field and press the Down Arrow (↓) key.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for this password. Keep a record of the password in a safe place.

Using the Configuration/Setup Utility program

6. Enter your password again in the appropriate data field,
7. Define the **Power-On Password Changeable by User** field. The choices are:
 - Yes** The power-on password can be changed without entering the administrator password, if the administrator password is set.
 - No** The power-on password cannot be changed unless the administrator password is entered, if the administrator password is set.
8. To change an administrator password, select **Change Administrator Password** from the Administrator Password menu; then press **Enter**. Press **Esc** to exit.

Attention administrator password users:

If an administrator password is set and then forgotten, you must complete *one* of the following to regain access to the Configuration/Setup Utility program:

- If enhanced security is disabled (default setting), you must remove the server cover and move the *Clear CMOS Request* jumper on the system board. (See “Erasing lost or forgotten passwords” on page 254 for further information.)
- If enhanced security is enabled, you must replace the system board.

To delete an administrator password:

1. From the Configuration/Setup Utility program menu, select **System Security**; then, press **Enter**.
2. The System Security menu appears.
3. Select **Administrator Password**; then, press **Enter**.
4. The Administrator Password menu appears.
5. Select **Administrator Password**.
6. Select **Delete Administrator Password**; then press **Enter**. Press **Esc** to exit.

Using the Configuration/Setup Utility program

If both a power-on and administrator password are set, you can enter either password to complete the system startup. However, the administrator password provides access to all menu choices, and provides the ability to change information. If you enter the power-on password, you can view limited information in the Configuration/Setup Utility program, but you cannot change any settings.

Using the Enhanced Security features

With enhanced security, your administrator password and drive-startup sequence are stored in a highly protected, nonvolatile, security EEPROM module. When your administrator password and drive-startup sequence are stored in the security EEPROM, they remain intact even if the battery expires or is removed.

Attention administrator password users:

If enhanced security is enabled, and you forget or lose the administrator password, you must replace the system board in your server to regain access to the Configuration/Setup Utility program.

If enhanced security is enabled and you have set an administrator password, your server will operate as follows:

- The security EEPROM is protected from unauthorized access once the startup procedures are complete.

With enhanced security disabled, the contents of the EEPROM are write protected, and the server can function in a network environment because the POST/BIOS utility program will allow updates to the system programs.

With enhanced security enabled, the POST/BIOS utility program will not allow updates to the system programs. In a network environment, this might prevent certain functions from being performed remotely.

- If the cover of your server has been removed, a tamper-detection feature will halt system processing and deny access to the keyboard and mouse until the administrator

Using the Configuration/Setup Utility program

password is entered. This feature will work if your server is powered on or off.

To enable or disable enhanced security:

Note: Enhanced security can be enabled or disabled only when you update the system programs in your server.

1. Insert a Flash BIOS diskette in your server. System programs updates are available on the World Wide Web. To obtain up-to-date information about your server model, access the home page for your server at the following address:
<http://www.ibm.com/netfinity/>
2. Turn on the server. If it is already turned on, you must turn it off and back on again.
3. The update begins, and the system prompts you for the administrator password, if you have set an administrator password.
4. When you enter the administrator password, the Flash BIOS diskette will continue to run, and you are given the option of enabling or disabling enhanced security.

To set, change, or delete an administrator password protected by enhanced security:

1. Turn off all attached devices and the server.
2. See Chapter 4, “Installing options” on page 67 for safety information, disconnecting all cables, and removing the server cover.
3. Locate the switch marked as 7 on the rocker switches section of the system board. See “Setting the administrator password switch” on page 266 for the location of the switch. Move the switch to the ON position. (It might be helpful to use the end of a small screwdriver to set the switch.)

Note: You must know the administrator password to change or delete it.

Using the Configuration/Setup Utility program

4. Set, change, or delete your password. Follow the instructions on the screen. (See “Using the Administrator Password menu” on page 48.)
5. Move the switch back to the **OFF** position after you have set, changed, or deleted your password.
6. Replace the cover. Then, turn on the server.

Restricting access to IDE devices and diskette drives

The setting for the **Secure IDE and Diskette Drives** option controls who has access to the IDE devices and diskette drives (user and administrator, or administrator only). Your server comes with this feature set to **Enable**, so that both the user and administrator have access to the IDE devices and diskette drives.

To disable access to the IDE devices and diskette drives:

1. From the Configuration/Setup Utility program menu, select **System Security**; then, press **Enter**.
2. The System Security menu appears.
3. Select **Secure IDE Devices and Diskette Drives**; then, press **Enter**.
4. Select a device; then, press the Left Arrow (←) or Right Arrow (→) key to toggle the entry to **Disable**.

Note: Your server supports IDE CD-ROM drives. IDE hard disk drives are not supported.

Remote Administration

Using this option, the BIOS can be updated remotely from a network server. If an administrator password is set, it does *not* have to be entered from the server to access this function. Consult your network administrator for information on setting up your network server to perform POST and BIOS updates.

To access the Remote Administration setting:

1. From the Configuration/Setup Utility program menu, select **System Security**; then, press **Enter**.
2. The System Security menu appears.

Using the Configuration/Setup Utility program

3. Select **Remote Administration**; then, press **Enter**.
4. To enable update POST/BIOS over the network, select **Enabled** (default setting). To disable, select **Disabled**.

You might need to perform a POST/BIOS (flash) update under the following circumstances:

- When you receive a system message instructing you to do so
- When you install a new microprocessor (see “Working with microprocessors” on page 126)
- When you receive certain error codes, such as 167 (see “POST message table” on page 169)
- When you change certain configuration switch settings (see “Setting the microprocessor speed switches” on page 258 and “Setting the ROM operation mode switch (BIOS recovery)” on page 262)

Before you can perform a POST/BIOS (flash) update, you must create a *Flash BIOS Diskette* as follows:

1. Insert a blank, 3.5-inch, formatted 2 MB diskette into diskette drive A.
2. Go to <http://www.ibm.com/pc/support/> on the World Wide Web and download the appropriate flash update program. Review the applicable README files, and use this information to create the Flash BIOS diskette.
3. If applicable, follow any additional instructions on the screen.

Note: The server is shipped with the **Remote Administration** feature set to **Enabled**. To ensure that the POST/BIOS update (flash) procedure works properly, do not change this default value.

To perform a POST/BIOS (flash) update, insert the *Flash BIOS Diskette* into the primary diskette drive and run the Flash Utility program. Follow the instructions in the program.

Using the Configuration/Setup Utility program

Setting Adapter ROM Security

Use this setting to lock the keyboard during adapter read-only memory (ROM) initialization; this feature can be used in conjunction with an administrator password to prevent the use of adapter ROM-based utility programs.

Advanced Setup

Select **Advanced Setup** to change values for advanced hardware features, such as cache control, ROM shadowing, PCI control, Plug and Play control, and microprocessor control. See Table 14 on page 246 for the default settings for these features.

Attention:

The system might not operate properly if these options are configured incorrectly. Follow the instructions on the screen carefully.

Use the Left Arrow (←) or Right Arrow (→) key to select a menu choice.

Cache Control

Select this choice to define the microprocessor cache state as enabled or disabled.

ROM Shadowing

Select this choice to enable or disable ROM shadowing in specified areas. When these areas are enabled, the contents can be cached, using the **Cache Control** option. These areas are hexadecimal address ranges. One of these areas is reserved for the system BIOS address space.

PCI Control

Select this choice to control features associated with PCI devices, such as **PCI Adapter Reset**, **PCI Parity**, **PCI Bus Master**, **Multimedia Devices**, and various types of adapters.

Using the Configuration/Setup Utility program

Plug and Play Control

Select this choice to control features associated with Plug and Play devices, such as **Set Device Node**, **Address Decode**, and **Plug and Play Operating System**.

Select **Set Device Node** to control the device node. When you change this value to **Disabled**, the system cannot update the configuration during POST.

Processor Control

Select this choice to control features associated with the microprocessors, such as **Processor 0 ID** and **Processor Updating**.

ISA Legacy Resources

Plug and Play is a configuration method that makes expanding your server easier. Support for Plug and Play is built into the system board of your server.

If an adapter is Plug and Play, there are no switches or jumpers that must be set on the adapter. A Plug and Play adapter comes with configuration specifications set in memory to provide installation information to the server during startup. When you install or remove Plug and Play adapters, this information is interpreted by the BIOS, which supports Plug and Play technology. If the required resources are available, the BIOS software automatically configures the adapter around the resources already in use by other devices.

Most adapters designed for PCI slots are Plug and Play devices that are auto-configuring. However, many ISA adapters are not Plug and Play devices. These adapters are known as *legacy* adapters. If you install a legacy adapter, you must manually configure it by setting switches or jumpers on the adapter, and by allocating or reserving the system resources that the adapter will use.

Note: See “Resolving configuration conflicts” on page 57 for information about handling resource conflicts.

Select **ISA Legacy Resources** to identify the available system resources:

- Memory

Using the Configuration/Setup Utility program

- I/O ports
- DMA
- Interrupt

Note: The menus do not contain resources that are used by the system or by previously installed Plug and Play adapters.

To store the legacy resource information for an installed adapter:

1. Select **ISA Legacy Resources**; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the system resource that you want to change.
2. Select a resource; then, use the Left Arrow (←) or Right Arrow (→) key to select a configuration choice.

If you remove an ISA legacy adapter, you must redefine the system resource as **[Available]**.

Power Management

With Power Management, the server and monitor can be set to use a reduced-power state if they are inactive for a specified length of time. You can also specify options to automatically start the server.

Attention:

The **ACPI BIOS Mode** feature is the only available Power Management feature.

The **APM BIOS Mode** feature is set to **Disabled**. Do not change this default value.

ACPI BIOS mode

When the automatic configuration and power interface (ACPI) BIOS mode is enabled, the operating system controls the power management features of your server and the settings for APM BIOS mode are ignored. Refer to your operating-system documentation to determine if your operating system supports ACPI. If your operating system does not support ACPI, you cannot use the **ACPI BIOS Mode** Power Management feature.

Resolving configuration conflicts

To set ACPI BIOS mode:

1. Select **Power Management** from the Configuration/Setup Utility program menu.
2. Set **ACPI BIOS Mode** to **Enabled** or **Disabled** as desired using the Left Arrow (←) or Right Arrow (→) key.

Resolving configuration conflicts

The resources used by your server consist of IRQs, DMA, I/O port addresses, and memory. This information is useful when a resource configuration conflict occurs.

Conflicts in the configuration occur if:

- A device that you installed requires the same resource as another device. (For example, a conflict occurs when two adapters try to write to the same address space.)
- A device resource is changed (for example, changing jumper settings).
- A device function is changed (for example, assigning *COM1* to two serial ports).
- A software program is installed that requires the same resource as a hardware device.

The steps required to resolve a configuration error are determined by the number and variety of hardware devices and software programs that you install. If a hardware configuration error is detected, a *configuration error* message appears after the server completes POST and before the operating system is loaded. You can bypass the error by pressing **Esc** while the error message is displayed.

The Configuration/Setup Utility program configures only the system hardware and interrupt requests. The program does not consider the requirements of the operating system or the application programs. For these reasons, memory-address configuration conflicts might occur. You can resolve some memory-address conflicts by changing the address of the conflicting hardware option,

Resolving configuration conflicts

or by changing or moving the hardware. You might have to resolve other memory-address conflicts by changing some software parameters. See “Resolving hardware configuration conflicts” on page 58 and “Resolving software configuration conflicts,” respectively, for additional information. See Chapter 5, “Solving problems” on page 157 for information about troubleshooting hardware and software problems.

Resolving hardware configuration conflicts

Use the following information to help resolve hardware configuration conflicts:

1. Run the Configuration/Setup Utility program to view and change the resources that the system board functions use. Record the current settings before making any changes. (See “The Configuration/Setup Utility program” on page 36 for instructions.)
2. Determine which adapter or device is causing the conflict.
3. Change adapter jumpers or switches. Some devices use jumpers and switches to define the system resources that they need. If the settings are incorrect or set to use a resource that cannot be shared, a conflict occurs, and the device will remain deactivated by the configuration program.
4. Change system board jumpers or switches. See “Preparing to add options” on page 73 for instructions for removing the cover. Then, refer to the system-board diagram inside your server.
5. Remove the device or adapter. Some configurations are not supported. If you must remove an adapter, see “Installing or removing ISA and PCI adapters” on page 82.

Resolving software configuration conflicts

The Configuration/Setup utility might change the memory-address space used by some hardware options. If this happens, the new memory-address space and IRQs used by some hardware options might conflict with addresses defined for use through application programs.

Configuring the Ethernet controller

If a conflict exists, one or more of the following conditions might exist:

- The system cannot load the operating system.
- The system does not work.
- An application program does not operate, or it returns an error.
- Screen messages indicate that a memory-address conflict exists.

Note: Start the Configuration/Setup Utility program to view the addresses that are used by your system board functions.

The best way to resolve memory-address conflicts is to change the addresses that are used by the application program or the device driver. You can use the Configuration/Setup Utility program to view and change addresses.

Configuring the Ethernet controller

Your Netfinity 3000 server comes with an Ethernet controller on the system board. The Ethernet controller provides 10BASE-T and 100BASE-TX support through the RJ-45 connector on the back of your server. When you connect your server to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps or 100 Mbps) on the network and then sets the controller to operate at the appropriate rate. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), half duplex (HDX), or full duplex (FDX). This process is also known as auto-negotiation. This auto-negotiation occurs without requiring software intervention. The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

However, auto-negotiation works only if the hub or switch to which your server is connected also supports auto-negotiation. If the hub or switch does not support auto-negotiation, the speed (10 Mbps or 100 Mbps) will still be detected correctly, but half-duplex mode will always be selected. A full-duplex switch that does not support auto-negotiation will not attach to the Netfinity 3000 server in full-duplex mode. In this case, if you want the network to operate in full-duplex mode, you must manually override the settings to obtain a full-duplex connection. To do this, your server must have

Configuring the Ethernet controller

a device driver that supports manual overrides. Use the ServerGuide software to install this device driver. Refer to your ServerGuide package for instructions on installing device drivers. The ServerGuide software includes IBM Update Connector, which helps you keep your BIOS and device drivers current. Verify that you have installed the appropriate device driver. Also, refer to your Ethernet documentation for additional information on operating modes, manual overrides, and device drivers.

Attention:

- The 10BASE-T Ethernet and the 100BASE-TX Fast Ethernet cabling in the network must be Category 5 to meet various standards, including electromagnetic compatibility.
- You must install a device driver to enable your operating system to address the Ethernet controller. Use the ServerGuide software to install this device driver. Refer to your ServerGuide package for instructions on installing device drivers. For more information about the ServerGuide package, see “What your IBM Netfinity 3000 server offers” on page 4.

Fast Ethernet operates at a data rate of up to 100 Mbps. However, except for the different operating speeds, Fast Ethernet and standard Ethernet are structurally identical. Most applications and protocols that are currently installed on a standard Ethernet system can be seamlessly migrated to a Fast Ethernet system. Because of the equivalence of the two types of Ethernet, mixed Ethernet and Fast Ethernet systems also can be designed and implemented.

The bandwidth required at each workstation connected to a server is generally far less than the bandwidth required at the server. This is because the server might have to handle the bandwidth of multiple workstations at the same time. A cost-effective solution to the bandwidth requirements of this type of system is a mixed Ethernet and Fast Ethernet network. This mixed network consists of standard Ethernet connections at the workstations and Fast Ethernet connections at the servers.

The Ethernet controller is a PCI device, and is therefore, a Plug and Play device. You do not have to set any jumpers or configure the

Configuring the Ethernet controller

controller for your operating system before you use the Ethernet controller.

Notes:

1. For information on Ethernet indicators, see “Status indicators” on page 10.
2. For information on the Ethernet connector, see “Input/output connectors” on page 11 and “Ethernet connector” on page 143.
3. For troubleshooting information, see “Troubleshooting the 10/100 Mbps Ethernet controller” on page 217.
4. The Ethernet controller supports the operating systems that your server supports. To find out which operating systems your server supports, go to the following World Wide Web address:
<http://www.ibm.com/netfinity/>

If you need additional Ethernet connections, you can install an Ethernet adapter, such as an IBM 10/100 Ethernet adapter. Review your network-adapter documentation for any additional configuration requirements.

Note: If you are installing an IBM 10/100 Ethernet adapter, be sure to run the Ethernet controller diagnostics and record the server's Ethernet controller configuration information before you install the adapter.

Using the SCSISelect Utility program

Using the SCSISelect Utility program

If a SCSI adapter comes with your server, the server also comes with a menu-driven configuration utility program, called SCSISelect, that allows you to view and change SCSI settings.

You can use the SCSISelect Utility program to:

- View and change the default SCSI identification (IDs)
- Verify and change configuration conflicts
- Perform a low-level format on a SCSI hard disk.

Starting the SCSISelect Utility program

You can access this program when you start the server. The SCSISelect prompt appears after the IBM Netfinity 3000 server logo appears. Press **Ctrl+A** immediately after the SCSISelect prompt appears:

```
<<< Press <CTRL><A> for SCSISelect™ Utility! >>>
```

Use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar to the various menu choices. Press **Esc** to return to the previous menu. Also, you can press the F5 key to switch between color and monochrome modes (if your monitor permits). To change the settings of the displayed items, such as Channel A or Channel B, follow the directions on the screen. Then, press **Enter**.

SCSISelect Utility program choices

The following choices appear on the SCSISelect Utility program menu:

- Configure/View Host Adapter Settings
- SCSI Disk Utilities

Configure/View Host Adapter Settings

To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings** and follow the directions on the screen.

Using the SCSISelect Utility program

Note: On this menu, the SCSI controller is referred to as the **Host Adapter**.

This menu has the following choices:

- Host Adapter SCSI ID
The default SCSI ID of the SCSI controller is 7. Do not change this value.
- SCSI Parity Checking
The default value is *Enabled*. Do not change this value.
- Host Adapter SCSI Termination
The default value is *Automatic*. Do not change this value.
- Boot Device Options
Select this choice to configure startable device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.
The default startup (boot) SCSI ID is 0 for an internal SCSI hard disk drive in Channel A.
- SCSI Device Configuration
Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

Notes:

1. For SCSI tape drives, set **Send Start Unit Command** to Off for that SCSI ID. This ensures proper server operation.
 2. When the **Maximum Sync Transfer Rate** is set to 40.0, this value represents the transfer rate for UltraSCSI devices. When this value is set to 20.0, it represents the transfer rate for Fast SCSI devices.
- Advanced Configuration Options
Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for drives with UltraSCSI speed.

Using the SCSISelect Utility program

To reset the SCSI controller defaults, press **F6**; then, follow the instructions on the screen.

SCSI Disk Utilities

To see the IDs that are assigned to each SCSI device or to format a SCSI device, select **SCSI Disk Utilities** from the SCSISelect Utility program menu.

To use the utility program, select a drive from the list. Read the screens carefully before you make a selection.

Note: If the following screen appears, you might have pressed **Ctrl+A** before the selected drives were ready. Restart the server, and watch the SCSISelect messages as each drive spins up. After the drive that you want to view or format spins up, press **Ctrl+A**.

```
Unexpected SCSI Command Failure

Target SCSI ID:          4
SCSI CDB Sent:          03 00 00 00 0E 00 07 00 02 00
Host Adapter Status:    00h - No host adapter error
Target Status:          02h - Check condition
Sense Key:              02h - Not ready
+Sense Code:            04h
+Sense Code Qualifier:  02h

Press 'Esc' to continue.
```

Performing a low-level disk format

You can use the *Format Disk* feature of the SCSISelect Utility program to perform a low-level format on hard disks.

Using the SCSISelect Utility program

Depending on the hard disk capacity, the low-level format program could take up to two hours.

When to use the Format Disk program

Use the Format Disk program:

- When you are installing software that requires a low-level format
- When you get recurring messages from the diagnostic tests directing you to run the Low-Level Format program on the hard disk
- As a last resort before replacing a failing hard disk drive

Note: For information about backing up all of your files, see your operating-system documentation.

Starting the low-level format

Attention:

The low-level format erases *all* data and programs.

1. If the hard disk drive is working, make a backup copy of all the files and programs on the hard disk.
2. Select **Format Disk**; then, follow the instructions on the screen.

Note: Hard disks normally contain more tracks than their stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, have the system serviced.

3. To install an operating system after the hard disk is formatted, follow the instructions in the ServerGuide package that comes with your server.

Using the SCSISelect Utility program

Chapter 4. Installing options

This chapter provides instructions to help you add options to your server. Some option-removal instructions are provided, in case you need to remove one option to install another. If you have several internal options to install, these instructions enable you to add them all at one time.

This chapter contains:

| | |
|--|-----|
| Before you begin | 69 |
| Electrical safety | 70 |
| Handling static-sensitive devices | 71 |
| Preparing to add options | 73 |
| Disconnecting cables and removing the side cover | 74 |
| Accessing the system board | 78 |
| Working with adapters | 79 |
| Adapter considerations | 79 |
| Installing or removing ISA and PCI adapters | 82 |
| Installing or removing AGP adapters | 86 |
| Removing and replacing the bottom cover | 89 |
| Removing and replacing the system board | 91 |
| Removing and replacing the front fan | 94 |
| Working with memory modules | 96 |
| Memory configuration | 97 |
| Installing or removing memory modules | 98 |
| Installing or removing internal drives | 102 |
| Expansion bays | 102 |
| Drive specifications | 104 |
| Types of cables | 105 |
| SCSI drives (if your server model comes with a SCSI adapter) | 110 |
| Preinstallation steps (all bays) | 112 |
| Working with drives in bays 1 through 4 | 114 |
| Working with drives in bays 5 and 6 | 122 |
| Working with microprocessors | 126 |
| Installing or replacing microprocessors | 127 |
| Connecting external options | 133 |
| Adding a hot-swap storage expansion enclosure | 133 |
| Adding external SCSI devices | 133 |
| Serial port connectors | 135 |
| Parallel port connector | 137 |
| Video port connector | 138 |

| | |
|--|-----|
| Keyboard and mouse connectors | 139 |
| SCSI connectors | 140 |
| Universal serial bus (USB) ports | 142 |
| Ethernet connector | 143 |
| Adding security options | 144 |
| Installing a U-bolt and security cable | 145 |
| Completing the installation | 148 |
| Updating the server configuration | 153 |
| Network operating system instructions | 154 |

Before you begin

- Become familiar with the safety and handling guidelines specified under “Safety information” on page xxiii, “Electrical safety” on page 70, and “Handling static-sensitive devices” on page 71. These guidelines will help you work safely while working with your server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options you intend to install.
- Place your server in a location that is dry. Rain or spilled liquids might damage your server.
- Have a supply of 2 MB (1.44 MB formatted), 3.5-inch diskettes available.
- Back up all important data before you make changes to hard disk drives.
- Have a small, flat-blade screwdriver available.

Attention:

To allow for air circulation, be sure to maintain the following minimum clearances around the server:

- 102 mm (4 in.) in the front
- 127 mm (5 in.) in the rear
- 51 mm (2 in.) on the left and right sides

Electrical safety

10



CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunications systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.

For your safety, always do the following *before* removing the cover:

1. Turn off the server and any attached devices, such as printers, monitors, and external drives.

Note: If you are in the United Kingdom and have a modem or fax machine attached to your server, you must disconnect the telephone line from the server *before* unplugging any power cords (also known as power cables). When reassembling your server, you must reconnect the telephone line *after* you plug in the power cords.

2. Unplug all the power cords from electrical outlets.
3. Disconnect all communication cables from external receptacles.
4. Disconnect all cables and power cords from the back of the server.

Note: Reconnect the cables or power cords only after you reassemble the server and put the cover back on.

9



CAUTION:

Never remove the cover on a power supply or any part (power backplane and AC box) that has the following label attached.



Hazardous voltage, current, and energy levels are present inside the power supplies, power backplane, and AC box. There are no serviceable parts inside the power supplies, power backplane, or AC box. If you suspect a problem with one of these parts, contact an IBM service technician.

Handling static-sensitive devices

Static electricity, though harmless to you, can seriously damage server 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 server 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. Handle adapters, the processor board, and memory modules by the edges. 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 server for at least two seconds. (This reduces static electricity from the package and from your body.)

Handling static-sensitive devices

- When possible, remove the option and install it directly into the server 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 server's covers or any metal surface.

Preparing to add options

Before you begin:

- Be sure that your current server configuration is working properly.
- If you have not already done so, locate the keys to the cover lock. At the time of shipment, two keys are attached to the back of the server, over the keylock. Store the keys in a safe place.
- Obtain a small, flat-blade screwdriver.
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read “Using the stabilizing feet” on page 23.

5



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:

Use safe lifting practices when lifting your machine.

Preparing to add options

Disconnecting cables and removing the side cover

Attention:

The presence of 5 V ac standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before you open the server.

1. Remove any media (diskettes or CDs) from the drives; then, turn off all attached devices and the server.

6



CAUTION:

The Power Control button on the front of the server does not turn off the electrical current supplied to the server. The server also might have more than one power cord. To remove all electrical current from the server, ensure that all power cords are disconnected from the power source.

2. Touch the rear of the bare metal frame to dissipate any static electricity from your body.
3. Before disconnecting cables, be sure to note where they attach, so that you can correctly reattach them later.

Note: If you are in the United Kingdom, you must perform step 5 before step 4.

4. Unplug all power cords (cables) from electrical outlets.
5. If you have a modem or fax machine attached to the server, disconnect the telephone line from the wall outlet and the server.
6. Note the location of the remaining cables and cords.

10



CAUTION:

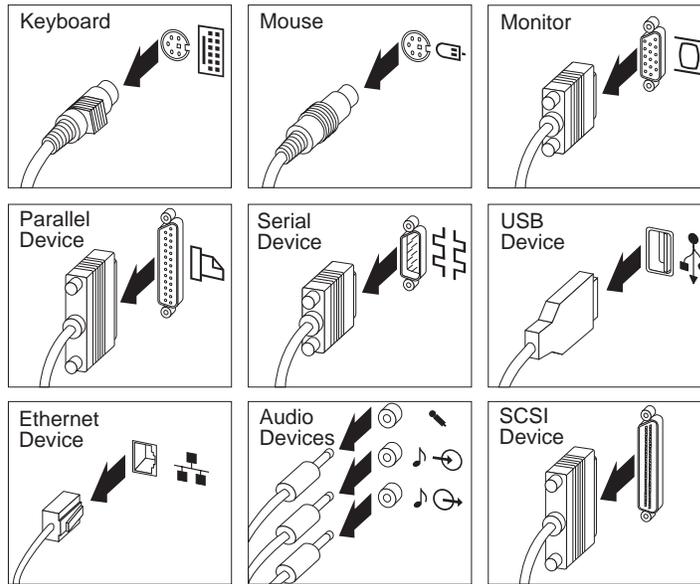
Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunications systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.

7. Disconnect all cables attached to the server; this includes power cords, input/output (I/O) cables, and any other cables that are connected to the server.

Notes:

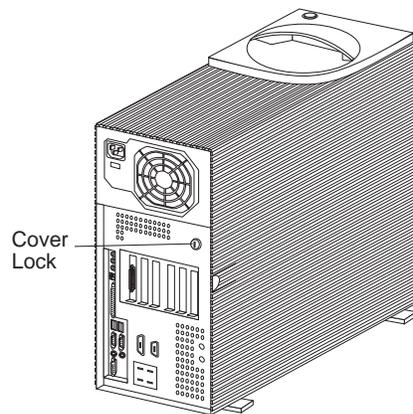
- a. For more information about the rear connectors, see “Input/output connectors” on page 11.
- b. For more information about ports, including universal serial bus (USB), see “Connecting external options” on page 133.

Preparing to add options

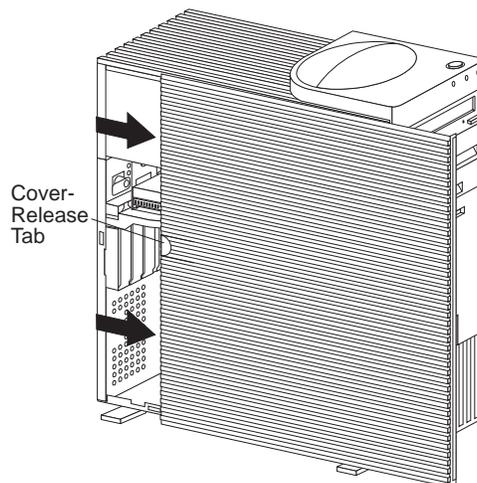


Preparing to add options

8. If necessary, unlock the server side cover. (The cover lock is located at the rear of the server.)



9. Remove the side cover by pulling out on the cover-release tab at the rear of the side cover. Then, slide the cover toward the front of the server and lift it off.
10. Set the door aside.



Preparing to add options

Accessing the system board

Before you can install or remove certain options, you might need to access the system board. For example, you might need to remove adapters, drives, and cables that impede your access to components on the system board. You also need to access the system board before you can install or remove such options as adapters, memory modules, and microprocessors, because these devices reside on the system board.

To access the system board more easily:

1. Rotate the stabilizer feet in towards the server, so that they do not detach due to the weight of the server.
2. Place the server on a flat, sturdy surface, such as a table.
3. Turn the server on its side, so that the system board is facing you.

If you access the inside of the server while it is in the upright position, ensure that the stabilizer feet are positioned correctly. For more information, see “Using the stabilizing feet” on page 23.

Note: To see a list of the system-board components and an illustration that shows their locations, see “System Board Illustration” on page 253.

Working with adapters

Adding an adapter, such as a communication adapter, extends the capabilities and power of your server. For example, if your server supports redundant array of independent disks (RAID) technology, you can add a RAID adapter that can enhance logical-drive capacity and performance.

Notes:

1. For a complete list of the adapters that your server supports, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web, or contact your IBM marketing representative.
2. For Netfinity 3000 servers, the ServeRAID adapters are supported only when installed in PCI slot 3. If your server has a standard SCSI adapter in PCI slot 3, you must first remove the standard SCSI adapter. You can install and use the standard SCSI adapter in PCI slot 1 or 2, but devices attached to the standard SCSI adapter will no longer provide startup (boot) support.

When you are installing or removing adapters, it is important to resolve any resource conflicts that might arise. For example, if you install an ISA legacy adapter, you might need to manually configure the adapter by setting a variety of switches on the adapter and by using the Configuration/Setup Utility program.

Many adapters now use *Plug and Play* technology, which enables the server to automatically configure the adapter, provided that the required resources are available. Refer to the instructions that come with your adapter to determine if it is Plug and Play. For more information, see “ISA Legacy Resources” on page 55.

Adapter considerations

Your server has connectors for Accelerated Graphics Port (AGP), industry standard architecture (ISA), and peripheral component interconnect (PCI) adapters. The following sections contain additional information about these types of adapters.

Working with adapters

AGP adapters

You may install a video adapter in the dedicated AGP slot connector, in an ISA slot connector, or in a PCI slot connector. However, the server system board does not support the AGP video connector and the integrated video subsystem simultaneously.

Your server contains one dedicated AGP slot connector on the inside rear of the server wall, adjacent to the dual-inline memory module (DIMM) connectors. To locate the dedicated AGP slot connector, see “System Board Illustration” on page 253.

If you need to install an AGP adapter in the dedicated AGP slot connector, go to “Installing or removing AGP adapters” on page 86. If you need to install a video adapter in an ISA or PCI slot connector, go to “ISA and PCI adapters.”

ISA and PCI adapters

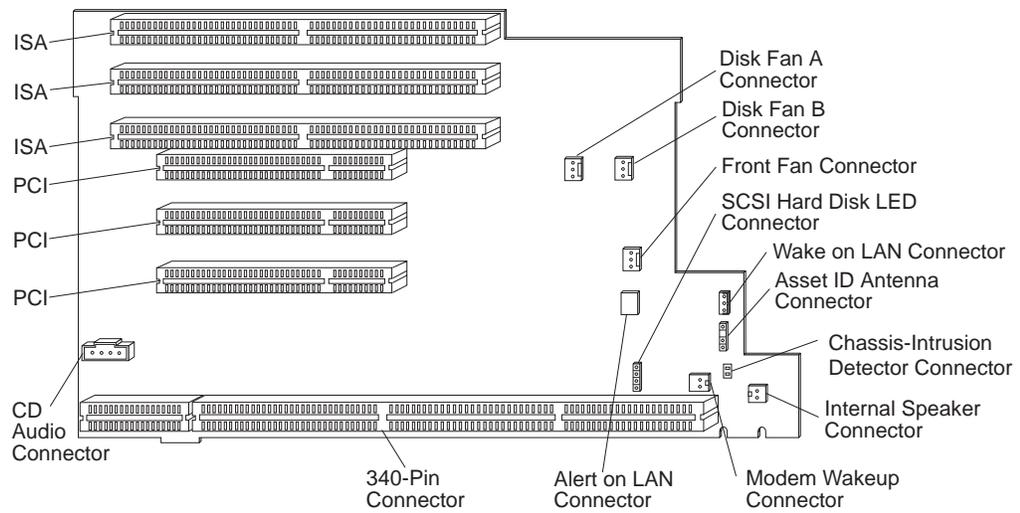
Your server uses a riser card for expansion. The riser card contains expansion slot connectors that connect adapters to the industry standard architecture (ISA) and peripheral component interconnect (PCI) buses.

You can install a variety of adapters in the expansion slot connectors on the riser card. For information on locating the riser card, see “System Board Illustration” on page 253. For an illustration of the expansion slots that are located on the rear of the server, see “Input/output connectors” on page 11.

The riser card in your server has three dedicated ISA slot connectors and three dedicated PCI slot connectors.

Working with adapters

The following illustration shows the expansion slot connectors and other connectors on the riser card.



Attention:

To avoid possible damage to adapters and server components, be sure that the adapters that you install do not touch each other or the other components (such as the microprocessor) inside the server.

Working with adapters

Installing or removing ISA and PCI adapters

This section gives the procedure for installing an ISA or PCI adapter. If you want to remove an ISA or PCI adapter, reverse the order of the following steps. If you need to install an AGP adapter in the dedicated AGP slot connector, go to “Installing or removing AGP adapters” on page 86.

Notes:

1. See “Input/output connectors” on page 11 for an illustration of the expansion slots on the rear of the server.
2. If you install an ISA legacy adapter, set the resources to **[ISA Resource]**; this reserves the resources for the legacy adapter and prevents the BIOS from using these resources for the system or other adapters. If you remove an adapter, reassign the system resources as **[Available]** for ISA legacy adapters. See “ISA Legacy Resources” on page 55.
3. To install some adapters, especially full-length adapters, you might need to remove the bottom cover, the microprocessor, the system board, and the front fan.

Before you begin:

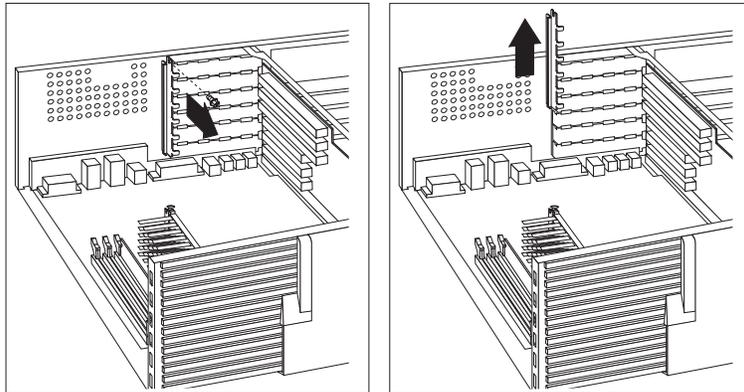
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.
- Read “Accessing the system board” on page 78.

To install an ISA or PCI adapter:

1. Review the instructions that come with the adapter to determine if it must be installed in an ISA or PCI expansion slot; otherwise, use any empty, bus-compatible slot.
2. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
3. If necessary, remove the bottom cover (see “Removing and replacing the bottom cover” on page 89).

Working with adapters

4. Remove the screw and bracket.
5. Remove the appropriate expansion-slot cover:
 - a. Remove the expansion-slot screw on the top of the expansion-slot cover.
 - b. Slide the expansion-slot cover out of the server.
 - c. Store the expansion-slot cover in a safe place for future use.



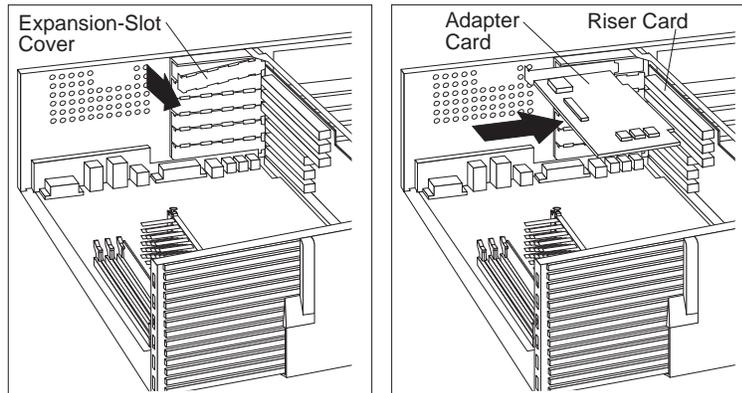
6. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the server; then, remove the adapter from the package.

Working with adapters

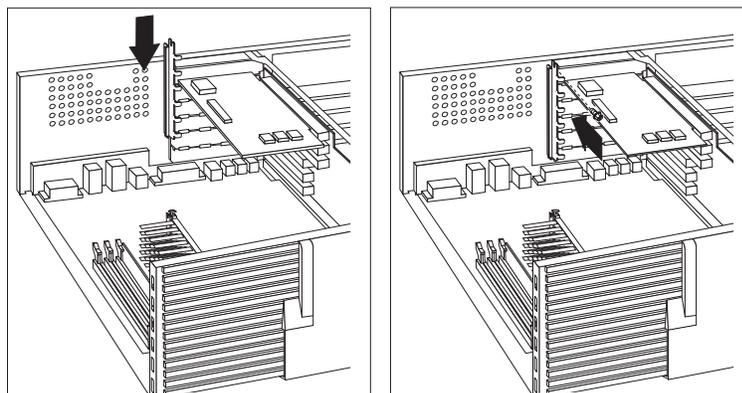
7. Install the adapter into the appropriate slot on the riser card.

You might have to remove the system board and the front fan in order to slide the adapter into the slot. See “Removing and replacing the front fan” on page 94 and “Removing and replacing the system board” on page 91.

Note: The components of a PCI adapter face down toward the system board, and the components of an ISA adapter face up. If a component in the server or on the adapter interferes with the installation, use another slot.



8. Install the bracket and the screw.



Working with adapters

9. If you removed the bottom cover, the microprocessor, the front fan, or the system board, replace them. See “Installing or replacing microprocessors” on page 127, “Removing and replacing the front fan” on page 94, “Removing and replacing the system board” on page 91, and “Removing and replacing the bottom cover” on page 89.
10. If necessary, connect any internal cables to the adapter. Refer to the documentation that comes with the option.
11. If you installed an ISA legacy adapter, go to “ISA Legacy Resources” on page 55 to assign system resources.
12. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Working with adapters

Installing or removing AGP adapters

This section gives the procedure for installing an AGP adapter in the dedicated AGP slot connector. If you want to remove an AGP adapter from this slot connector, reverse the order of the following steps. If you need to install an adapter in an ISA or PCI slot connector, go to “Installing or removing ISA and PCI adapters” on page 82.

Notes:

1. You may install a video adapter in the dedicated AGP slot connector, in an ISA slot connector, or in a PCI slot connector. However, the server system board does not support the AGP video connector and the integrated video subsystem simultaneously.
2. You can install only a special AGP graphics adapter in the dedicated AGP slot connector. For information on the available AGP adapters, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.
- Read “Accessing the system board” on page 78.

Attention:

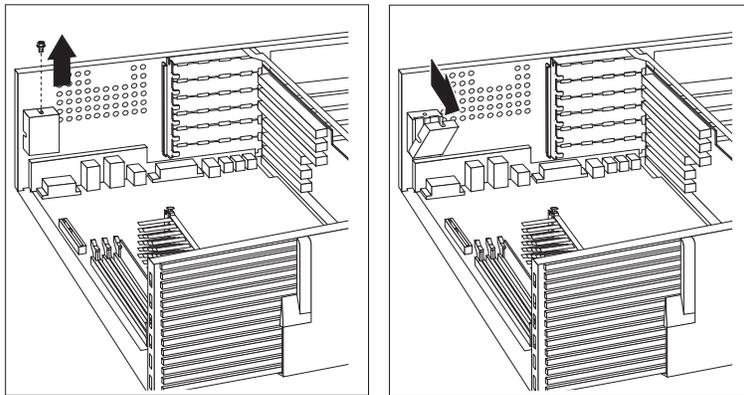
The presence of 5 V ac standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before you open the server.

To install an AGP adapter:

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Remove the screw; then, remove the cover to access the two slots on the server wall. The slots on the server wall provide

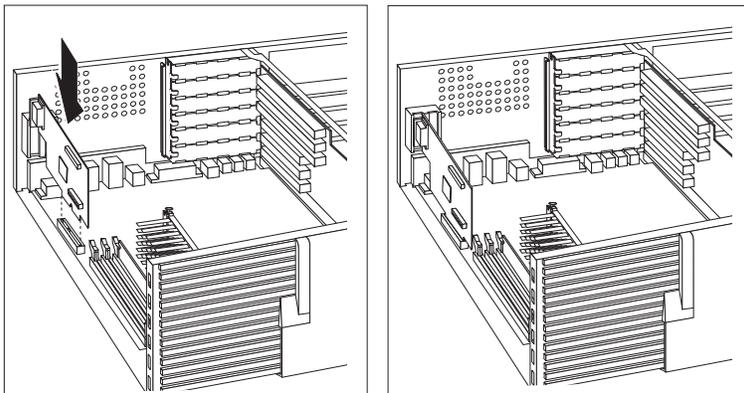
Working with adapters

access to the connector on the AGP adapter for attaching external devices.



3. Install the AGP adapter. The following illustration shows the installation of an AGP adapter. Note that the connector for external devices on the AGP adapter is accessible through the slot on the server wall.

Note: Some adapters support the attachment of secondary adapters called *daughterboards*. (A daughterboard is an adapter that can be plugged into another adapter or the system board.) Because a daughterboard might provide another connector for external devices, a second slot is provided in the server wall for access.



Working with adapters

4. If necessary, connect any internal cables to the adapter. Refer to the documentation that comes with the option.
5. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Removing and replacing the bottom cover

Attention:

The presence of 5 V ac standby power might result in damage to your hardware unless you disconnect the power cord from the wall before you open the server.

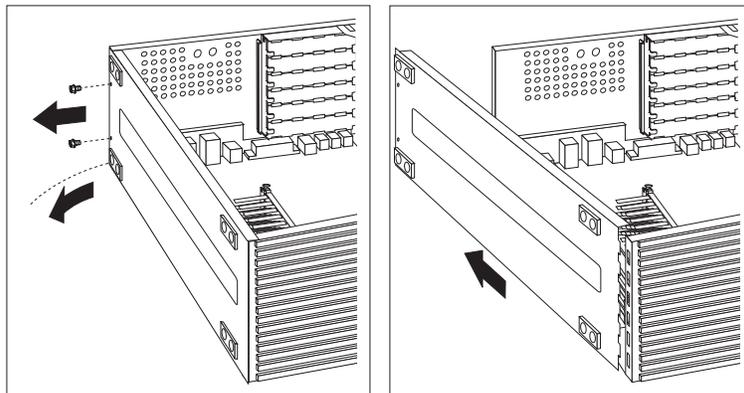
Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.

To remove the bottom cover:

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Position the server as described in “Accessing the system board” on page 78.
3. Remove the screws from the bottom cover.
4. Pivot the end of the bottom cover away from the server frame.

Note: Your server bottom cover might look different from the bottom cover in this illustration.

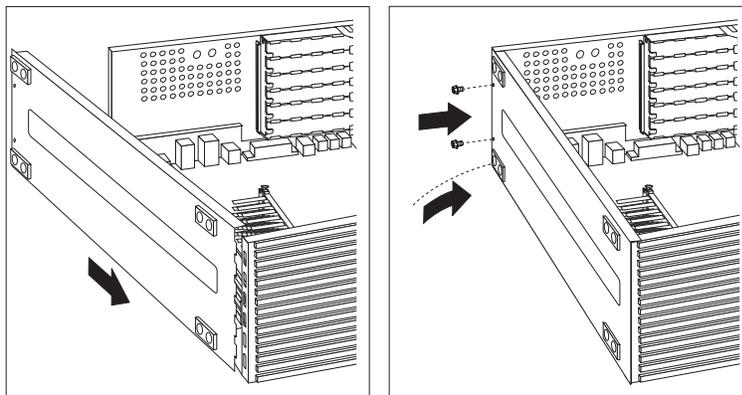


5. Slide the tabs on the end of the cover out of their openings and remove the cover.

Working with adapters

To replace the bottom cover:

1. Hold the bottom cover at an angle and align the tabs on the end with the openings in the frame.
2. Fit the tabs into the openings and pivot the bottom cover until it is closed.



3. Align the holes and insert the two bottom screws.
4. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Removing and replacing the system board

Attention:

The presence of 5 V ac standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before you open the server.

Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.

To install an adapter, you might have to remove the system board.

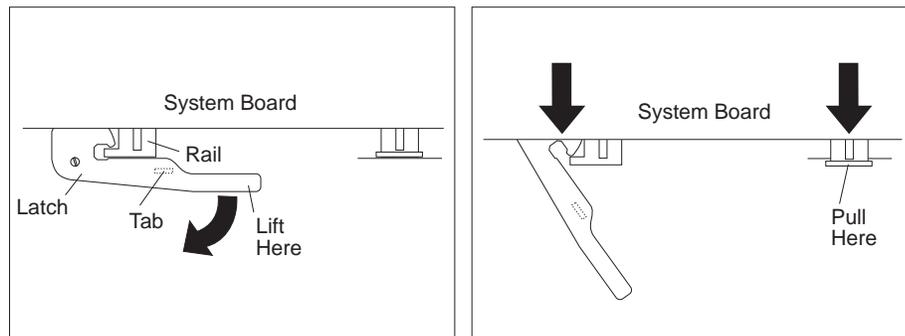
To remove the system board:

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Position the server as described in “Accessing the system board” on page 78.
3. Remove the bottom cover. (See “Removing and replacing the bottom cover” on page 89.)
4. Loosen, but do not remove, the riser card mounting screw.
5. Lift the system board latch handle upward to disconnect the plastic tab on the bottom of the handle from the chassis.

Working with adapters

6. Grasp and turn the latch clockwise to the extended position. This releases the system board from the riser card.

Note: Do not pull on the microprocessor, the DIMMs, or the DIMM sockets to remove the system board.



7. Using the tab, slide the system board out and set it aside.

To reinstall the system board:

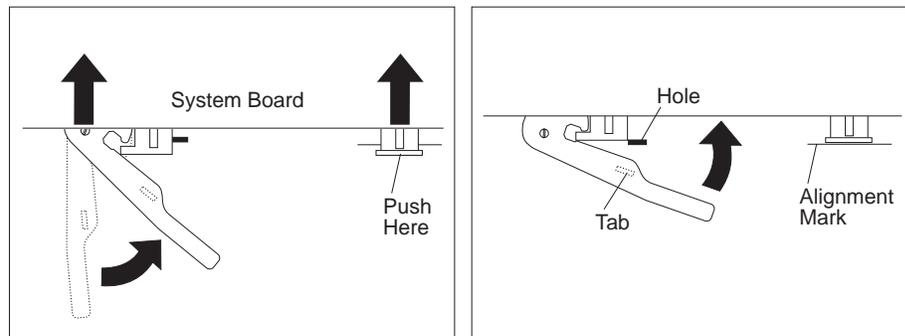
1. Make sure that the system-board latch handle is in the extended position.
2. Align the system-board rails with the tracks on the chassis and slide the board in until it is approximately 6 mm (0.25 in) from the riser-card edge connector.
3. Rotate the latch handle counterclockwise until the system board is properly aligned with the riser-card edge connector.
4. Continue rotating the latch handle counterclockwise while firmly pushing on the system-board rail on the right-hand side of the system board.

Note: Do not push on the microprocessor, the DIMMs, or the DIMM sockets to install the system board.

Make sure that the system board is fully seated in the riser-card edge connector.

Working with adapters

5. Push down on the latch to lock the tab on the underside in the opening (hole) in the chassis. This securely holds the latch in the closed position.



Note: You cannot see the connection with a full-sized adapter in place. To make sure that the system board is fully seated, lock the tab on the underside of the system-board latch in the opening (hole) in the chassis.

6. Retighten the riser card mounting screw.
7. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Working with adapters

Removing and replacing the front fan

Attention:

The presence of 5 V ac standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before you open the server.

Before you begin:

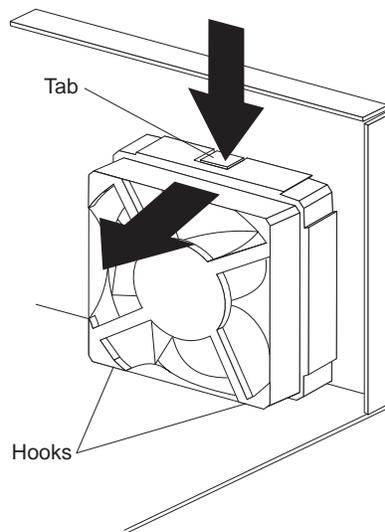
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.

To remove and replace the front fan:

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Position the server as described in “Accessing the system board” on page 78.
3. Disconnect the front fan cable from the riser card. See the label inside the server for the location of the front fan connector, or see the riser-card illustration in “ISA and PCI adapters” on page 80.

Working with adapters

4. Press the tab and pull the front fan forward until it clears the server wall.



5. Replace the front fan by aligning the two hooks on the bottom of the front fan assembly with the slots on the server wall.
6. Insert the tab on the front fan assembly into the slot on the server wall.
7. Connect the front fan cable to the connector on the riser card.
8. Replace the bottom cover (see “Removing and replacing the bottom cover” on page 89).
9. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Working with memory modules

Working with memory modules

Adding system memory to your server can make programs run faster. You can increase the amount of system memory by installing options called *memory modules*.

The maximum amount of system memory your server supports is 384 MB of unbuffered memory, or 768 MB of registered memory. The memory modules that your server uses are *dual-inline memory modules (DIMMs)*. You can add memory to your server to increase system performance.

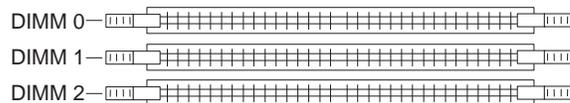
Attention:

You cannot mix registered and unbuffered DIMMs in your server. To use registered DIMMs, you must remove all unbuffered DIMMs from your server.

Your server has three connectors for installing system-memory modules.

Note: The following illustration is for reference only. Before you install memory, be sure to check the orientation of your server system board for the correct connector locations.

To locate the memory connectors on the system board, see “System Board Illustration” on page 253.



The DIMMs that come with your server are unbuffered synchronous dynamic random-access memory (SDRAM) with error checking and correction (ECC). These memory modules have a speed of 100 MHz. You can add extra memory modules or replace existing memory modules.

When installing or replacing DIMMs, follow these guidelines:

- Your server comes with one or more unbuffered dual-inline memory modules (DIMMs) installed.

Working with memory modules

- Install DIMMs with a maximum height of 6.35 cm (2.5 inches).
- Use only 3.3 V dc 100 MHz SDRAM DIMMs.
- Do not mix registered and unbuffered DIMMs. If you use registered DIMMs, you must remove all unbuffered DIMMs from your server.

A mix of registered and unbuffered memory prevents the server from completing startup, and results in a 1-3-4 error beep sequence and a blank screen.

- Each memory connector supports a maximum of 256 MB of memory. However, the maximum amount of unbuffered system memory your server supports is 384 MB. Your server supports up to 768 MB of registered memory.
- To enable ECC, all DIMMs must be ECC; therefore, install only ECC DIMMs. If you install nonparity (NP) DIMMs, the server will not power up, and POST memory error code 164 will be displayed. For additional information on error code 164, see “POST message table” on page 169.
- If you are installing DIMMs of different sizes, for optimum signal quality, install the DIMMs with greater memory capacity starting with the connector closest to the edge of the system board (DIMM 2).
- After installing or removing a DIMM, you must save the new configuration information using the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility program” on page 39.
- For more information about the DIMMs that your server supports, go to the following World Wide Web address:
<http://www.ibm.com/pc/us/compat/>

Memory configuration

When you are adding or removing memory, a basic rule to follow is to fill each system memory connector sequentially, starting at *DIMM 2*. For optimum signal quality, install the DIMMs with greater memory capacity starting with the connector closest to the edge of the system board (DIMM 2).

Working with memory modules

Table 1 and Table 2 on page 98 show some of the possible memory configurations for your server. The contents of these tables and additional information can be found on a label located inside your server. Alternative configurations are possible.

| Total Memory (MB) | DIMM 2 | DIMM 1 | DIMM 0 |
|-------------------|--------|--------|--------|
| 32 | 32 | 0 | 0 |
| 64 | 64 | 0 | 0 |
| 64 | 32 | 32 | 0 |
| 96 | 64 | 32 | 0 |
| 96 | 32 | 32 | 32 |
| 128 | 128 | 0 | 0 |
| 128 | 64 | 32 | 32 |
| 128 | 64 | 64 | 0 |
| 192 | 64 | 64 | 64 |
| 256 | 128 | 64 | 64 |
| 256 | 128 | 128 | 0 |
| 384 | 128 | 128 | 128 |

| Total Memory (MB) | DIMM 2 | DIMM 1 | DIMM 0 |
|-------------------|--------|--------|--------|
| 256 | 256 | 0 | 0 |
| 512 | 256 | 256 | 0 |
| 768 | 256 | 256 | 256 |

Note: The values in Table 1 and Table 2 are represented in megabytes (MB).

Installing or removing memory modules

This section gives the procedure for installing memory modules. If you want to remove a memory module, reverse the order of the following steps.

Working with memory modules

Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.
- Read “Accessing the system board” on page 78.

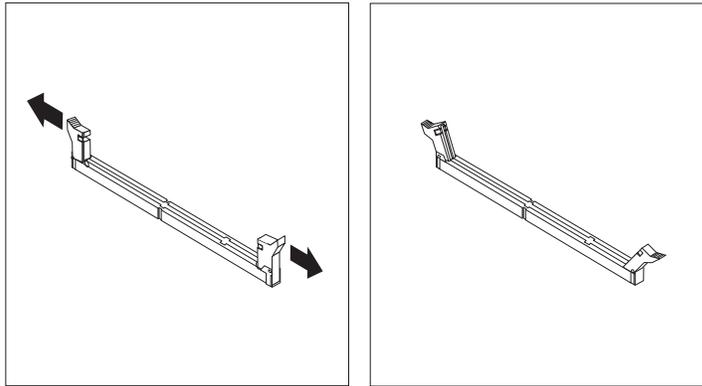
Notes:

1. When you are removing a memory module, be careful not to push too hard on the retaining clips because the memory module might abruptly eject from the connector.
2. Each memory connector contains two keys (dividers), which are used to assure that a memory-module can be installed only in the correct position.
3. A retaining clip at each end of the connector locks the memory module into place.
4. For information about memory configuration, see Table 1 and Table 2 on page 98.

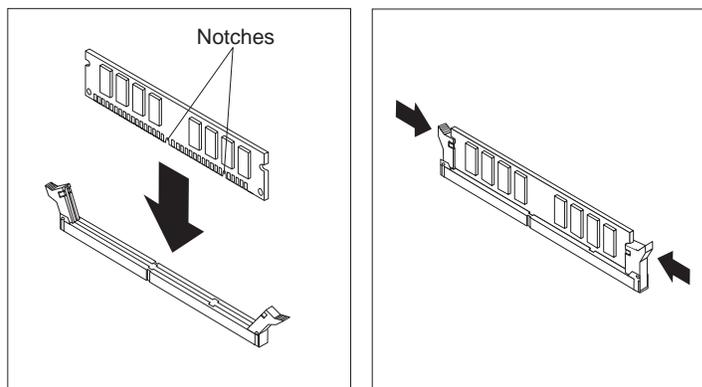
To install a DIMM:

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Locate the memory connectors on the system board. See the illustration at the beginning of this section.
3. Be sure that the retaining clips are in the open position, as shown in the following right-hand illustration. If the retaining clips are perpendicular to the connector, push outward on them until they click open.

Working with memory modules



4. Touch the static-protective package containing the DIMM to any *unpainted* metal surface in the server; then, remove the DIMM.
5. Position the DIMM above the connector so that the two notches on the bottom edge of the DIMM align properly with the connector.
6. Firmly push the DIMM straight down into the connector until the retaining clips close and snugly fit around both ends of the DIMM.



Note: Adding or removing DIMMs changes the configuration information in the server. When you restart the server, the system displays POST error 164. Start the Configuration/Setup Utility program and select **Save Settings**.

Working with memory modules

7. To install another DIMM, repeat steps 3 through 6 on pages 99 and 100.
8. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Installing or removing internal drives

Installing or removing internal drives

Drives are devices that your server uses to store and retrieve data. You can add drives to your server to increase storage capacity and to enable your server to read multiple types of media. Several types of drives are available, such as:

- Diskette
- Hard disk
- Rewritable optical disc
- Tape

Expansion bays

Internal drives are installed in *bays* at the front and rear of your server. The bays are referred to as bay 1, bay 2, and so on.

Drive bays 1 through 4, at the front of your server, are contained in the upper drive bracket. Drive bays 5 and 6, at the rear of your server, are contained in the lower drive bracket.

Note: A drive bracket is also known as a drive cage, or a drive bay assembly.

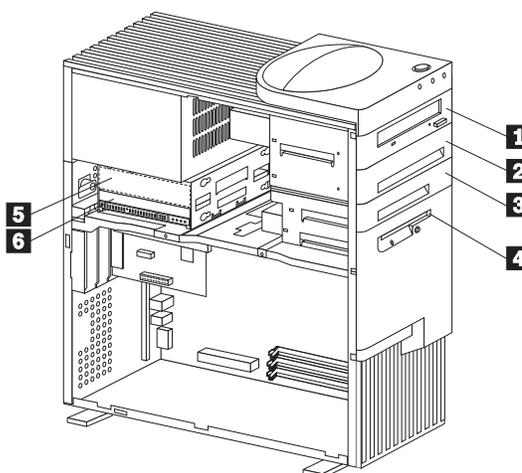
Your server comes with the following preinstalled drives:

- A 3.5-inch, 1.44 MB diskette drive in bay 4
- A 3.5-inch, hard disk drive in bay 6 (in some models)
- A 5.25-inch, CD-ROM drive in bay 1

Installing or removing internal drives

The following illustration shows the locations of the bays in your server. This illustration shows the server front view, with the side panel removed.

- 1** Bay 1
- 2** Bay 2
- 3** Bay 3
- 4** Bay 4
- 5** Bay 5
- 6** Bay 6



The following is a detailed description of the drive bay contents.

CD-ROM drive: Your server comes with an integrated drive electronics (IDE) CD-ROM drive.

Open bays: Your server's design accommodates 3.5-inch and 5.25-inch devices, such as hard disk, tape, and rewritable optical disk drives. The number and capacities of the hard disk drives vary by model.

For information on the supported types of drives and their installation, see “Drive specifications” on page 104, “Preinstallation steps (all bays)” on page 112, and <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

Diskette drive: The 3.5-inch, 1.44 MB⁵ diskette drive uses 1 MB (unformatted) or 2 MB (unformatted) diskettes.

⁵ MB equals approximately 1 000 000 bytes; total user-accessible capacity may vary depending on operating environment.

Installing or removing internal drives

Drive specifications

Table 3 describes some of the drive types that you can install in each bay, and their width and height requirements.

| Bays | Drive widths | Drive types | Drive height |
|---------|-----------------------|---|-----------------------------------|
| 1 | 3.5-inch ⁶ | Removable media ⁷ drive, hard disk drive | 25.4 mm (1.0 in.) |
| | 5.25-inch | CD-ROM drive | 41.3 mm (1.6 in.) ⁹ |
| 2 | 3.5-inch ⁶ | Removable media ⁷ drive, hard disk drive | 25.4 mm (1.0 in.) |
| | 5.25-inch | | 41.3 mm (1.6 in.) ⁹ |
| 3 | 3.5-inch | Hard disk drive ⁸ | 25.4 mm (1.0 in.) |
| 4 | 3.5-inch | Diskette drive | 25.4 mm (1.0 in.) |
| 5 and 6 | 3.5-inch | Hard disk drive ⁸ | 25.4 mm (1.0 in.) |
| | | | 41.3 mm (1.6 in.) ^{9,10} |

⁶ To properly install a 3.5-inch drive in bay 1 or 2, use the 3.5-inch conversion kit for a 5.25-inch bay that is already installed in bay 2. If you are installing a 5.25-inch drive in bay 2, you must first remove the conversion kit.

⁷ Removable media include CD-ROMs, optical discs, diskettes, and tapes. If you install removable-media drives, you must install them in bays 1-4 only. The server supports only one diskette drive (standard in bay 4).

⁸ In some models, the CD-ROM drive might be set as the default startup (or boot) drive. However, if a hard disk drive is preinstalled, you can change the startup sequence, and specify the hard disk drive as the startup drive. See "Start Options" on page 42 for information about changing the startup sequence.

⁹ Drives that are higher than 41.3 mm (1.6 in.) cannot be installed.

¹⁰ One slim-high drive has a height of 25.4 mm (1.0 in.). One half-high drive has a height of 41.3 mm (1.6 in.). Therefore, you can install two slim-high drives or one half-high drive between bays 5 and 6.

Types of cables

Your server uses cables to connect IDE and SCSI drives to the power supply, riser card, and system board. The diskette drive is also powered through a cable attached to the riser card. Each cable connector is designed to fit a corresponding drive connector. The following cables are provided:

- Four-wire *power cables* connect most drives to the power supply. At the ends of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, some power cables attach to the riser card.
- Flat *signal cables*, sometimes called *ribbon cables*, connect IDE drives to the riser card. There are two sizes of signal cables that come with your server.
 - The wider signal cable attaches to the primary IDE connector on the back of the riser card.
 - The narrower signal cable attaches to the diskette drive and to the diskette drive connector on the back of the riser card.
- A flat SCSI *signal cable* for connecting devices to the SCSI adapter, if a SCSI adapter comes with your server.

If your server model comes with an UltraSCSI adapter, it has a ribbon cable that is connected to the internal SCSI hard disk drive. One end of this cable is connected to the 68-pin, internal SCSI connector on the SCSI adapter. The other end of the SCSI cable has a terminator. This cable provides four connectors for attaching other internal SCSI devices.

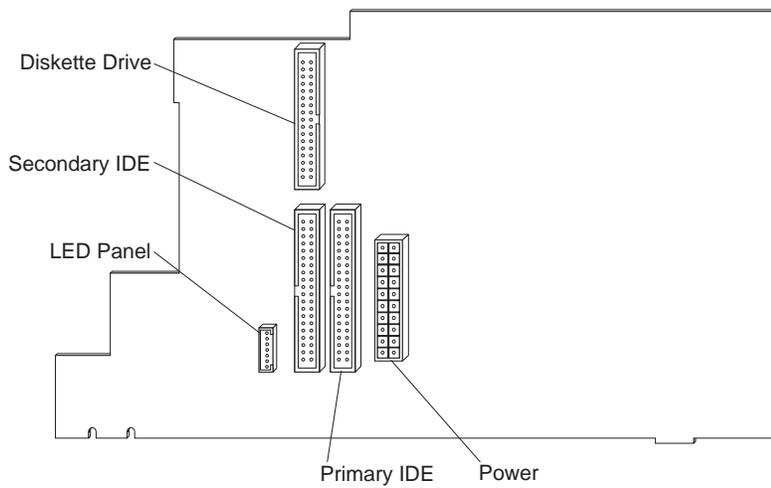
For more information about SCSI devices, see “SCSI drives (if your server model comes with a SCSI adapter)” on page 110.

Note: To locate connectors on the system board, see “System Board Illustration” on page 253.

Installing or removing internal drives

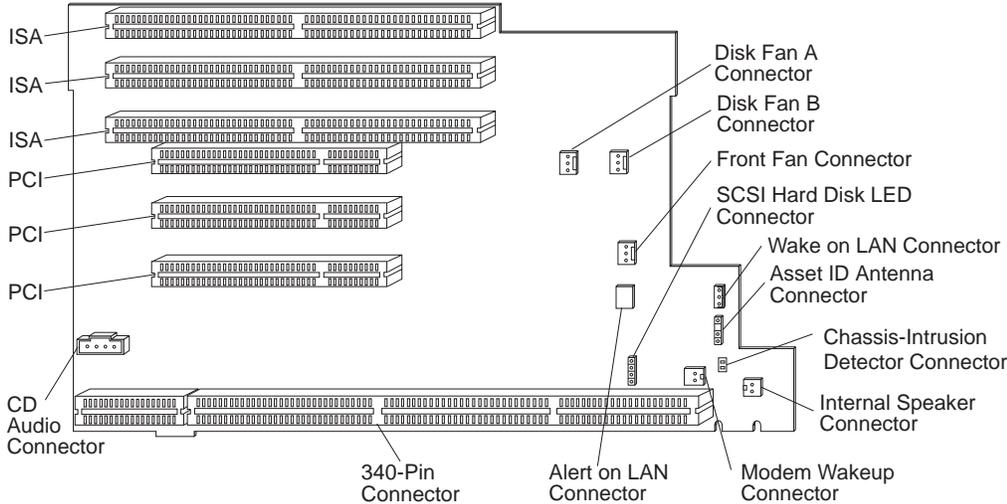
The diskette, IDE CD-ROM, and other IDE device connectors are on the back of the riser card. When you are installing optional drives, refer to the following illustration for the location of the appropriate connectors.

Note: The following illustration is for reference only. Before you install drives, be sure to check the orientation of your server riser card for the correct connector locations. The bottom edge of this card is located at the back of the server.

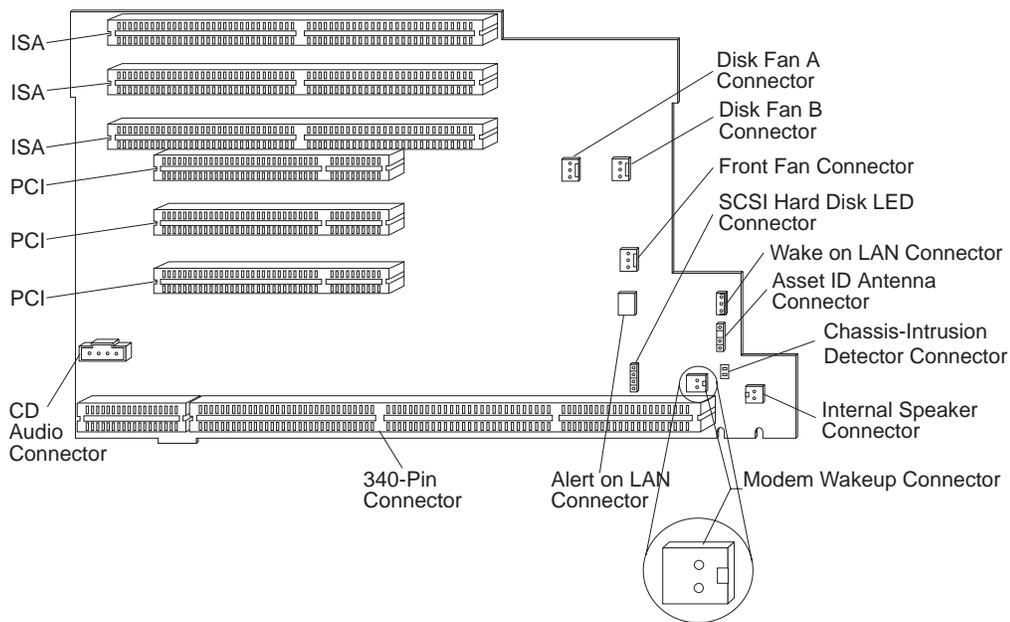


Installing or removing internal drives

The following illustration shows the connectors on the riser card.



Installing or removing internal drives



The following are some important points to remember when connecting power and signal cables to internal drives:

- The diskette drive, hard disk drive (if applicable), and CD-ROM drive that are preinstalled in your server come with power and signal cables attached. The CD-ROM drive is attached to the secondary IDE connector on the back of the riser card. If you replace any drives, it is important to remember which cable is attached to which drive.
- When you install a drive, ensure that the connector at the end of the signal cable is connected to the system board.
- The CD-ROM drive and the diskette drive are IDE devices that come with your server. You can install another IDE device, such as a CD-ROM drive or tape drive.
- If two or more IDE devices are used on a single cable, one must be designated as the primary or master device and all others as secondary or subordinate devices; otherwise, some of the IDE devices might not be recognized by the system. The primary or

Installing or removing internal drives

secondary designation is determined by switch or jumper settings on each IDE device.

In this server, the IDE CD-ROM drive is the primary device. If you install a second IDE device, it must be the secondary device.

- You can install one diskette drive only.
- If you plan to attach an internal SCSI drive, connect it to one of the available connectors on the internal SCSI cable.

If you plan to attach an external SCSI drive, see “Connecting external options” on page 133 for additional information.

For help in selecting drives, cables, and other options for your server, do one of the following:

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your IBM reseller, or your IBM marketing representative.
- Within Canada, call 1-800-565-3344 or 1-800-465-7999.
- Outside the United States and Canada, contact your IBM reseller or IBM marketing representative.

Installing or removing internal drives

SCSI drives (if your server model comes with a SCSI adapter)

Note: If your server model comes with a SCSI adapter, the adapter is an IBM UltraSCSI adapter. The information in this SCSI section applies to an UltraSCSI adapter. If your server model does not come with a SCSI adapter and you or your dealer have installed a SCSI adapter, consult the documentation that comes with that adapter for information on SCSI devices. Then, proceed to “Preinstallation steps (all bays)” on page 112.

Some drives have a special design called *small computer system interface* (SCSI). This design allows you to attach multiple drives to a single connector.

Note: Any information about SCSI drives also applies to other SCSI devices, such as scanners and printers.

Your Netfinity 3000 server supports drives that comply with American National Standards Institute (ANSI) SCSI Standards X3.131-1986 (SCSI), X3.131-1994, (SCSI-2), X3.277-1996 (SCSI-3 Fast-20 parallel interface), and X3.253-1995 (SCSI-3 parallel interface).

For a complete list of the SCSI devices that your server supports, go to <http://www.ibm.com/netfinity/> on the World Wide Web.

SCSI physical unit numbers (PUNs)

When more than one physical device is connected to the same UltraSCSI *adapter*, the devices compete for support from the UltraSCSI adapter. Because the UltraSCSI adapter communicates with only one device at a time, the priority of a device is based on its SCSI identification (ID). The highest priority IDs are 7 to 0; the lowest priority IDs are 15 to 8.

If you install additional SCSI devices, you must set a unique ID for each SCSI device that you connect to the integrated SCSI-2 connector. This unique ID enables the UltraSCSI adapter to identify the devices and to prevent two devices from sending or receiving data on the SCSI bus at the same time. SCSI devices use a variety

Installing or removing internal drives

of methods to set the SCSI ID, such as jumpers, thumbwheels, or switches.

The SCSI device ID is also known as the SCSI *address* or *physical unit number* (PUN).

The UltraSCSI adapter supports SCSI IDs 0 to 15; ID 7 is reserved for the adapter. The default startup (boot) SCSI ID is 0 for an internal SCSI hard disk drive in Channel A. Use SCSISelect to view the SCSI IDs of SCSI devices in your server. (See “Using the SCSISelect Utility program” on page 62 for more information.)

If you install wide (16-bit) SCSI devices, you can set the IDs to any number between 0 and 6, or between 8 and 15. If you install narrow (8-bit) SCSI devices, you can set the IDs to any number between 0 and 6.

SCSI logical unit number (LUN)

Each physical device has a physical unit number (PUN) and a logical unit number (LUN). If a physical device supports no logical devices, its LUN is 0. Most SCSI devices support only LUN 0. Certain types of physical SCSI devices (*bridge controllers*) can support more than one logical device.

For example, a printer controller might support up to eight printers. The printer controller is a physical device, and each printer is a logical device. If the printer controller is assigned to ID 2, the ID of the first printer appears in the SCSI device configuration as PUN 2, LUN 0. The IDs of the other printers are PUN 2, LUN 1; PUN 2, LUN 2; on up to PUN 2, LUN 7.

Termination requirements

The SCSI bus must be terminated at both ends only. The UltraSCSI adapter provides termination for one end of the SCSI bus (cable). The SCSI cable comes with a terminator that provides termination for the other end of the SCSI bus. Therefore, any internal SCSI devices that are installed must have their termination set to Disabled.

Installing or removing internal drives

- When you install devices in bays 2, 3, 5, and 6, you must disable the termination for the devices before you install them.
- If you connected external SCSI devices to your server, set the termination for the last device on the external cable to Enabled. See the device documentation for instructions.

If you plan to install both 16-bit (wide) and 8-bit (narrow) SCSI devices:

1. Attach the 16-bit devices at the beginning of the SCSI chain.
2. Attach the 8-bit devices at the end of the SCSI chain.

Note: The beginning of the SCSI chain is the end closest to the SCSI adapter or the system board.

This enables the UltraSCSI adapter to recognize all of the devices in the SCSI chain, and thus ensures proper server operation.

Refer to the instructions that come with the SCSI device for more information about termination.

Preinstallation steps (all bays)

Before you begin, be sure you have:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the documentation that comes with the option.
- Read “Termination requirements” on page 111.
- Verified that you have all cables, drive trays, and any other equipment specified in the documentation that comes with the internal drive.

Before you can install drives in your Netfinity 3000 server, you might need to perform certain preinstallation activities. Some of the steps are required only during the initial installation of an option.

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).

Installing or removing internal drives

2. Choose the bay in which you want to install the drive. (Refer to Table 3 on page 104 for the drive types and sizes available for each bay.)
3. Access the appropriate drive bays.

Notes:

- a. In all models, drive bays 1 and 4 come with drives preinstalled.
- b. In some models, drive bay 6 comes with a drive preinstalled.
- c. Drive bays 2 and 3 have a bay panel installed. Your server might also come with a metal static shield installed in these drive bays.
- d. If you remove a drive that has removable media and you do not intend to install a new drive immediately, reinstall the bay panel for that bay.

To access drive bays 1 through 4, go to “Working with drives in bays 1 through 4” on page 114.

To access drive bays 5 and 6, go to “Working with drives in bays 5 and 6” on page 122.

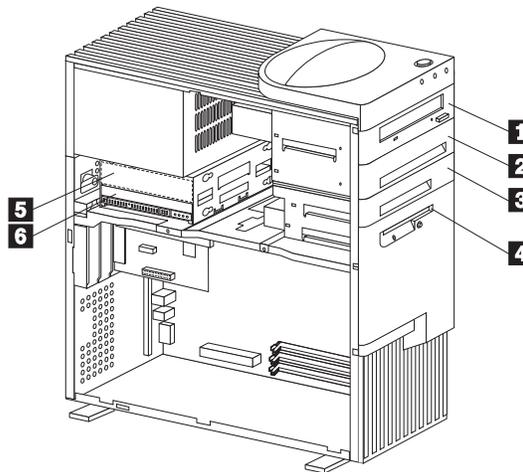
4. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag.
5. Check the instructions that come with the drive, or contact your IBM reseller or IBM marketing representative to see if you need to set any switches or jumpers on the drive, or if you need to attach a tray to the drive.

Installing or removing internal drives

Working with drives in bays 1 through 4

The following illustration shows the server bays.

- | | |
|----------|-------|
| 1 | Bay 1 |
| 2 | Bay 2 |
| 3 | Bay 3 |
| 4 | Bay 4 |
| 5 | Bay 5 |
| 6 | Bay 6 |



Note: The front drive bay assembly is also known as the upper drive bay assembly.

Attention:

The presence of 5 V ac standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before you open the server.

Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Read the instructions that come with the drive that you want to install or replace.
- Position the server as described in “Accessing the system board” on page 78.

Installing or removing internal drives

Installing drives in the front drive bay assembly

This section gives the procedure for installing drives in the front drive bay assembly. If you want to remove a drive from the front drive bay assembly, follow the steps in “Removing drives in the front drive bay assembly” on page 119.

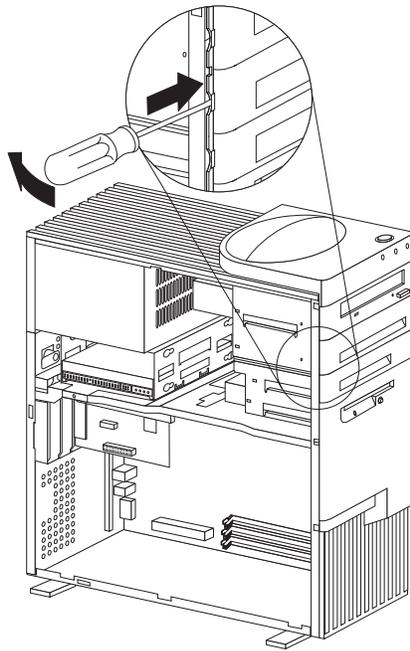
Before you begin:

- Read “Working with drives in bays 1 through 4” on page 114.
- Read the documentation that comes with the drive.

1. Remove the bay panel for the drive bay where you are installing the drive.
 - a. Locate the appropriate bay panel in the front of the server.
 - b. Use the tip of a screwdriver, if necessary, to release the plastic tabs that hold the bay panel at the front of the server.

Installing or removing internal drives

- c. Remove the bay panel.

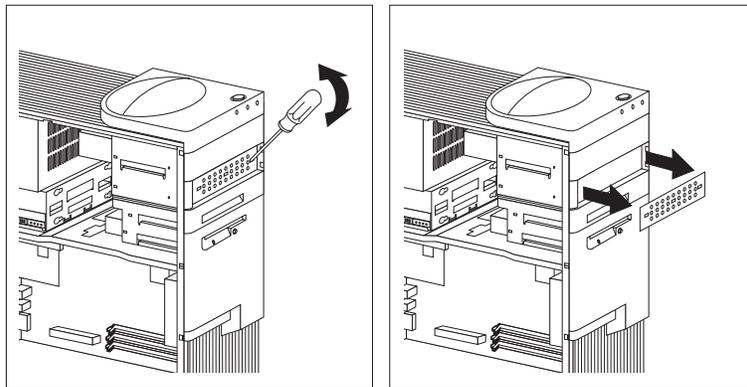


2. If knockouts are present in the drive bay opening, twist them with a screwdriver or pliers to remove.

If your server comes with a metal static shield in the drive bay, remove the shield by pulling out the tabs on the sides of the shield until it flexes. Lift off one side, then the other.

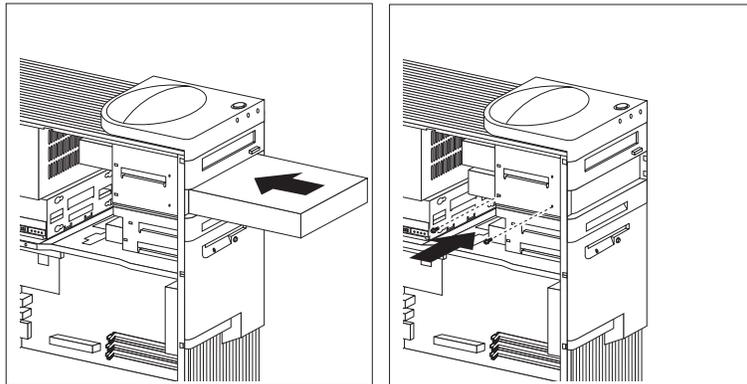
Installing or removing internal drives

The following illustration shows the type of metal static shield that might be installed in bays 2 and 3.



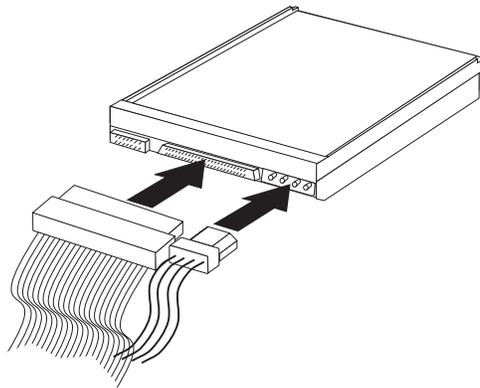
3. Install the drive in the bay opening and secure the drive by inserting screws.

Note: As shown in the following illustration, only two screws are needed to secure the drive within the drive bay.

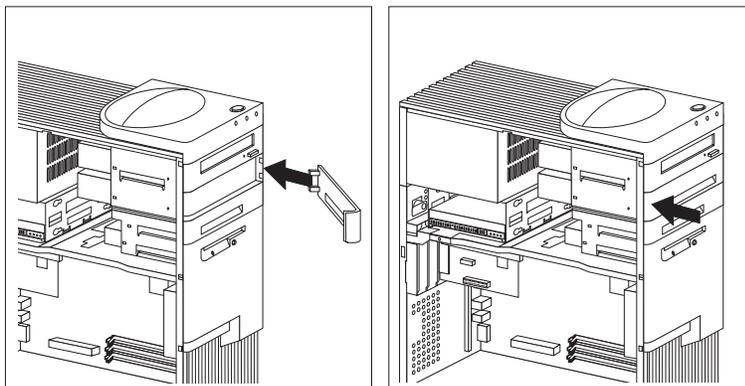


Installing or removing internal drives

4. Attach the cables to the drive. See “ISA and PCI adapters” on page 80 for an illustration that shows the locations of the connectors on the riser card.



5. If the installed drive has nonremovable media, replace the bay panel.



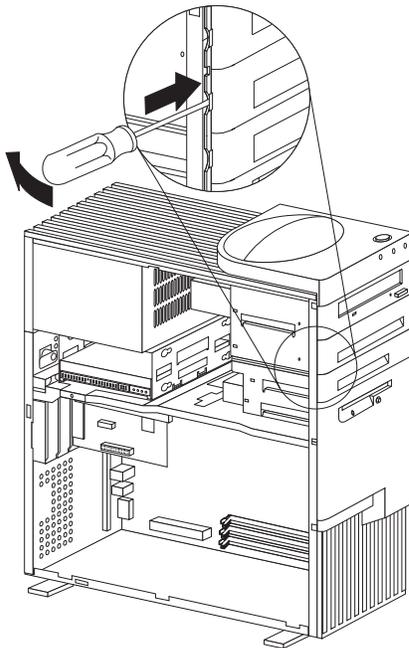
6. If you installed a CD-ROM drive and want to connect the drive to the CD-ROM audio connector, see “ISA and PCI adapters” on page 80 to locate the CD-ROM audio connector on the riser card.
7. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Installing or removing internal drives

Removing drives in the front drive bay assembly

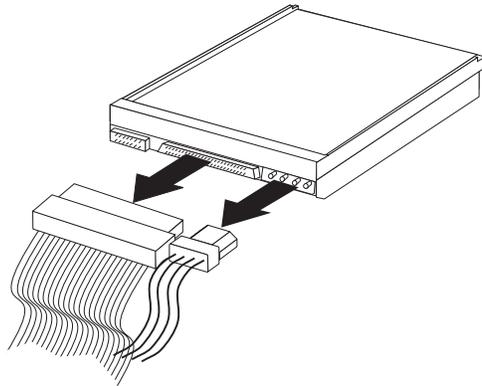
This procedure shows how to remove drives from the front drive bay assembly.

1. If the drive being removed has nonremovable media, remove the bay panel.
 - a. Locate the appropriate bay panel in the front of the server.
 - b. Use the tip of a screwdriver, if necessary, to release the plastic tabs that hold the bay panel at the front of the server.
 - c. Remove the bay panel.

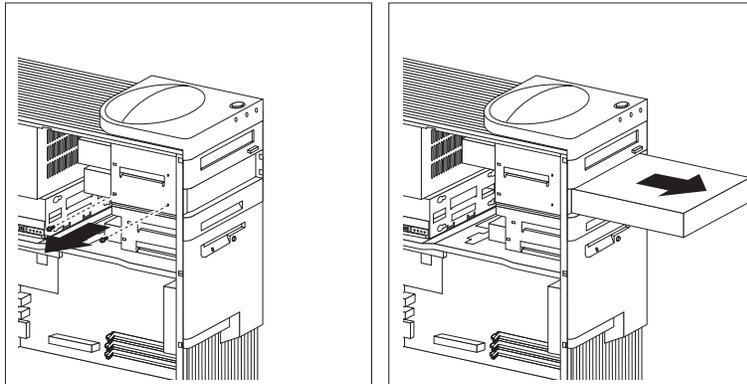


Installing or removing internal drives

2. Disconnect the cables from the drive that you want to remove.

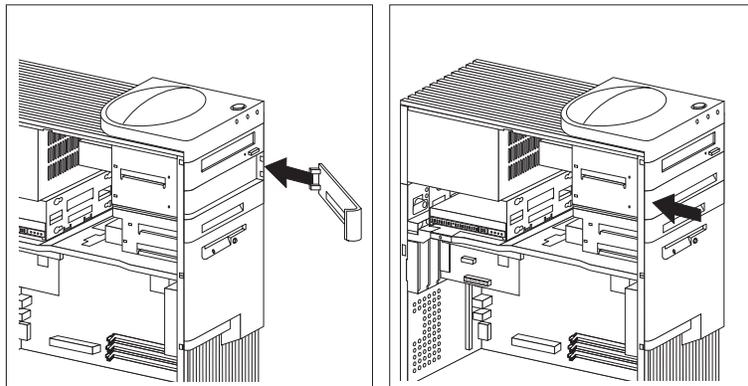


3. Remove the visible screws that hold the drive and slide it out the front of the server.



Installing or removing internal drives

4. If you are not installing another drive, replace the bay panel.



5. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Installing or removing internal drives

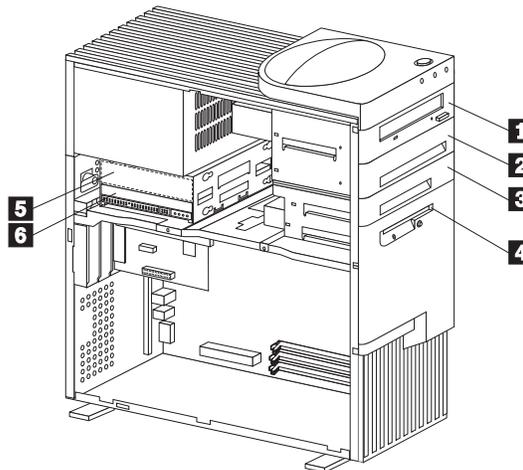
Working with drives in bays 5 and 6

Before you begin:

- Read “Working with drives in bays 1 through 4” on page 114.
- Read the documentation that comes with the drive.

The following illustration identifies the server bays.

- | | |
|----------|-------|
| 1 | Bay 1 |
| 2 | Bay 2 |
| 3 | Bay 3 |
| 4 | Bay 4 |
| 5 | Bay 5 |
| 6 | Bay 6 |

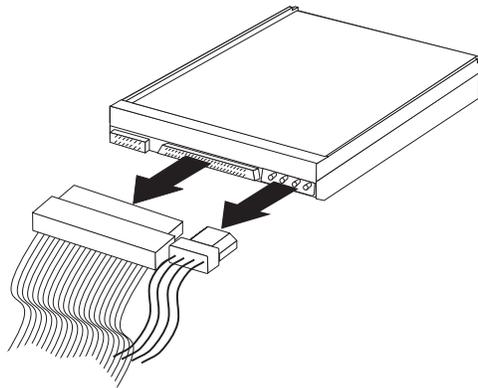


The drives in bays 5 and 6 must have nonremovable media. (In some models, the server comes with a hard disk drive in bay 6.) To install or remove drives in these bays, you must remove the rear (lower) drive bay assembly.

Installing or removing internal drives

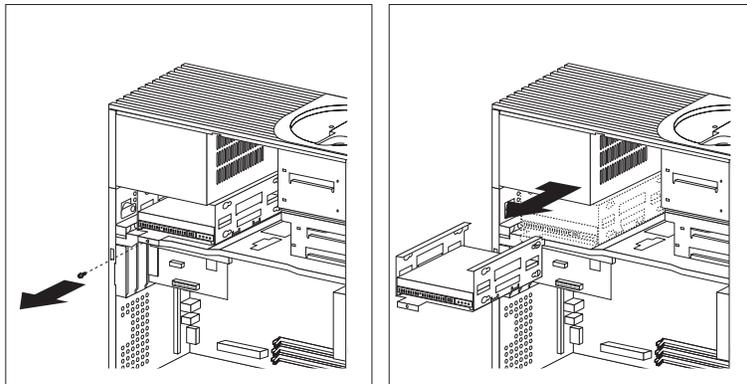
To install or remove drives in bays 5 and 6:

1. If there is a hard disk drive in bay 5 or 6, disconnect the cable from the drive in that bay.



2. Remove the screw that holds the drive bay assembly, and carefully slide the drive bay assembly past the cover lock and out.

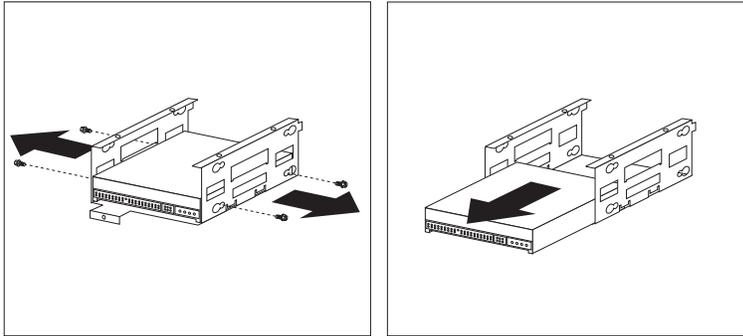
Note: Your drive bay assembly may differ in appearance from the drive bay assembly in these illustrations.



Installing or removing internal drives

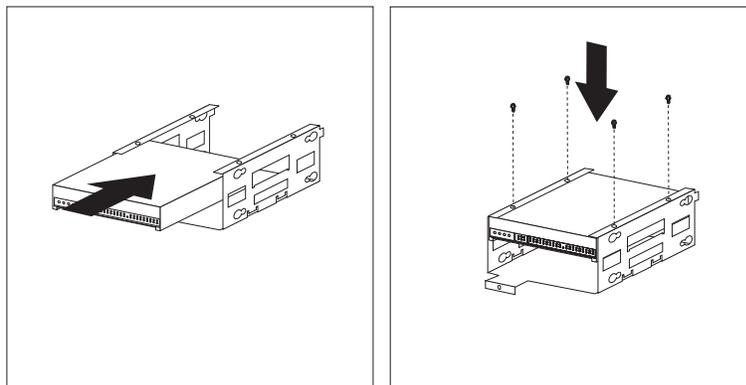
3. If you are removing a drive, remove the screws that hold the drive in the bay assembly and slide the drive out of the bay assembly.

The following illustration shows a drive being removed from bay 6.



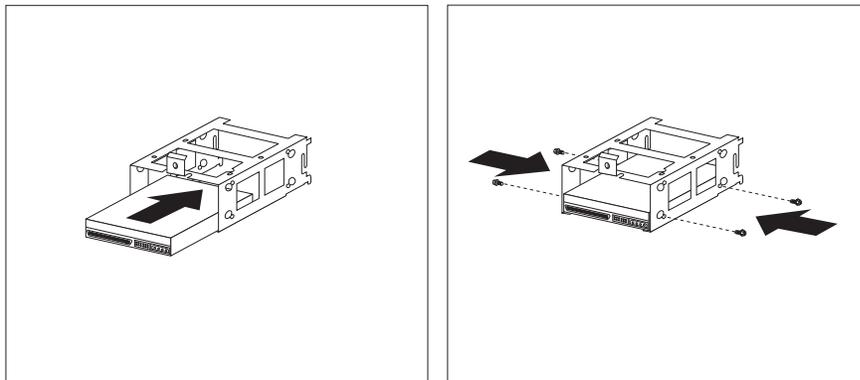
4. When you are installing a drive, turn the drive upside down and slide it into the desired bay. This ensures that the drive connectors will properly align with and attach to the cable connectors (see the illustration in step 5).
5. Secure the drive with the screws (see the following illustration for bay 5, and the next illustration for bay 6).

Bay 5



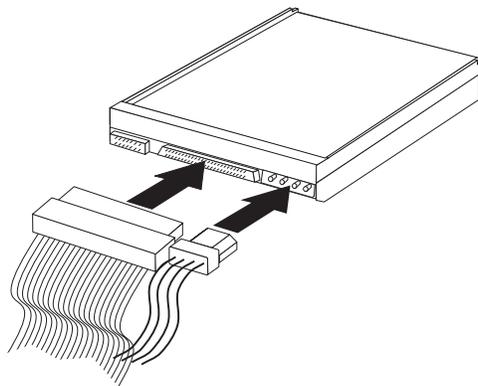
Installing or removing internal drives

Bay 6



Note: When the rubber grommets (washers) are used to attach the drive, you must use the additional screws that are shipped with your server.

6. Reinstall the rear drive bay assembly and secure it with the screw that you removed in step 2 on page 123.
7. Attach the cables to the drive, as shown in the following illustration.



8. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Working with microprocessors

Working with microprocessors

Your server comes with an Intel microprocessor. The speed and type vary by model. For the latest information about microprocessor upgrades available for your server, contact your IBM reseller or IBM marketing representative. If you do upgrade the microprocessor, use the instructions that come with the upgrade along with the instructions in “Installing or replacing microprocessors” on page 127.

The voltage regulator function is built into the system board. This feature supports the microprocessor on the system board.

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

Installing or replacing microprocessors

This section gives the procedure for installing microprocessors. If you want to remove a microprocessor, reverse the order of the following steps.

Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server BIOS. The ServerGuide package software includes IBM Update Connector, which you can use to keep your BIOS and device drivers current. You can also obtain the latest level of BIOS for your server through the World Wide Web and the IBM Personal Computer Company Bulletin Board System (BBS). See Chapter 6, “Getting help, service, and information” on page 229 for the appropriate World Wide Web addresses and bulletin board telephone numbers.
- For a list of supported operating systems, see <http://www.ibm.com/netfinity/> on the World Wide Web.
- Read “Accessing the system board” on page 78.
- Locate the *Flash BIOS Diskette* that you created in “Remote Administration” on page 52.

Note: If you have not already done so, go to <http://www.ibm.com/pc/support/> on the World Wide Web and download the appropriate flash update program. Review the applicable README files, and use this information to create a *Flash BIOS Diskette*. Perform the POST/BIOS (flash) update procedure (see “Remote Administration” on page 52 for additional information).

Attention:

If you select a setting for the frequency switch that is greater than the actual frequency of the microprocessor, you might damage the microprocessor.

Working with microprocessors

Notes:

1. The microprocessor in your server comes with an attached heat sink. The microprocessor plugs into the microprocessor socket on the system board and is stabilized with a plastic bracket attached to the system board.

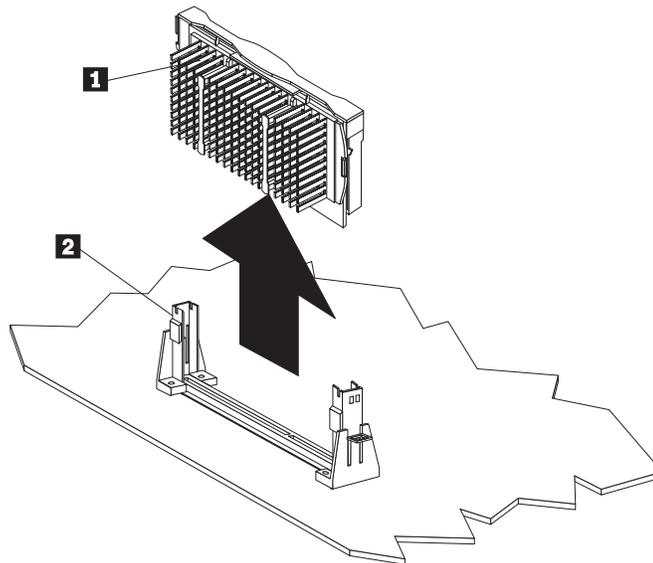
The type of heat sink in your server might be different from the heat sink shown in this section.

2. To locate the microprocessor switch area of the system board, find the rocker switches section of the system-board illustration. See “System Board Illustration” on page 253. For information about the appropriate switch settings, see “Setting the microprocessor speed switches” on page 258, or see the label inside the server.

To install a microprocessor:

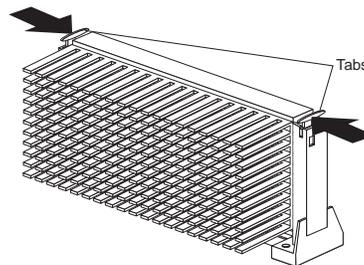
1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Remove the existing microprocessor from its socket.
 - a. Locate the microprocessor socket on the system board. (See the illustration in “System Board Illustration” on page 253.)
 - b. Grasp the middle of the microprocessor adapter **1** and pull straight up, lifting the microprocessor out of the connector **2**.

Working with microprocessors



Note: If the microprocessor has tabs at the upper corners instead of an adapter with a handle, remove it by following these instructions:

- 1) Place your index fingers on the small retainer tabs on the top of the microprocessor.
- 2) Push in toward the microprocessor until the tabs release.

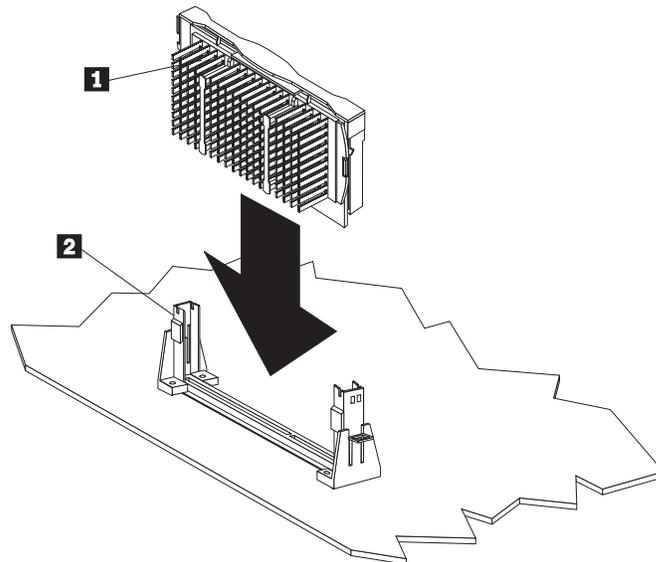


- 3) Lift the microprocessor out of the connector.

Working with microprocessors

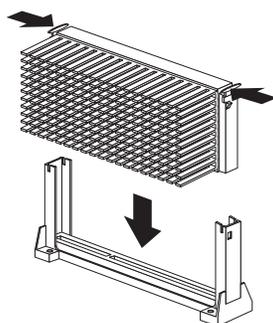
Note: The illustrations in this section might differ slightly from your hardware.

- c. Store the old microprocessor in a static-protective package.
3. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface in the server; then, remove the new microprocessor.
4. Center the microprocessor **1** over the microprocessor connector **2**. Make sure the microprocessor is oriented and aligned correctly.

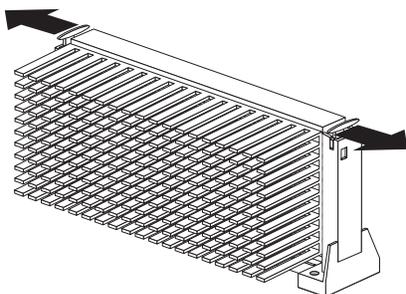


If the microprocessor has tabs at the upper corners instead of an adapter with a handle, press inward on the retainer tabs until they click into place.

Working with microprocessors



5. Press the microprocessor into the connector until it snaps into place and is fully seated in the connector.
6. If the microprocessor has tabs at the upper corners instead of an adapter with a handle, pull outward on the retainer tabs to secure the microprocessor in place.



7. If you replace the microprocessor with one that has a different speed, you must change the switch settings on the system board. To locate the switches, see “System Board Illustration” on page 253. For information about the appropriate switch settings, see “Setting the microprocessor speed switches” on page 258, or see the label inside the server side cover.
8. Go to Table 14 on page 246 to update the microprocessor information; then, return here.
9. If you receive the error code 167 after you install a new microprocessor, run the Flash Utility program. Insert the *Flash*

Working with microprocessors

BIOS Diskette into the primary diskette drive and run the flash program. Follow the instructions in the program.

Note: If you have not already done so, go to <http://www.ibm.com/pc/support/> on the World Wide Web and download the appropriate flash update program. Review the applicable README files, and use this information to create a *Flash BIOS Diskette*. Perform the POST/BIOS (flash) update procedure (see “Remote Administration” on page 52 for additional information).

For additional information on error code 167, see “POST message table” on page 169.

10. Because you installed a new microprocessor in your server, you must reconfigure your server. Follow the procedure described in “Using the Configuration/Setup Utility program” on page 39.
Refer to your operating-system documentation. You might need to make changes so that the operating system recognizes the new microprocessor.
11. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the installation” on page 148.

Connecting external options

Some examples of the external options that you can connect to the server include SCSI drives and storage enclosures, printers, modems, and other serial and parallel devices.

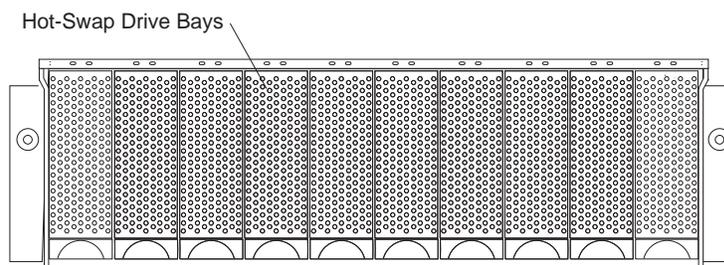
To attach an external option:

1. Turn off the server and all attached devices.
2. Follow the instructions that come with the option and the information in this section to connect it to the server.

The information in this section supplements the instructions that come with the external option. Use the instructions that come with the option to prepare it for installation.

Adding a hot-swap storage expansion enclosure

You can connect a storage enclosure to the external SCSI connector on the separately installed SCSI adapter. Contact your IBM reseller or IBM marketing representative for additional information.



Adding external SCSI devices

The internal SCSI connector provides support for SCSI devices installed inside the server. The external SCSI connector provides support for external SCSI devices. The UltraSCSI adapter can support a maximum of 15 devices.

Connecting external options

Notes:

- If you plan to install both internal and external SCSI devices, you must follow the instructions given in “Installing or removing internal drives” on page 102 in addition to the instructions in this section. Read “Installing or removing internal drives”; then, return here.

For additional information about SCSI configurations supported, see <http://www.ibm.com/netfinity/>

- If your server comes with a SCSI adapter, it also comes with a wide (16-bit) SCSI cable that supports 16-bit devices. If you want to attach narrow (8-bit) devices to your server, you must purchase a SCSI 68-pin to 50-Pin Converter that will enable the connection of the device to the cable that comes with your server.
- It is good practice not to exceed the following cable-length guidelines:
 - If you connect one or more UltraSCSI devices to the UltraSCSI adapter, do not exceed 1.5 meters (5 feet) total length for all cables (internal and external).
 - If you connect only Fast SCSI devices to the UltraSCSI adapter, do not exceed 3 meters (10 feet) total length for all cables (internal and external).

Attention:

In addition to cable length and the number of installed devices, you must consider other factors that limit the performance of the SCSI subsystem. For example, if you install UltraSCSI devices in an external expansion enclosure that is limited to Fast transfer rates, or if you exceed the previously described cable-length guidelines, the transfer rate to all SCSI devices must be limited to Fast or standard transfer rates. You accomplish this by using the SCSISelect Utility program. See “Using the SCSISelect Utility program” on page 62 for additional information.

If you plan to attach an external SCSI device, you must order an additional SCSI cable. That is, to use an external device with the Netfinity 3000 server, you must connect it to the external SCSI

Connecting external options

connector, using a SCSI cable. This SCSI cable must have the proper connector for the SCSI external connector on one end, and the proper connector for the external device on the other end. To select and order the correct SCSI cable for use with the external device, contact your IBM reseller or IBM marketing representative.

Serial port connectors

Serial ports are used to communicate with printers, plotters, external modems, auxiliary terminals, and other computers. Your server provides two serial ports (1 and 2). You can add more serial ports by installing a serial adapter in one of the expansion slots.

Serial ports transfer data *asynchronously*; they can transmit any number of bits at any time, with no restriction on the duration of the pauses between characters.

The serial ports transmit and receive data and commands at a rate of 300 bits per second (bps) up to 115 200 bps. The bits-per-second measurement is commonly referred to as the *baud rate*.

Connecting external options

Both of the serial connectors on your server use a 9-pin, D-shell connector.

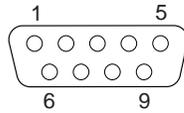


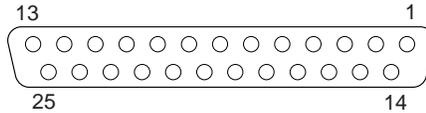
Table 4 shows the pin-number assignments for the serial port connectors. The pin-number assignments conform to the industry standard.

| Pin | Signal | Pin | Signal |
|------------|---------------------|------------|-----------------|
| 1 | Data carrier detect | 6 | Data set ready |
| 2 | Receive data | 7 | Request to send |
| 3 | Transmit data | 8 | Clear to send |
| 4 | Data terminal ready | 9 | Ring indicator |
| 5 | Signal ground | | |

Connecting external options

Parallel port connector

Parallel ports are used to communicate with printers and other devices, such as some CD-ROM and tape drives. Your server provides one 25-pin, D-shell connector on the back of the server.



This parallel port connector conforms to the Institute of Electrical and Electronics Engineers (IEEE) Standard 1284. There are three standard modes of operation:

- Standard Parallel Port (SSP)
- Enhanced Parallel Port (EPP)
- Extended Parallel Port (ECP)

Table 5 shows the pin-number assignments for the parallel port connector. The signal names for all three modes are shown. SSP and ECP signal names are the same; EPP signal names that are different are shown in parentheses.

| Pin | Signal | Pin | Signal |
|-----|------------------|-----|-------------------|
| 1 | -STROBE (-WRITE) | 14 | -AUTO FD (-DSTRB) |
| 2 | Data 0 | 15 | -ERROR |
| 3 | Data 1 | 16 | -INIT |
| 4 | Data 2 | 17 | -SLCT IN (-ASTRB) |
| 5 | Data 3 | 18 | Ground |
| 6 | Data 4 | 19 | Ground |
| 7 | Data 5 | 20 | Ground |
| 8 | Data 6 | 21 | Ground |
| 9 | Data 7 | 22 | Ground |
| 10 | -ACK | 23 | Ground |
| 11 | BUSY (-WAIT) | 24 | Ground |
| 12 | PE | 25 | Ground |
| 13 | SLCT | | |

Connecting external options

Video port connector

The video port is where you can attach a video monitor to your Netfinity 3000 server. Your server provides a 15-pin video port connector.

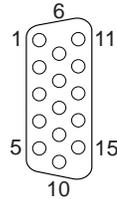


Table 6 shows the pin-number assignments for the video port connector.

| Pin | Signal |
|------------|------------------------------------|
| 1 | Red |
| 2 | Green or monochrome |
| 3 | Blue |
| 4 | Not connected |
| 5 | Ground |
| 6 | Red ground |
| 7 | Green ground or monochrome ground |
| 8 | Blue ground |
| 9 | Reserved |
| 10 | Ground |
| 11 | Not connected |
| 12 | Display data channel (DDC data) |
| 13 | Horizontal synchronization (Hsync) |
| 14 | Vertical synchronization (Vsync) |
| 15 | Display data channel (DDC clock) |

Connecting external options

Keyboard and mouse connectors

Your server provides one keyboard port and one auxiliary-device port. An auxiliary device can be a mouse or other pointing device. Your server provides two 6-pin port connectors.

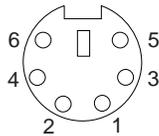


Table 7 shows the pin-number assignments for the keyboard and auxiliary-device port connectors.

| <i>Table 7. Keyboard and auxiliary-device port connectors pin-number assignments</i> | |
|--|---------------|
| Pin | Signal |
| 1 | Data |
| 2 | Not connected |
| 3 | Ground |
| 4 | +5 V dc |
| 5 | Clock |
| 6 | Not connected |

Connecting external options

SCSI connectors

If your server comes with a 16-bit UltraSCSI adapter installed, the information in this section about SCSI connectors applies to your server. The 16-bit UltraSCSI adapter adapter has two 68-pin, high-density connectors (one internal and one external). You can use these connectors to install internal SCSI devices in your server and to attach external SCSI devices to your server.

Note: The 50-pin SCSI connector is not supported.

See “SCSI drives (if your server model comes with a SCSI adapter)” on page 110 for additional information about the SCSI subsystem.

Internal SCSI connector

A 4-drop, 68-pin (16-bit) cable is installed in your server. This cable is connected to the internal connector for the 16-bit UltraSCSI adapter. You can use this cable to install additional SCSI devices in your server. A hard disk drive might also be installed in bay 6, depending on the model of your Netfinity 3000 server.

For information about termination requirements, see “Termination requirements” on page 111.

External SCSI connector

You can attach external SCSI devices to the 16-bit, 68-pin external SCSI connector that is located on the rear of your server.

Connecting external options

Table 8 shows the pin-number assignments for the 68-pin SCSI connectors.

Table 8. The 68-pin SCSI port connector pin-number assignments

| Pin | Signal | Pin | Signal |
|-----|----------------|-----|----------------|
| 1 | Ground | 35 | Data 12 |
| 2 | Ground | 36 | Data 13 |
| 3 | Ground | 37 | Data 14 |
| 4 | Ground | 38 | Data 15 |
| 5 | Ground | 39 | Data P1 |
| 6 | Ground | 40 | Data 0 |
| 7 | Ground | 41 | Data 1 |
| 8 | Ground | 42 | Data 2 |
| 9 | Ground | 43 | Data 3 |
| 10 | Ground | 44 | Data 4 |
| 11 | Ground | 45 | Data 5 |
| 12 | Ground | 46 | Data 6 |
| 13 | Ground | 47 | Data 7 |
| 14 | Ground | 48 | Data P0 |
| 15 | Ground | 49 | Reserved |
| 16 | Ground | 50 | -PRSN |
| 17 | Terminal power | 51 | Terminal power |
| 18 | Terminal power | 52 | Terminal power |
| 19 | Reserved | 53 | Reserved |
| 20 | Ground | 54 | Ground |
| 21 | Ground | 55 | -Attention |
| 22 | Ground | 56 | Ground |
| 23 | Ground | 57 | -Busy |
| 24 | Ground | 58 | -Acknowledge |
| 25 | Not connected | 59 | -Reset |
| 26 | Ground | 60 | -Message |
| 27 | Ground | 61 | -Select |
| 28 | Ground | 62 | -Control/Data |
| 29 | Ground | 63 | -Request |
| 30 | Ground | 64 | -Input/Output |
| 31 | Ground | 65 | Data 8 |
| 32 | Ground | 66 | Data 9 |
| 33 | Ground | 67 | Data 10 |
| 34 | Ground | 68 | Data 11 |

Connecting external options

Universal serial bus (USB) ports

The universal serial bus (USB) is an emerging serial interface standard for telephony and multimedia devices. Each USB port is a single connector for devices that previously used serial, parallel, keyboard, mouse, and game ports. USB technology uses Plug and Play to determine which type of device has been attached to the connector. Each USB device is accessed by a unique USB address. A device called a hub is used to convert a single USB connector into multiple attachment points. A hub has multiple ports where peripherals can be attached. USB provides 12 megabits-per-second (Mbps) bandwidth with a maximum of 63 peripherals and a maximum signal distance of five meters per segment.

Note: If more than one USB device is to be attached, the device must be connected to a hub. Your Netfinity 3000 server does not support a keyboard attached to the system USB port.

Your Netfinity 3000 server comes with two USB ports. Table 9 shows the pin-number assignments for the USB port connectors.

| Pin | Signal |
|------------|---------------|
| 1 | VCC |
| 2 | -Data |
| 3 | +Data |
| 4 | Ground |

Connecting external options

Ethernet connector

The system board in your Netfinity 3000 server contains an Ethernet *controller*. The controller has an external RJ-45 connector on the rear of the server that is used with a Category 5 twisted-pair cable. Through this connector, you can attach an Ethernet network cable to the internal transceiver in your server.

Attention:

The 10BASE-T Ethernet and the 100BASE-TX Fast Ethernet cabling in the network must be Category 5 or higher to meet various standards, including electromagnetic compatibility.

See “Configuring the Ethernet controller” on page 59 for additional information about the Ethernet controller.

Table 10 shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

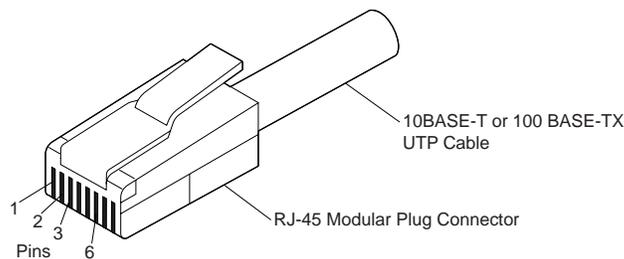


Table 10. Ethernet connector pin-number assignments

| Pin | Signal | Pin | Signal |
|-----|----------------|-----|---------------|
| 1 | Transmit data+ | 5 | Reserved |
| 2 | Transmit data- | 6 | Receive data- |
| 3 | Receive data+ | 7 | Reserved |
| 4 | Reserved | 8 | Reserved |

Adding security options

Adding security options

Security features can help to protect your server data and programs from unauthorized access and use, and help to physically protect your server from theft and tampering. After you determine your system security needs, you can activate or implement the appropriate security features.

To control access to the information in your server databases, you can implement security measures through your system configuration programs. These features include defining two levels of password protection, restricting diskette access, and defining a system owner's name. Implementing these security measures helps you to ensure the integrity of the data and programs that are stored in your server. See "System Security" on page 43 for details.

To prevent writing to a diskette in a diskette drive, set the diskette write-protect switch, as described in "Setting the diskette write-protect switch" on page 268.

To erase lost or forgotten passwords, you can move the CMOS clear (password) jumper on the system board.

To control access to other hardware components in your server, you can install several types of optional devices. These options include:

- U-bolt
- Security cable
- Padlock

The following section discusses these security options.

Installing a U-bolt and security cable

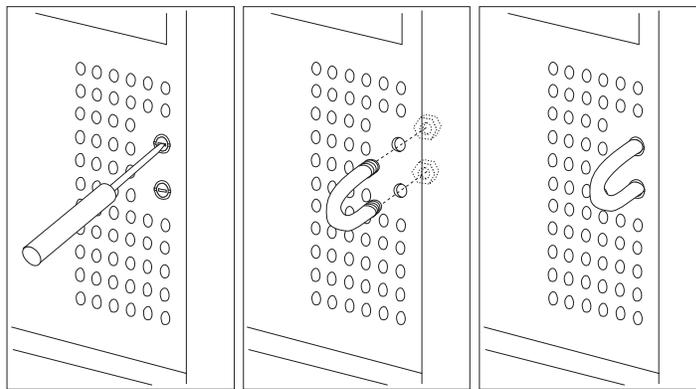
You can help to deter unauthorized removal of your Netfinity 3000 server by installing a U-bolt and security cable on the rear of your server. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

Before you begin:

- Obtain the following:
 - A flat-blade screwdriver
 - An adjustable wrench
 - A 19 mm (3/4 in.) U-bolt or wire rope (similar to National Manufacturing No. 3230, Stock No. 176-735)
 - Threaded nuts that fit the U-bolt
 - A security cable
 - A lock, such as a combination lock or padlock
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.

Adding security options

1. Remove the server side cover (see “Disconnecting cables and removing the side cover” on page 74).
2. Locate the two holes on the lower right edge of the rear of the server.
3. Insert the U-bolt through the rear panel; then, attach and tighten the nuts with an appropriately sized or adjustable wrench.

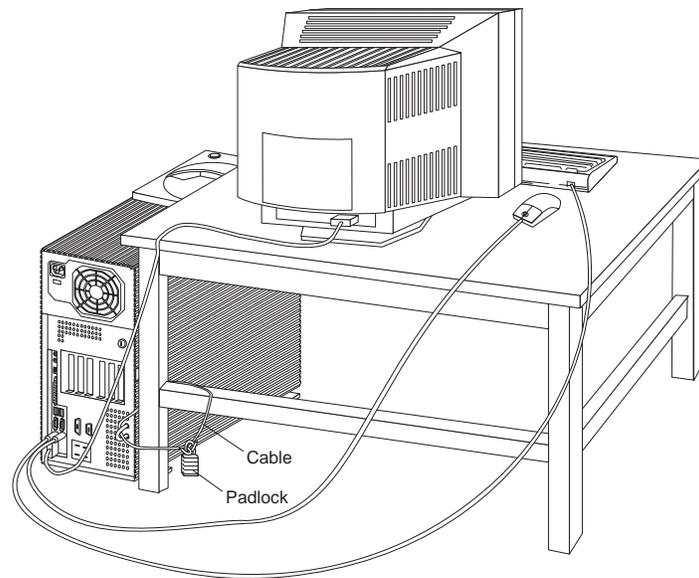


4. If you have completed installing the U-bolt and do not want to install any other internal options, replace the server side cover and reconnect all external cables and power cords. (See “Completing the installation” on page 148 if you need additional information.)

Adding security options

5. Thread the cable through the U-bolt and around an object that is not a part of or permanently secured to the building structure or foundation, and from which it cannot be removed; then, fasten the cable ends together with a lock.

The following illustration shows an example of how this might work.



Completing the installation

Completing the installation

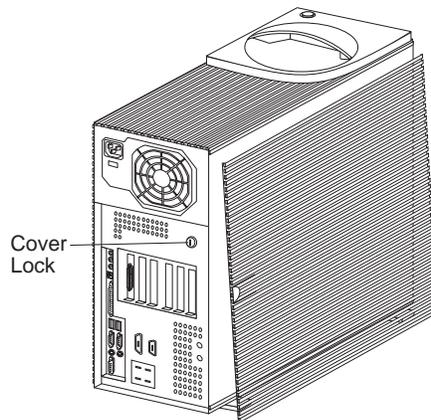
Before you begin:

- Complete all the installation procedures for the internal options that you have chosen to install.
- Read “Electrical safety” on page 70.

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Clear any cables that might impede the replacement of the cover.
3. Place the server in an upright position, and ensure that the stabilizer feet are positioned correctly. For more information, see “Using the stabilizing feet” on page 23.

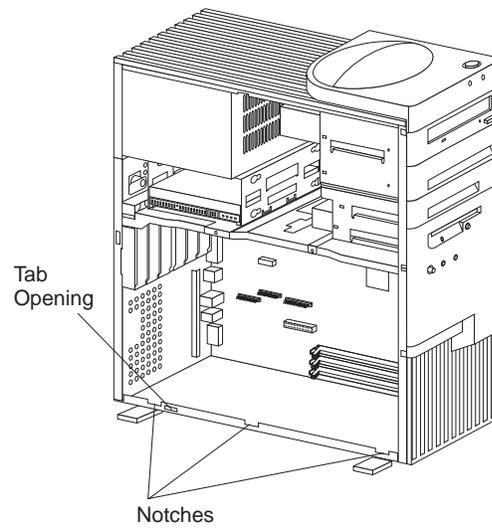
Note: It is easier to install the cover if the server is placed in an upright position.

4. Install the side cover:
 - a. Make sure that the cover lock (if present) is in the unlocked position.

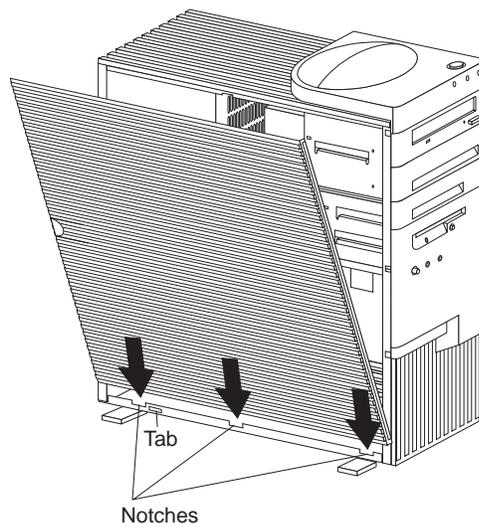


Completing the installation

- b. Align the three bottom cover guides with the corresponding notches on the frame of the server.

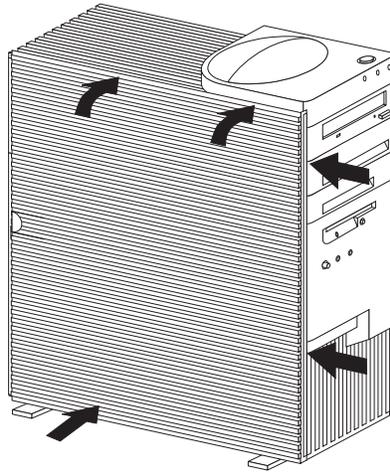


- c. Insert the bottom cover tab into the tab opening.

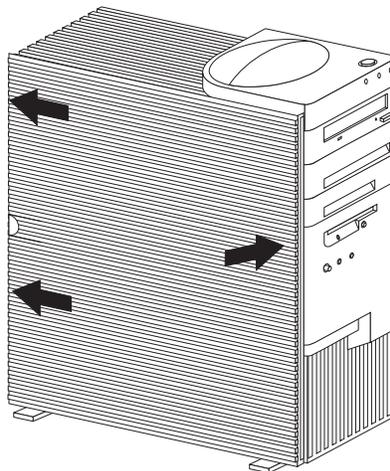


Completing the installation

- d. With one hand, align the top so that the cover rests against the server. With the other hand, press the cover at the bottom left corner, above the left rotated foot.



- e. Keep the hand at the top to hold the cover in place. Use the thumb from the other hand to slide the cover as shown in the following illustration. Make sure that the cover is latched into position.



Completing the installation

5. If a cover lock is present, go to the back of the server and lock the cover.

You can use the cover lock and keys to secure the outside cover. For more information about the keys for the cover lock, see “Recording the identification numbers” on page 244.

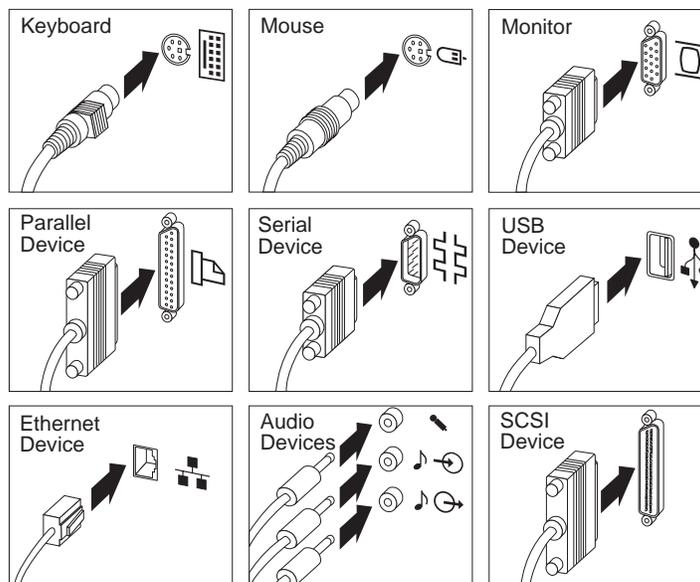
7



CAUTION:

When the power cord bracket option is installed on the power cord, the server must be plugged to a power source that is easily accessible.

6. Reconnect the cables to the back of the server; then, plug the power cords into properly grounded electrical outlets.



Completing the installation

7. If you have a modem or fax machine attached to the server, and you are not in the United Kingdom, reconnect the telephone line to the wall outlet and the server, and plug the power cords into properly grounded electrical outlets.
If you are in the United Kingdom, plug in the power cords first; then, connect the telephone line to the wall outlet and the server.
8. Turn on the server and all attached devices.

Attention:

To allow for air circulation, be sure to maintain the following minimum clearances around the server:

- 102 mm (4 in.) in the front
- 127 mm (5 in.) in the rear
- 51 mm (2 in.) on the left and right sides

What to do next?

When you have completed installing the covers and cables, go to “Updating the server configuration” on page 153.

Updating the server configuration

Attention:

The configuration information in this section applies to installing options. For more information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.

When you start your server for the first time after you add, remove, or replace an internal option or an external SCSI device, a message might appear, indicating that the configuration has changed. The configuration settings must be updated. This reconfiguration is performed automatically by the server or *manually* by you. When the server automatically configures an option, it uses system programs. However, you must save the new settings through the Configuration/Setup Utility program. If the system programs do not update the settings, you can use the Configuration/Setup Utility program to reconfigure the appropriate settings.

For example, when you start your server after adding memory or after adding most internal hard disk drives, the settings are automatically updated, and you use the Configuration/Setup Utility program to save those changes. However, if a resource conflict arises after an ISA legacy adapter is installed or removed, you must manually update the server configuration and save the information.

Notes:

1. If an error message related to the chassis-intrusion detector appears after you restart your server, you must enter the administrator password. Note that chassis intrusion can be detected only if the chassis-intrusion detector feature is activated, which occurs when enhanced security is enabled and an administrator password is set.
2. If you remove a SCSI device, the server might not recognize any SCSI devices that are still connected. See Chapter 5, “Solving problems” for information about correcting this situation.
3. To run the Configuration/Setup Utility program, follow the instructions in “Using the Configuration/Setup Utility program” on page 39.

4. When you add a hard disk drive and you want to include it in your startup sequence, use the **Start Options** selection of the Configuration/Setup Utility program (see “Start Options” on page 42).
5. When you install an ISA legacy adapter, you must allocate system resources to support it (see “ISA Legacy Resources” on page 55).
6. Make a record of all customized settings before you make any changes.
7. For more information on handling resource conflicts, see “Resolving configuration conflicts” on page 57.

Record the new configuration information in Chapter 7, “Server records and specifications” on page 243.

You might need to install device drivers after you install or replace options, or after you update the configuration settings. See the instructions that come with the option to determine if device drivers are required, and, if so, how to install them. In most situations, the ServerGuide software automatically installs your device drivers during the operating system installation process. Also, the video, SCSI, and Ethernet device drivers are on the IBM ServerGuide CDs. Refer to your ServerGuide documentation for instructions on configuring hardware and installing a network operating system.

If you do not need to install any device drivers, or update or save the system configuration, your server is ready to use.

Network operating system instructions

If you do not use the ServerGuide software to install your network operating system (NOS), you must download system-specific NOS installation instructions and download device drivers.

To obtain system-specific NOS installation instructions and the latest device drivers, access the IBM Web site at <http://www.ibm.com/pc/support>

Note: If you are outside the United States, access the IBM Web site at <http://www.ibm.com/pc> and select a country-specific Web site.

Chapter 5. Solving problems

This chapter describes the diagnostic tools that are available to you. You can use these tools to identify and correct problems that might occur as you use your server. This chapter also contains information about Option Diskettes.

This chapter contains:

| | |
|---|-----|
| Diagnostic tools overview | 158 |
| Diagnostic test programs | 159 |
| Power-on self-test (POST) | 160 |
| POST beep codes | 161 |
| Error messages | 161 |
| Troubleshooting charts | 162 |
| Installing files from Option Diskettes | 163 |
| Running the diagnostic test programs | 164 |
| Power-on self-test (POST) messages | 165 |
| POST message table | 169 |
| Power-on self-test (POST) beep codes | 192 |
| POST beep code tables | 193 |
| SCSI messages | 194 |
| SCSI message table | 194 |
| Ethernet controller messages | 196 |
| Troubleshooting | 200 |
| Troubleshooting charts | 200 |
| Troubleshooting the 10/100 Mbps Ethernet controller | 217 |
| Checking the system for damage | 222 |
| After dropping it | 222 |
| After spilling liquid on it | 223 |
| Replacing the battery | 224 |

Diagnostic tools overview

Diagnostic tools overview

Server problems can be caused by the hardware, the software, or a user error. An example of a user error is pressing the wrong key on the keyboard.

You can check the hardware by using the diagnostic test programs and the information in this chapter.

Notes:

1. Some hardware and software errors are caused by configuration conflicts. For information on handling these situations, see “Resolving configuration conflicts” on page 57.
2. When running the diagnostic test programs, a single problem can cause several error messages to occur. When this happens, work to correct the cause of the first error message. After the cause is corrected, the other error messages probably will not occur the next time that you run the tests.

If the hardware is OK and you have not made an error, you might have a software problem. If you suspect that you have a software problem, refer to the information that comes with that software package.

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

- Diagnostic test programs
- Power-on self-test (POST)
- POST beep codes
- Error messages
- Troubleshooting charts
- Option Diskettes

Descriptions of these tools follow.

Diagnostic test programs

IBM provides programs that you can run to diagnose hardware and some software problems. Several utility programs that provide helpful information about your server are also included. One of these programs provides the user interface for running these diagnostic and utility programs.

The server diagnostic test programs are stored on the *IBM Enhanced Diagnostics* CD that comes with your server. These programs are the primary method of testing the system board, memory, and other standard features of your Netfinity 3000 server. You can also use them to test some external devices.

Also, if you cannot determine whether a problem is caused by the hardware or by the software, you can run the test programs to confirm that the hardware is working properly.

The IBM Enhanced Diagnostics programs will isolate your server hardware from software that you have installed on your hard disk. The programs run independently of the operating system, and *must be run either from CD or diskette*. This method of testing is generally used when other methods are not accessible or have not been successful in isolating a problem suspected to be hardware related.

The server diagnostic test programs can identify most problems associated with major components of your server: the system board, Ethernet controller, video adapter or controller, random-access memory (RAM), diskette drive, CD ROM drive, hard disk drive, serial port, parallel port, keyboard, and mouse.

In addition to the server test programs, the *IBM Enhanced Diagnostics* CD contains utility programs that provide information about your server hardware, including the hardware configuration. This information might be useful in helping to isolate problems related to the operating system and device drivers.

The *IBM Enhanced Diagnostics* CD also contains additional diagnostic programs for non-IBM devices.

Diagnostic tools overview

See “Running the diagnostic test programs” on page 164 for information on running the diagnostic programs that come with your server.

Power-on self-test (POST)

When you turn on the server, it performs a series of tests to check the operation of server components and some options. This series of tests is called the power-on self-test, or POST.

POST does the following:

- Checks the operation of some basic system-board operations
- Checks the memory operation
- Compares the current server configuration with the stored server configuration information
- Configures PCI adapters
- Starts the video operation
- Verifies that the drives (such as the diskette, CD-ROM, and hard disk drives) are connected properly

If **Power-On Self-Test** is set to [**Enhanced**], numbers that show the amount of memory being tested appear in the top-left corner of the screen until the total amount of memory in the system is reached. Options for running a quick POST or accessing the Configuration/Setup Utility program appear in the lower-left corner of the screen. Quick mode is the default mode of operation. To change the mode to [**Enhanced**], select **Start Options** from the Configuration/Setup Utility program menu and follow the prompts on the screen.

Note: The amount of available memory shown might be somewhat less than expected because of BIOS shadowing in RAM.

If POST finishes without detecting any problems, the first screen of your operating system or application program appears (if you have not set a power-on password). If you have set a power-on password, a password prompt appears. You must enter your password before the first screen of your operating system or application program will appear. (For further information on using passwords, see “System Security” on page 43.)

Diagnostic tools overview

If **Power-On Status** is set to **[Enabled]** and POST detects a problem, you will hear multiple beeps or no beep. In most cases, an error code appears in the top left corner of the screen, and in some cases, a description of the error is displayed beside the code. (Note that the screen will sometimes display multiple error codes and descriptions.) For more information about what caused an error message to appear and what action to take, see “Power-on self-test (POST) messages” on page 165 and “POST message table” on page 169.

POST beep codes

If **Power-On Status** is set to **[Enabled]**, POST also generates beep codes to indicate successful completion or the detection of an error.

- The startup of the operating system or application program indicates successful completion of POST.
- More than one beep indicates that POST detected an error. For more information, see “Power-on self-test (POST) beep codes” on page 192.

Error messages

Error messages indicate that a problem exists; they are not intended to be used to identify a failing part. Troubleshooting and servicing of complex problems indicated by error messages should be performed by a trained service technician.

Hardware error messages that occur can be text, numeric, or both. Messages generated by your software generally are text messages, but they also can be numeric.

Diagnostic tools overview

POST error messages and beep codes

POST error messages and beep codes occur during startup when POST finds a problem with the hardware or detects a change in the hardware configuration. POST error messages are 3-, 4-, 5-, 8-, or 12-character alphanumeric messages and include brief explanations (except I999xxxx errors).

For more information about what caused an error message to appear and what action to take, see “Power-on self-test (POST) messages” on page 165 and “POST message table” on page 169. Also see “Power-on self-test (POST) beep codes” on page 192.

SCSI error messages

These messages appear if a problem or conflict is detected by the SCSI subsystem. Refer to the SCSI documentation in the ServerGuide package that comes with your server for information about these messages.

Diagnostic error messages

Diagnostic error messages occur when a test finds a problem with the server hardware. The messages present text information that can be used to identify a failing part. These error messages are alphanumeric. Follow the instructions on the screen.

Software-generated error messages

These messages occur if a problem or conflict is found by an application program, the operating system, or both. Error messages for operating-system and other software problems are generally text messages, but they also can be numeric messages. For information about these software error messages, refer to the information that comes with the operating system or application program, or both.

Troubleshooting charts

The charts under “Troubleshooting charts” on page 200 list symptoms of problems (for example, a symptom might be “The mouse is not working.”), along with steps to correct the problems.

Installing files from Option Diskettes

An optional device or adapter might come with a diskette. Diskettes that are included in option packages usually contain files that the system needs for recognizing and activating the options. Until you install the necessary files, the new device or adapter might cause error messages.

If your optional device or adapter comes with a diskette, you might need to install some configuration (.CFG) files or diagnostic files (.EXE or .COM) from the diskette to your hard disk. Refer to the documentation that comes with the option to see if you need to install files.

Running the diagnostic test programs

Note: See “Diagnostic test programs” on page 159 for a description of the diagnostic programs that come with your server.

Attention:

Do not discard the *Enhanced Diagnostics* CD. Store it in a safe place for later use.

Make a backup copy of the *Enhanced Diagnostics* CD information on a diskette. To do this:

1. Insert the *Enhanced Diagnostics* CD into the CD-ROM drive and restart the system.
2. Select **Make IBM Diagnostic Diskette** from the Enhanced Diagnostic menu.
3. Follow the instructions on the screen. Use a blank, 3.5-inch, formatted 2 MB diskette in diskette drive A.

To start the IBM Enhanced Diagnostics using your *Enhanced Diagnostics* CD, do the following:

1. Turn off your server and any attached devices.
2. Insert the *IBM Enhanced Diagnostics* CD into the CD-ROM drive.
3. Turn on all attached devices; then, turn on your server.
4. Follow the instructions on the screen.

Power-on self-test (POST) messages

If you receive an error message during the power-on self-test (POST), completing the steps outlined in this section might enable you to resolve the problem.

Note: If you have just added, removed, or changed the location of a device and you receive an error message, you must reconfigure your server. Follow the procedure described in “Using the Configuration/Setup Utility program” on page 39. If the procedure in “Using the Configuration/Setup Utility program” on page 39 does not eliminate the error message, then proceed with the following instructions.

1. Write down all error code numbers and descriptions that appear on the screen as you start your server. (Note that a single problem can cause several error messages to appear. When you correct the cause of the first error message, the other error messages probably will not appear on the screen the next time that you turn on your server.)
2. If you have set a power-on password and have the password prompt set to On or Dual, a password prompt appears. If you have set both power-on and administrator passwords, you can type either of the passwords at the password prompt. However, if you think you might need to change any settings in the Configuration/Setup Utility program, you must type your administrator password at the password prompt. If you type your power-on password, you will be able to view the error codes and error code descriptions that are displayed on the POST Startup Errors screen; you will also be able to view limited information in the Configuration/Setup Utility program. However, you will not be able to change any settings.
3. In the case of most errors, the Configuration/Setup Utility program starts automatically so that you can attempt to identify and correct the problem. When the Configuration/Setup Utility program starts, a screen titled POST Startup Errors appears. (Note that the POST Startup Errors screen does not appear immediately. You must wait approximately one minute.) If the POST Startup Errors screen does not appear, proceed to step 6 on page 168.

POST Messages

4. At the POST Startup Errors screen, select **Continue** if you want to access the Configuration/Setup Utility program menu. Select **Exit Setup** if you want to exit from the Configuration/Setup Utility program. (For more information on exiting from the Configuration/Setup Utility program, go to the **Attention:** section that follows step 5d.) To select an item, press the Up Arrow (↑) or Down Arrow (↓) key to highlight the item; then, press **Enter**.
5. If you selected **Continue** in step 4, the Configuration/Setup Utility program menu appears on the screen. You will see a pointer next to any menu items that indicate components that are malfunctioning or that have been changed since the last time you turned on your server. If you did not knowingly make a change to a flagged component, that component is probably malfunctioning. If you made a change, continue here. If you did not make a change, go to the **Attention:** section that follows step 5d.

To use the Configuration/Setup Utility program, do the following:

- a. Select the menu item that is flagged (or that you want to view) by pressing the Up Arrow (↑) or Down Arrow (↓) key; then, press **Enter**.
- b. A new menu specific to the item that you selected appears. Press the Left Arrow (←) or Right Arrow (→) key to toggle between choices for a menu item. (Note that each menu item has a Help screen. To view the Help screen, select the menu item; then, press **F1**.)
- c. When you have finished viewing and changing settings, press **Esc** to return to the Configuration/Setup Utility program menu.
- d. Before you exit from the program, select **Save Settings**. When you exit from the Configuration/Setup Utility program menu (see step 5e on page 167), your operating system will start automatically (unless there is an unresolved problem with the startup device).

POST Messages

Attention:

If you did *not* change any settings in the Configuration/Setup Utility program, note the following:

- You will get an error message if you exit from the Configuration/Setup Utility program without selecting **Save Settings**. Your operating system will not start, but the server will automatically restart. When the server restarts, you will get a POST error message, and then the Configuration/Setup Utility program will again start automatically.
 - You will *not* get an error message if you select **Save Settings** and then exit from the Configuration/Setup Utility program. Your system will save all settings as they currently appear in the Configuration/Setup Utility program, and your operating system will start (unless there is an unresolved problem with the startup device).
- e. To exit from the Configuration/Setup Utility program, press **Esc** and follow the instructions on the screen.

POST Messages

6. For more information about what caused an error message to appear and what action to take, refer to the following chart.

| Problem | Go to: |
|--|---|
| After more than one beep, application program or operating system appears. | “Running the diagnostic test programs” on page 164. |
| POST error code or message appears. | “POST message table” on page 169. |
| Blank screen, unreadable screen, or other unusual response occurs. | “Troubleshooting charts” on page 200. |

If you are unable to resolve a problem and need assistance, refer to Chapter 6, “Getting help, service, and information” on page 229.

POST message table

The following table shows error messages that can appear on the screen during the power-on self-test (POST).

The server might display more than one error message. Often, the first error to occur causes subsequent errors. When using the POST message charts in this section, always begin by following the suggested action for the *first* error message that appears on your server screen. Note that, in these charts, *x* can be any alphanumeric character.

Attention:

If you find it necessary to remove the server cover, first read “Electrical safety” on page 70, “Handling static-sensitive devices” on page 71, and “Preparing to add options” on page 73 for important safety information and instructions.

Notes:

1. The actions for some of the messages require you to run the Configuration/Setup Utility program. For information on using these programs, see “Using the Configuration/Setup Utility program” on page 39.
2. If a password prompt appears with a POST message, type the administrator or power-on password; then, press **Enter**.

| POST message | Description |
|--------------|---|
| 101 | A failure occurred during the system board and microprocessor |
| 102 | test. |
| 106 | <i>Action:</i> Have the system serviced. |

POST Messages

| POST message | Description |
|--------------|---|
| 110 111 | <p>A memory parity failure occurred during testing of the system board.</p> <p><i>Action:</i> Run the diagnostic programs to verify that a problem exists in a DIMM. (See “Running the diagnostic test programs” on page 164 for information on running the diagnostic programs that come with your server.)</p> <p>See “Working with memory modules” on page 96 if you need to reconfigure the system memory to aid in identifying the defective DIMM.</p> <p>If this procedure does not help you to identify the defective DIMM, have the system serviced.</p> |
| 114 | <p>An adapter read-only memory (ROM) error occurred.</p> <p><i>Action:</i> Remove all adapters that are not required for system startup and reinstall them one at a time, powering on after each is reinstalled. When this message displays, replace the adapter that you just installed.</p> <p>If you cannot isolate and correct the problem, have the system serviced.</p> |
| 151 | <p>A real-time clock (RTC) error occurred.</p> <p><i>Action:</i> Have the system serviced.</p> |
| 161 | <p>The battery on the system board is dead.</p> <p>Attention: Follow the instructions in the battery-safety statement in “Replacing the battery” on page 224.</p> <p><i>Action:</i> Replace the battery. For additional information on battery use, disposal, and replacement, see “Lithium battery notice” on page xxv and “Replacing the battery” on page 224.</p> <p>You can use the server until you replace the battery. However, you must run the Configuration/Setup Utility program and set the time and date each time that you turn on the server, until you install a new battery. (For instructions on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.)</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 162 | <p>A change in device configuration occurred. This error occurs under one or more of the following conditions:</p> <ul style="list-style-type: none">• A new device has been installed.• A device has been moved to a different location or cable connection.• A device has been removed or disconnected from a cable.• A device is failing and is no longer recognized by the server as being installed.• An external device is not turned on.• Microprocessor update code has not been installed or cannot be found.• The <i>Erasing Lost or Forgotten Passwords</i> procedure was performed. This procedure also erases configuration data.• An invalid checksum is detected in CMOS memory (nonvolatile RAM). <p><i>Action:</i></p> <ol style="list-style-type: none">1. Verify that all external devices are turned on. You must turn on external devices before turning on the server.2. Verify that all devices are properly installed and securely connected.3. If you added, removed, or changed the location of a device, or if you erased passwords, you must save the new configuration in the Configuration/Setup Utility program. See "Using the Configuration/Setup Utility program" on page 39 for further information and instructions on saving the configuration.4. If you changed the microprocessor, you must use the Configuration/Setup Utility program to update the settings. You must also update the server configuration. See "Updating the server configuration" on page 153 for instructions.5. If you did not add, remove, or change the location of a device, a device is probably failing. Running the diagnostic tests might isolate the failing device, but you must have the system serviced. (See "Running the diagnostic test programs" on page 164 for information on running the diagnostic programs that come with your server.) <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 163 | <p>The clock is not working correctly.</p> <p><i>Action:</i> Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, replace the battery. (See “Replacing the battery” on page 224.)</p> <p>If this does not correct the problem, have the system serviced.</p> <p>Until the system is serviced, the server can be used, but any application programs that use the date and time will be affected.</p> |
| 164 | <p>A change in the memory configuration occurred. This message might appear after you add or remove memory, or incorrectly install memory.</p> <p><i>Note:</i> The server can be used with decreased memory capacity until the error is corrected.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. If you added memory, see “Working with memory modules” on page 96 to verify that the new memory is correct for your server and that it is installed correctly. (If the memory is not installed correctly, reseat the memory modules.)2. If you added or removed memory, you must save the new configuration in the Configuration/Setup Utility program. Run the Configuration/Setup Utility program; then, exit, saving the new configuration settings. For information about using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.3. Running the diagnostic tests might isolate the location of the problem memory module and provide additional information. (See “Running the diagnostic test programs” on page 164 for information on running the diagnostic programs that come with your server.) <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 167 | <p>An installed microprocessor is not supported by the current POST/BIOS.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Obtain the latest POST/BIOS update diskette image.2. Perform the POST/BIOS (flash) update procedure (see “Remote Administration” on page 52 for additional information).3. Verify the microprocessor switch settings (see “Setting the microprocessor speed switches” on page 258). <p><i>Note:</i> Although you might have the current POST/BIOS level, you must still perform the POST/BIOS (flash) update procedure to clear this error.</p> |
| 168 | <p>The Alert on LAN feature is not working correctly.</p> <p><i>Action:</i> Set the correct state in the Configuration/Setup Utility program, as follows:</p> <ol style="list-style-type: none">1. From the Configuration/Setup Utility menu, select I/O Devices and Ports. Then, follow the instructions on the screen.2. Select Ethernet Setup.3. Select Alert on LAN.4. Set the value for Alert on LAN to Enabled. <p>For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <p>Verify that the Ethernet cable is attached to both the client and server, and that the appropriate software is installed on both the client and server.</p> <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |
| 175 | <p>A failure occurred during testing of the system board and microprocessor.</p> <p><i>Action:</i> Have the system serviced.</p> |
| 176 | <p>The server cover has been removed.</p> <p><i>Action:</i> You must enter the administrator password to clear this POST message. If the message recurs when the cover has not been removed, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 177 | <p>A security (inventory) violation has occurred.</p> <p>The Asset Control System Security feature has detected that the values for AssetCare and Asset ID have been set to Enabled, and the server has been moved without authorization.</p> <p><i>Action:</i> You must enter the administrator password to clear this POST message.</p> <p>From the Configuration/Setup Utility menu, select System Security. Then, follow the instructions on the screen. Set the values for AssetCare and Asset ID to Disabled. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <p>If the problem persists, have the system serviced.</p> |
| 183 | <p>The privileged-access protection message is received if the administrative password has been enabled.</p> <p><i>Action:</i> You must enter the administrator password to clear this POST message. If the message recurs when the cover has not been removed, have the system serviced.</p> |
| 184 | <p>Invalid power-on password checksum received.</p> <p>The values for AssetCare and Asset ID have been set to Enabled, and an RFID Antenna has been installed.</p> <p><i>Action:</i></p> <p>From the Configuration/Setup Utility menu, select System Security. Then, follow the instructions on the screen. Set the values for AssetCare and Asset ID to Disabled. An RFID Antenna should not be installed. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <p>If this information cannot be restored, have the system serviced.</p> |
| 186 | <p>A system board or hardware security error has been cleared.</p> <p><i>Action:</i> The administrator password was entered to clear POST message 176. No further action is required.</p> |
| 187 | <p>The administrator password and startup (boot) sequences have been cleared. POST message 162 will normally display also.</p> <p><i>Action:</i> See POST message 162</p> |
| 190 | <p>The server tamper indicator was cleared.</p> <p><i>Action:</i> No action is required.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 20x | <p>A failure occurred during the memory test. This error can be caused by:</p> <ul style="list-style-type: none">• Incorrectly installed memory• A failing memory module• A system-board failure <p><i>Action:</i></p> <ol style="list-style-type: none">1. If you just installed memory, verify that the new memory is correct for your system, and that the memory modules are installed properly. If the memory is not installed correctly, reseal the memory modules. (See “Working with memory modules” on page 96.) Verify that the memory modules are configured correctly. (See Chapter 3, “Configuring your server” on page 33.)2. Run the diagnostic programs to verify the problem. (See “Running the diagnostic test programs” on page 164 for information on running the diagnostic programs that come with your server.) <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |
| 301 303 | <p>An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.</p> <p><i>Action:</i></p> <p>Ensure that:</p> <ol style="list-style-type: none">1. Nothing is resting on the keyboard and pressing a key.2. No key is stuck.3. The keyboard cable is securely connected to the keyboard connector on the server. (See “Input/output connectors” on page 11 for the location of the keyboard connector.) <p><i>Note:</i> If you have just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least 5 seconds; then, turn on the server. If the error message goes away, replace the device. If the error message remains, have the keyboard, cable, and system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 601 | <p>A failure occurred during testing of the diskette drive and diskette-drive controller. This error can be caused by a loose or incorrectly connected cable, a failing drive, or a failing system board.</p> <p><i>Note:</i> You can use the server, but one or more diskette drives might not work.</p> <p><i>Action:</i> Verify that all diskette drive cables are properly installed and securely connected.</p> <p>Running the diagnostic tests might isolate the server component that failed, but you must have your system serviced. (See "Running the diagnostic test programs" on page 164 for information on running the diagnostic programs that come with your server.)</p> |
| 602 | <p>The server cannot start the diskette in the drive. The diskette might be damaged or formatted incorrectly.</p> <p><i>Action:</i> Try another startable diskette that is formatted correctly and is in good condition. (For information and instructions on formatting diskettes, refer to your operating-system documentation.)</p> <p>If this does not correct the problem, have the system serviced.</p> |
| 604 | <p>A failure occurred during a diskette-drive test.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 39.2. Run the diagnostic programs. (See "Running the diagnostic test programs" on page 164 for information on running the diagnostic programs that come with your server.)3. If the diagnostic programs detect a failure, replace the diskette drive. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 662 | <p>A diskette drive configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Verify that the Configuration/Setup Utility program correctly reflects the number of diskette drives that you have installed. If the drive information is not correct, change it. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.2. If you installed or removed a diskette drive, you must save the new configuration in the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility program” on page 39 for information and instructions on saving the configuration.3. Run the diagnostic programs. (See “Running the diagnostic test programs” on page 164 for information on running the diagnostic programs that come with your server.) <p>If the problem persists, have the system serviced.</p> |
| 762 | <p>A math coprocessor configuration error occurred.</p> <p><i>Action:</i> Have the system serviced.</p> |
| 11xx | <p>A serial port error occurred.</p> <p>The serial port number is identified by xx.</p> <p><i>Action:</i> Have the system serviced.</p> |
| 1762 | <p>A hard disk configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Verify that the Configuration/Setup Utility program correctly reflects the number of hard disk drives that you have installed. If the drive information is not correct, change it. (For instructions on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.)2. If you added or removed a hard disk drive, you must save the new configuration in the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility program” on page 39 for additional information and instructions on saving the configuration. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 178x | <p>A failure occurred during testing of the hard disk drive or a primary or secondary IDE device.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Run the diagnostic programs. (See “Running the diagnostic test programs” on page 164 for information on running the diagnostic programs that come with your server.)2. If the diagnostic programs detect a failure, replace the defective hard disk drive or primary or secondary IDE device. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1800 | <p>A PCI adapter has requested a hardware interrupt that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the hardware interrupt settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required interrupt resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all hardware interrupts are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make an interrupt available to the PCI adapter that you want to install. For information about removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. For information on setting interrupts, see “PCI Control” on page 54. <p><i>Note:</i> If you remove an ISA legacy adapter, set the hardware interrupt used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make an interrupt available to the PCI adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1801 | <p>A PCI adapter has requested memory resources that are not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all memory resources are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make memory available to the PCI adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the memory resources used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the PCI adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 1802 | <p>A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the I/O address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required I/O resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. If the I/O port resource settings are correct, the PCI adapter might be defective. Have the system serviced.3. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.4. If all I/O addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make an I/O address available to the PCI adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the I/O address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">5. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make an I/O address available to the PCI adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1803 | <p>A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. If the memory address settings are correct, the PCI adapter might be defective. Have the system serviced.3. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.4. If all memory addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make a memory address available to the PCI adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the memory address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">5. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the PCI adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1804 | <p>A PCI adapter has requested a memory address that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all memory addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make a memory address available to the PCI adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the memory address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the PCI adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |
| 1805 | <p>A PCI adapter read-only memory (ROM) error occurred.</p> <p><i>Action:</i> Remove all PCI adapters that are not required for system startup, and reinstall them one at a time, powering on after each is reinstalled. When message 1805 displays, replace the adapter that you just installed.</p> <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 1880 | <p>A Plug and Play adapter has requested a hardware interrupt that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the hardware interrupt settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required interrupt resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all hardware interrupts are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make an interrupt available to the Plug and Play adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. For information on setting resources, see “ISA Legacy Resources” on page 55. <p><i>Note:</i> If you remove an ISA legacy adapter, set the hardware interrupt used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make an interrupt available to the Plug and Play adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1881 | <p>A Plug and Play adapter has requested memory resources that are not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all memory resources are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make memory available to the PCI adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the memory resources used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the Plug and Play adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 1882 | <p>A Plug and Play adapter has requested an I/O address that is not available, or the Plug and Play adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the I/O address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required I/O resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. If the I/O port resource settings are correct, the Plug and Play adapter might be defective. Have the system serviced.3. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.4. If all I/O addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make an I/O address available to the Plug and Play adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the I/O address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">5. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make an I/O address available to the Plug and Play adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1883 | <p>A Plug and Play adapter has requested a memory address that is not available, or the Plug and Play adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If the memory address settings are correct, the Plug and Play adapter might be defective. Have the system serviced.4. If all memory addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make a memory address available to the Plug and Play adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the memory address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">5. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the Plug and Play adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|---|
| 1884 | <p>A Plug and Play adapter has requested a memory address that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all memory addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make a memory address available to the Plug and Play adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the memory address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the Plug and Play adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 1885 | <p>A Plug and Play adapter read-only memory (ROM) error occurred.</p> <p><i>Action:</i> Remove all Plug and Play adapters that are not required for system startup, and reinstall them one at a time, powering on the server after each adapter is reinstalled. When message 1885 displays, replace the adapter that you just installed.</p> <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 1886 | <p>A Plug and Play adapter has requested a DMA address that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all ISA legacy adapters and all other adapters are set correctly in the Configuration/Setup Utility program. If the DMA address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to ISA Resource enables the Plug and Play function to configure around the legacy adapters. <p>For information about PCI and ISA adapters, see “Working with adapters” on page 79. For information about Plug and Play and legacy (non-Plug and Play) adapters, see “ISA Legacy Resources” on page 55. For information about the required memory resource settings for ISA adapters, refer to the documentation that comes with these adapters. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.</p> <ol style="list-style-type: none">2. Make sure that the switches on all ISA legacy adapters are set correctly. For information about switch settings, refer to the documentation that comes with the ISA legacy adapters.3. If all DMA addresses are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make a DMA address available to the Plug and Play adapter that you want to install. For information on removing adapters, see “Installing or removing ISA and PCI adapters” on page 82. <p><i>Note:</i> If you remove an ISA legacy adapter, set the DMA address used by the removed adapter to Available before installing another adapter.</p> <ol style="list-style-type: none">4. If you have other PCI or Plug and Play adapters installed, you might need to remove one of these adapters to make memory available to the Plug and Play adapter that you want to install. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST Messages

| POST message | Description |
|--------------|--|
| 1962 | <p>A startup sequence error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that the startup options are set correctly in the Configuration/Setup Utility program. If the settings are not correct, change and save them. For instructions on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 39.2. Make sure that the primary IDE or SCSI cable is properly installed and securely connected.3. Make sure that all adapters are installed correctly. For instructions on adding adapters, see "Installing or removing ISA and PCI adapters" on page 82. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |
| 2462 | <p>A video configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that the primary monitor signal cable is securely attached to the monitor and the monitor connector (video port) on the rear of your server. To find the location of the video port, see "Input/output connectors" on page 11.2. Make sure that the graphics adapter in your server, if you installed one, is securely connected to the connector where you installed it (an ISA or PCI slot connector on the riser card, or the dedicated AGP slot connector in the server wall). For the location of the ISA and PCI slot connectors on the riser card, see "ISA and PCI adapters" on page 80. For the location of the dedicated AGP slot connector, see "System Board Illustration" on page 253.3. If you just added or removed video memory, you must save the new configuration in the Configuration/Setup Utility program. See "Using the Configuration/Setup Utility program" on page 39 for additional information and instructions on saving the configuration. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

POST beep codes

| POST message | Description |
|---------------|---|
| 5962 | <p>A removable media configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Verify that the Configuration/Setup Utility program correctly reflects the number of removable-media drives that you have installed. If the drive information is not correct, change it. (For instructions on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.)2. If you added or removed a removable-media drive, you must save the new configuration in the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility program” on page 39 for additional information and instructions on saving the configuration. <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |
| 8601 8603 | <p>A pointing device or system board error occurred.</p> <p><i>Action:</i> Have the system serviced.</p> |
| 19990301 | <p>A hard disk drive failure occurred.</p> <p><i>Action:</i> Have the system serviced.</p> |
| Other Numbers | <p>The server POST found an error.</p> <p><i>Action:</i> Follow the instructions on the screen.</p> |

Power-on self-test (POST) beep codes

In some models, one beep and the appearance of text on the monitor indicate successful completion of POST. More than one beep indicates that POST detected an error.

Beep codes are sounded in a series of two or three sets of beeps. The duration of each beep is constant, but the length of the pause between the beeps varies. For example, a 1-2-4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

It is possible to misinterpret beep codes if you do not understand exactly how they work. Keeping in mind that POST beep codes vary in the length of the pause, and not the duration of the beep tones, will help you to distinguish the beeps.

POST beep codes

POST beep code tables

In the following tables, the numbers indicate the sequence and number of beeps. For example, a “2-3-2” error symptom (a burst of two beeps, three beeps, then two beeps) indicates a memory module problem.

If the following beep codes occur, have the system serviced.

| Beep Code | Probable Cause |
|-----------|--|
| 1-1-3 | CMOS write/read failure |
| 1-1-4 | BIOS ROM checksum failure |
| 1-2-1 | Programmable interval timer test failure |
| 1-2-2 | DMA initialization failure |
| 1-2-3 | DMA page register write/read test failure |
| 1-2-4 | RAM refresh verification failure |
| 1-3-1 | First 64 K RAM test failure |
| 1-3-2 | First 64 K RAM parity test failure |
| 2-1-1 | Secondary DMA register test in progress or failure |
| 2-1-2 | Primary DMA register test in progress or failure |
| 2-1-3 | Primary interrupt mask register test failure |
| 2-1-4 | Secondary interrupt mask register test failure |
| 2-2-2 | Keyboard controller test failure |
| 2-3-2 | Screen memory test in progress or failure |
| 2-3-3 | Screen retrace tests in progress or failure |
| 3-1-1 | Timer tick interrupt test failure |
| 3-1-2 | Interval timer channel 2 test failure |
| 3-1-4 | Time-of-day clock test failure |
| 3-2-4 | Comparing CMOS memory size against actual |
| 3-3-1 | Memory size mismatch occurred |

SCSI messages

If the following beep code occurs, make sure only registered or only unbuffered system memory is used.

| Beep Code | Probable Cause |
|-----------|--|
| 1-3-4 | Memory types mixed—unbuffered vs. registered |

SCSI messages

The following table lists messages that reflect problems with the SCSI controller or a SCSI device.

Note: If your server does not have a hard disk drive, ignore any message that indicates that the BIOS is not installed.

SCSI message table

You will get these messages only when running the SCSISelect Utility program. For more information, see the documentation that comes with the SCSISelect Utility program.

SCSI messages

| SCSI Messages | Description |
|---------------|--|
| All | <p>One or more of the following might be causing the problem:</p> <ul style="list-style-type: none">• A failing SCSI device (adapter, drive, controller)• An improper SCSI configuration or SCSI termination jumper setting• Duplicate SCSI IDs in the same SCSI chain• A missing or improperly installed SCSI terminator• A defective SCSI terminator• An improperly installed cable• A defective cable <p><i>Action:</i></p> <p>Verify that:</p> <ul style="list-style-type: none">• The external SCSI devices are turned on. External SCSI devices must be turned on before you turn on the system.• The cables for all external SCSI devices are connected correctly.• If you have attached an internal or external SCSI device to the server, make sure that the SCSI termination is set correctly. See “Termination requirements” on page 111 for more information about SCSI termination.• The SCSI devices are configured correctly. <p>If the above are correct, run the diagnostic programs for additional information about the failing device. If the error recurs, have the system serviced.</p> |

Ethernet controller messages

Ethernet controller messages

Note: The error messages shown in this section are available only with the integrated Ethernet controller. These error messages are not available when remote program load (RPL) or dynamic host configuration protocol (DHCP) is used through optional network adapters.

If a failure condition occurs after the Ethernet controller is initialized, an error message appears on the screen. The error messages that can occur are shown in the following sections. If you experience any error related to the integrated Ethernet controller, record the error message, and tell your network administrator about the problem.

The two most common error messages are:

RPL-ROM-ERR: 105 The integrated Ethernet failed the loopback test.
RPL-ROM-ERR: 107 The media test failed.

Error 105 indicates that a power-on diagnostic test performed by the Ethernet module did not execute correctly. If this error message appears, you must have the server serviced. Error 107 indicates that the cable from the LAN is not securely connected to the Ethernet port on your server. Check the cable to ensure that it is properly connected.

Other error messages that might occur are shown in Table 11 on page 197.

Note: An x value that follows an error code represents any alphanumeric character.

Ethernet controller messages

Table 11 (Page 1 of 3). Ethernet controller messages

| Error Code | Description |
|------------------|---|
| RPL-ROM-ERR: 100 | <p>The integrated Ethernet controller cannot be found.</p> <p><i>Action:</i> Make sure that the Ethernet controller is enabled in the BIOS. If the problem persists, have the system serviced.</p> |
| RPL-ROM-ERR: 101 | <p>The integrated Ethernet controller was unable to initialize.</p> <p><i>Action:</i> Make sure that the Ethernet controller is enabled in the BIOS. If the problem persists, have the system serviced.</p> |
| RPL-ROM-ERR: 102 | <p>The integrated Ethernet controller could not be reset.</p> <p><i>Action:</i> Make sure that the Ethernet controller is enabled in the BIOS. If the problem persists, have the system serviced.</p> |
| RPL-ROM-ERR: 103 | <p>There are multiple Ethernet controllers or adapters in the system.</p> <p><i>Action:</i> Specify the correct serial number in the NET.CFG file.</p> |
| RPL-ROM-ERR: 104 | <p>The integrated Ethernet controller EEPROM is faulty or not present.</p> |
| RPL-ROM-ERR: 105 | <p>The integrated Ethernet failed the loopback test.</p> <p>A power-on diagnostic test performed by the Ethernet module did not execute correctly.</p> <p><i>Action:</i> Have the system serviced.</p> |
| RPL-ROM-ERR: 106 | <p>The integrated Ethernet controller is configured for Plug and Play in a non-Plug and Play system.</p> |
| RPL-ROM-ERR: 107 | <p>The media test failed.</p> <p><i>Action:</i> The cable from the LAN is not securely connected to the Ethernet port on your server. Check the cable to ensure that it is properly connected.</p> |

Ethernet controller messages

Table 11 (Page 2 of 3). Ethernet controller messages

| Error Code | Description |
|------------------|---|
| RPL-ROM-ERR: 110 | The integrated Ethernet controller RAM failed the memory test. <i>Action:</i> Have the system serviced. |
| E61 | Service boot (startup) canceled; that is, the boot diskette image was not downloaded from the network. <i>Action:</i> No action is required. |
| E62 | Cannot initialize controller. |
| E63 | Cannot initialize controller. |
| E67 | Cannot initialize controller. |
| E6d | Cannot find boot protocol (BOOTP) server. |
| E6e | Cannot start from downloaded image. |
| E71 | Too many multicast trivial file transfer protocol (MTFTP) packages. |
| M10 | Address resolution protocol (ARP) canceled by keystroke. <i>Action:</i> No action is required. |
| M11 | ARP timeout. |
| M20 | Cannot copy memory. |
| M21 | Cannot write to memory. |
| M22 | Cannot write to memory. |
| M30 | Cannot ARP trivial file transfer protocol (TFTP) address. |
| M31 | TFTP canceled by keystroke. |
| M32 | TFTP open timeout. |
| M33 | Unknown TFTP parameter (operation code). |
| M34 | TFTP read canceled by keystroke. |
| M35 | TFTP timeout. |
| M38 | Cannot open TFTP connection. |
| M39 | Cannot read from TFTP connection. |
| M40 | BOOTP canceled by keystroke. |

Ethernet controller messages

Table 11 (Page 3 of 3). Ethernet controller messages

| Error Code | Description |
|-------------------|---|
| M40 | DHCP canceled by keystroke. |
| M41 | BOOTP timeout. |
| M41 | DHCP timeout. |
| M42 | No client or server Internet protocol (IP) address. |
| M43 | No boot (startup) file name. |
| M44 | Cannot ARP redirected BOOTP server. |
| M6f | System is locked. Press Ctrl+Alt+Del to restart. |
| M90 | Cannot initialize controller for multicast address. |
| M91 | MTFTP canceled by keystroke. |
| M92 | MTFTP open timeout. |
| M93 | Unknown MTFTP parameter (operation code). |
| M94 | MTFTP read canceled by keystroke. |
| M95 | MTFTP timeout. |
| M96 | Cannot ARP MTFTP address. |
| M98 | Cannot open MTFTP connection. |
| M99 | Cannot read from MTFTP connection. |
| Txx | If you are running a TFTP session to another computer, an error message generated by the TFTP session will contain a message prefix of Txx. |

Troubleshooting

Troubleshooting

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

Troubleshooting charts

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column. If you have just added new software or a new option and your server is not working, do the following before using the troubleshooting charts:

- Remove the software or device that you just added.
- Run the diagnostic programs to determine if your server is running correctly. (See “Diagnostic test programs” on page 159 for a description of the diagnostic programs that come with your server.)
- Reinstall the new software or new device.

Note: If you cannot find the problem in the troubleshooting charts, go to “Running the diagnostic test programs” on page 164 to test the system. If you already have run the diagnostic programs, or if running the tests does not reveal the problem, have the system serviced.

Troubleshooting

| CD-ROM drive problems | Action |
|---------------------------------------|--|
| The CD is not working properly. | <p>Follow the instructions in “Using the CD-ROM drive” on page 30 for using the CD-ROM drive, handling a CD, and loading a CD.</p> <p>Clean the CD by wiping it with a soft, lint-free cloth, from the center of the CD to the outer edge. Do <i>not</i> clean the CD in a circular pattern. This can cause loss of data.</p> <p>If a problem still exists, have the system serviced.</p> |
| The CD-ROM drive tray is not working. | <p>The system must be turned on. If the system is on and the tray does not slide out of the drive when you press the Eject/Load button, insert one end of a large paper clip into the emergency-eject hole located above and to the left of the CD-ROM drive in-use light.</p> <p><i>Note:</i> In some models, you might have to remove the front bezel from the CD-ROM drive to access the emergency-eject hole.</p> <p>If the drive still does not work correctly, have the system serviced.</p> |

Troubleshooting

| CD-ROM drive problems | Action |
|---|--|
| The server does not recognize the CD-ROM drive. | <p data-bbox="631 690 1174 743">Your server comes with an IDE CD-ROM drive. Verify that:</p> <ol data-bbox="643 758 1174 1381" style="list-style-type: none"><li data-bbox="643 758 1174 890">1. The CD-ROM drive is enabled in the Configuration/Setup Utility program. For instructions on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 39.<li data-bbox="643 905 1174 978">2. The server is checking for the CD-ROM drive in the startup sequence. Use the Configuration/Setup Utility program to verify this.<li data-bbox="643 993 1174 1066">3. The CD is good and not damaged. If the CD is damaged, replace it.<li data-bbox="643 1081 1065 1102">4. The CD is inserted correctly in the drive.<li data-bbox="643 1117 1174 1226">5. The CD contains the necessary files to start the system (the CD must be startable). <i>Note:</i> The CD that comes with your server is startable.<li data-bbox="643 1241 1174 1293">6. The CD-ROM drive cable is properly installed and securely connected.<li data-bbox="643 1308 1174 1381">7. Your software program is OK. See Software Problems at the end of these troubleshooting charts. <p data-bbox="631 1396 1174 1583">Follow this procedure if you have installed a SCSI CD-ROM drive. Because you installed a SCSI device, you must set a SCSI ID for this device. Depending on the SCSI controller that your CD-ROM drive is using, use the SCSISelect Utility program to verify the SCSI ID of the CD-ROM drive. For more information, see "SCSISelect Utility program choices" on page 62.</p> <p data-bbox="631 1598 1174 1673">If the CD-ROM drive in-use light stays on, or if the system continues to bypass the CD-ROM drive, have the system serviced.</p> |

Troubleshooting

| Diskette drive problems | Action |
|--|--|
| The diskette drive in-use light stays on, or the system bypasses the diskette drive. | <p>If there is a diskette in the drive, verify that:</p> <ol style="list-style-type: none">1. The diskette drive is enabled in the Configuration/Setup Utility program. For instructions on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 39.2. The server is checking for the diskette drive in the startup sequence. Use the Configuration/Setup Utility program to verify this.3. The diskette is good and not damaged. (Try another diskette if you have one.)4. The diskette is inserted correctly, with its label up and its metal-shutter end first in the drive.5. The diskette contains the necessary files to start the system (the diskette must be startable).6. The diskette drive cable is properly installed and securely connected.7. Your software program is OK. See Software Problems at the end of these troubleshooting charts. <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, have the system serviced.</p> |

| Monitor self-tests | Action |
|---------------------------|---|
| General monitor problems. | <p>Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, refer to the information that comes with the monitor for adjusting and testing instructions.</p> <p>If you still cannot find the problem, check the Monitor Problems troubleshooting chart for possible solutions.</p> <p>If the problem cannot be isolated and corrected, have the monitor and system serviced.</p> |

Troubleshooting

| Monitor problems | Action |
|---|---|
| The screen is blank. | <p>Verify that:</p> <ol style="list-style-type: none">1. The system power cord is plugged into the system and a working electrical outlet.2. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.3. The primary monitor signal cable is securely attached to the monitor and the monitor connector (video port) on the rear of your server. To find the location of the video port, see "Input/output connectors" on page 11.4. The graphics adapter in your server, if you installed one, is securely connected to the connector where you installed it (an ISA or PCI slot connector on the riser card, or the dedicated AGP slot connector in the server wall). For the location of the ISA and PCI slot connectors on the riser card, see "ISA and PCI adapters" on page 80. For the location of the dedicated AGP slot connector, see "System Board Illustration" on page 253. <p>If the items above are correct and the screen remains blank, have the system serviced.</p> |
| Only the cursor appears. | <p>Have the system serviced.</p> |
| The monitor works when you turn on the system, but goes blank when you start some application programs. | <p>Verify that:</p> <ol style="list-style-type: none">1. The primary monitor signal cable is securely attached to the monitor and the monitor connector (video port) on the rear of your server. To find the location of the video port, see "Input/output connectors" on page 11.2. The graphics adapter in your server, if you installed one, is securely connected to the connector where you installed it (an ISA or PCI slot connector on the riser card, or the dedicated AGP slot connector in the server wall). For the location of the ISA and PCI slot connectors on the riser card, see "ISA and PCI adapters" on page 80. For the location of the dedicated AGP slot connector, see "System Board Illustration" on page 253.3. You installed the necessary device drivers for the applications. To install device drivers, follow the instructions in the ServerGuide package that comes with your server. <p>If the problem cannot be isolated and corrected, have the monitor and system serviced.</p> |

Troubleshooting

| Monitor problems | Action |
|---|---|
| The monitor works when you turn on the system, but goes blank after some period of server inactivity. | <ul style="list-style-type: none"><li data-bbox="667 663 1206 741">• The system might have a screen-saver program, or the network performance might be low. Move the mouse.<li data-bbox="667 758 1206 915">• The server might be set for energy savings with the Advanced Power Management (APM) feature. This feature is not available in your server and therefore, has a default setting of Disabled. If the APM feature setting has been enabled, change the setting back to Disabled. <p data-bbox="667 932 1206 982">If the problem cannot be isolated and corrected, have the system serviced.</p> |
| The screen flickers. | <p data-bbox="667 999 1206 1178">Set the monitor for the highest, noninterlaced refresh rate supported by your monitor and the video controller in your server. For additional information, refer to the documentation that comes with your monitor and the README files for the graphics adapter (if applicable). The README files are on the ServerGuide CDs that come with your server.</p> <p data-bbox="667 1194 1206 1272">Attention: Using a resolution or refresh rate that is not supported by your monitor might damage it.</p> <p data-bbox="667 1289 1206 1415">You can reset the refresh rate through your operating system, using the instructions provided in the README files. Refer to your operating system documentation for further information on monitor settings.</p> <p data-bbox="667 1432 1206 1482">If this does not correct the problem, have the monitor and system serviced.</p> <p data-bbox="667 1499 1206 1547"><i>Note:</i> To reset the refresh rate, use a utility program, such as AnyView Professional or WinMode.</p> |

Troubleshooting

| Monitor problems | Action |
|--|---|
| Wavy, unreadable, rolling, distorted screen, or screen jitter. | <p>If the monitor self-tests show that the monitor is working properly, verify that:</p> <ol style="list-style-type: none">1. The location of the monitor is appropriate. Magnetic fields around other devices, such as transformers, appliances, fluorescent lights, and other monitors might be causing the problem. To determine if the location is causing the problem:<ol style="list-style-type: none">a. Turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.)b. Adjust the placement of the monitor and other devices so that they are at least 305 mm (12 in.) apart. Also, when relocating the monitor, be sure that it is at least 76 mm (3 in.) from the diskette drives to prevent diskette drive read/write errors.c. Turn on the monitor.2. An IBM monitor signal cable is properly connected to the monitor and server, and that the cable is installed securely. Non-IBM monitor signal cables might cause unpredictable problems.3. You are not trying to run your monitor at a higher refresh rate than the monitor supports. Refer to the documentation that comes with your monitor for the supported refresh rates. <p><i>Note:</i> An enhanced monitor signal cable with additional shielding might be available for your monitor. Contact your IBM reseller or marketing representative for information.</p> <p>If the problem still exists, have the monitor and system serviced.</p> |
| Wrong characters appear on the screen. | Have the system serviced. |
| General problems | Action |
| Problems such as broken cover locks or indicator lights not working. | Have the system serviced. |

Troubleshooting

| General problems | Action |
|--|---|
| The server does not start when you press the power switch. | Verify that: <ol style="list-style-type: none">1. The power indicator is on.2. All cables are securely connected to the proper connectors on the server. For the location of the connectors, see "Input/output connectors" on page 11.3. The server cover is properly installed.4. The power outlet functions properly.5. You installed the correct type of memory. If you just installed an option, remove it, and restart the server. If the server now starts, you might have installed more options than the power supply supports. If the problem still exists, have the system serviced. |

| Intermittent problems | Action |
|--|---|
| A problem occurs only occasionally and is difficult to detect. | Verify that: <ol style="list-style-type: none">1. All cables and cords are connected securely to the rear of the system and attached options.2. When the system is turned on, the fan grill is not blocked (that is, air is flowing from the rear of the system at the fan grill), and the fans are working. If there is no air flow, the fans are not working. This causes the system to overheat and shut down.3. The last external device in each SCSI chain is terminated correctly. Refer to your SCSI documentation and see "Termination requirements" on page 111. If the items above are correct, have the system serviced. |

Troubleshooting

| Microprocessor problems | Action |
|---|--|
| The server emits a continuous tone during POST. | <p>The microprocessor is not working properly.</p> <ol style="list-style-type: none">1. Replace the microprocessor. Restart the server.2. If you receive the error code 167 after you install a new microprocessor, run the Flash Utility program. Insert the <i>Flash BIOS Diskette</i> into the primary diskette drive and run the flash program. Follow the instructions in the program. For information on error code 167, see the description in the "POST message table" on page 169.3. If you installed a new microprocessor in your server, you must reconfigure your server. Follow the procedure described in "Using the Configuration/Setup Utility program" on page 39.4. Refer to your operating-system documentation. You might need to make changes so that the operating system recognizes the new microprocessor. <p>If the problem still exists, have the system serviced.</p> |

| Keyboard, mouse, or pointing-device problems | Action |
|---|--|
| All or some keys on the keyboard do not work. | <p>Verify that:</p> <ol style="list-style-type: none">1. The server and the monitor are turned on.2. The keyboard cable is securely connected to the keyboard connector on the server. For the location of the keyboard connector, see "Input/output connectors" on page 11. <p>If the problem cannot be isolated and corrected, have the keyboard and system serviced.</p> |

Troubleshooting

| Keyboard, mouse, or pointing- device problems | Action |
|--|---|
| The mouse or pointing device does not work. | Verify that: <ol style="list-style-type: none"><li data-bbox="672 751 1201 940">1. The mouse or pointing-device cable is securely attached to the proper connector on the server. Depending on the type of mouse that you have, the mouse cable will connect to either the mouse connector or the serial connector. To find the mouse and serial connectors, see “Input/output connectors” on page 11.<li data-bbox="672 951 1146 1003">2. The device drivers for the mouse are installed correctly. If the problem cannot be isolated and corrected, have the server and the device serviced. |

Troubleshooting

| Memory problems | Action |
|---|---|
| The amount of memory displayed is less than the amount of memory installed. | <p>The amount of available memory shown might be somewhat less than expected because of basic input/output system (BIOS) shadowing in random access memory (RAM).</p> <p>Verify that:</p> <ol style="list-style-type: none">1. The memory modules are properly seated and securely connected.2. You have installed the correct type of memory for your server. Install only ECC DIMMs to enable ECC. If you mix nonparity (NP) DIMMs and ECC DIMMs, ECC will be disabled. See "Working with memory modules" on page 96 for additional information about memory requirements.3. If you added or removed memory, you updated the memory configuration with the Configuration/Setup Utility program. For information about using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 39.4. The DIMMs that you installed have the correct speed (100 MHz). <p>If the problem persists, run the memory test from the diagnostic program that comes with your server. (See "Running the diagnostic test programs" on page 164 for additional information.) The system might have detected a defective DIMM and automatically reallocated memory to enable your server to continue to operate.</p> <p>If the problem cannot be isolated and corrected, have the system serviced.</p> |

Troubleshooting

| Option problems | Action |
|--|--|
| An IBM option that used to work does not work now. | <p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none">1. The cables for all external SCSI options are connected correctly.2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.3. An external SCSI option is turned on. You must turn on an external SCSI option before turning on the system. <p>For more information, refer to your SCSI documentation and see Chapter 4, "Installing options" on page 67.</p> <p>If the items above are correct and the diagnostic tests found no problem, have the server and option serviced.</p> |

Troubleshooting

| Option problems | Action |
|--|--|
| An IBM option that was just installed does not work. | <p data-bbox="631 663 743 690">Verify that:</p> <ol data-bbox="643 703 1169 1339" style="list-style-type: none"><li data-bbox="643 703 1040 730">1. The option is designed for the system.<li data-bbox="643 732 1169 810">2. You followed the installation instructions that come with the option and the instructions in Chapter 4, "Installing options" on page 67.<li data-bbox="643 812 1154 863">3. You have not loosened any other installed options or cables.<li data-bbox="643 865 1169 1050">4. If the option is an adapter, you have provided enough hardware resources for the adapter to function correctly. Refer to the documentation that comes with the adapter (as well as the documentation for any other installed adapters) to determine the resources that are required for each adapter.<li data-bbox="643 1052 1159 1129">5. All option files (if required) are installed correctly. See "Installing files from Option Diskettes" on page 163 for information on installing option files.<li data-bbox="643 1131 1159 1339">6. You updated the configuration information in the Configuration/Setup Utility program, if necessary, and have no conflicts. Whenever memory or an option is changed, you must update the configuration. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 39. <p data-bbox="631 1352 1138 1459">If the problem persists, run the diagnostic programs. (See "Running the diagnostic test programs" on page 164 for additional information on running the diagnostic programs that come with your server.)</p> <p data-bbox="631 1472 1146 1526">If the problem cannot be isolated and corrected, have the server and the option serviced.</p> |

Troubleshooting

| Parallel port problems | Action |
|--|--|
| The parallel port cannot be accessed, or the number of parallel ports displayed is less than the number of parallel ports installed. | Verify that: <ol style="list-style-type: none">1. Each port is assigned a unique address. To verify the address, run the Configuration/Setup Utility program, and select Devices and I/O Ports. See “Devices and I/O Ports” on page 41 for additional information.2. The parallel-port adapter, if you installed one, is properly installed and firmly seated. For information on installing adapters, see “Installing or removing ISA and PCI adapters” on page 82. If the items above are correct, have the system serviced. |
| <hr/> | |
| Serial port problems | Action |
| The serial port cannot be accessed, or the number of serial ports displayed is less than the number of serial ports installed. | Verify that: <ol style="list-style-type: none">1. Each port is assigned a unique address. To verify the address, run the Configuration/Setup Utility program, and select Devices and I/O Ports. See “Devices and I/O Ports” on page 41 for additional information.2. The serial-port adapter, if you installed one, is properly installed and firmly seated. For information on installing adapters, see “Installing or removing ISA and PCI adapters” on page 82. If the items above are correct, have the system serviced. |
| A serial device does not work. | Verify that the serial port is enabled and is assigned a unique address. If the items above are correct, have the system serviced. |

Troubleshooting

| Universal serial bus (USB) port problems | Action |
|--|---|
| The USB ports cannot be accessed, or the number of serial buses displayed is less than the number of serial buses installed. | Verify that: <ol style="list-style-type: none">1. Each bus is assigned a unique address.2. Each port is assigned a unique address. To verify the address, run the Configuration/Setup Utility program, and select Devices and I/O Ports. See “Devices and I/O Ports” on page 41 for additional information.3. The USB device is properly installed and firmly seated.4. The serial-port adapter, if you installed one, is properly installed and firmly seated. For information on installing adapters, see “Installing or removing ISA and PCI adapters” on page 82. If the items above are correct, have the system serviced. |
| A USB device does not work. | Verify that: <ol style="list-style-type: none">1. The USB is enabled and is assigned a unique address. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39.2. The USB clock speed matches the clock speed of the USB device. If the items above are correct, have the system serviced. |
| A serial device does not work. | Verify that the serial port is enabled and is assigned a unique address. If the items above are correct, have the system serviced. |

Troubleshooting

| Printer problems | Action |
|----------------------------|---|
| The printer does not work. | <p>Verify that:</p> <ol style="list-style-type: none">1. The printer is turned on and is online.2. The printer signal cable is connected to the correct parallel, serial, or USB port on the system. For the location of the parallel, serial, and USB ports, see “Input/output connectors” on page 11. <p><i>Note:</i> Non-IBM printer cables might cause unpredictable problems.</p> <ol style="list-style-type: none">3. You have assigned the printer port correctly in your operating system or application program.4. You have assigned the printer port correctly using the Configuration/Setup Utility program. For information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 39. <p>If the items above are correct and the printer still does not work, run the tests described in the documentation that comes with your printer. If the tests show that the printer is OK, have the system serviced.</p> |

| Expansion enclosure problems | Action |
|---|--|
| The SCSI expansion enclosure used to work, but does not work now. | <p>Verify that all SCSI expansion enclosure hardware and cable connections are secure.</p> <p>Verify that:</p> <ol style="list-style-type: none">1. The cables for all external SCSI options are connected correctly.2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.3. An external SCSI option is turned on. You must turn on an external SCSI option before turning on the system. <p>For more information, see your SCSI and expansion enclosure documentation.</p> <p>If the SCSI expansion enclosure comes with its own test instructions, use those instructions to test it. In addition, test the power supply.</p> <p>If the items above are correct and the test programs found no problem, have the server and SCSI expansion enclosure serviced.</p> |

Troubleshooting

| Expansion enclosure problems | Action |
|---|--|
| The SCSI Repeater Card used to work, but does not work now. | <p>Verify that all SCSI Repeater Card hardware and cable connections are secure.</p> <p>Verify that:</p> <ol style="list-style-type: none">1. The cables for all external SCSI options are connected correctly.2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.3. An external SCSI option is turned on. You must turn on an external SCSI option before turning on the system. <p>For more information, see your SCSI documentation.</p> <p>If the SCSI Repeater Card comes with its own test instructions, use those instructions to test it.</p> <p>If the items above are correct and the test programs found no problem, have the server and SCSI Repeater Card serviced.</p> |

| Software problems | Action |
|------------------------------|---|
| Is your software program OK? | <p>To determine if problems are caused by the software, verify that:</p> <ol style="list-style-type: none">1. Your system has the minimum memory requirements needed to use the software. Refer to the information that comes with the software to verify memory requirements. <p><i>Note:</i> If you have just installed an adapter or memory, you might have a memory address conflict.</p> <ol style="list-style-type: none">2. The software is designed to operate on your system.3. Other software works on your system.4. The software that you are using works on another system. <p>If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase or service technician for help.</p> |

Troubleshooting the 10/100 Mbps Ethernet controller

This section provides troubleshooting information for problems that might occur with the 10/100 Mbps Ethernet controller.

Note: For additional information about the Ethernet controller, such as configuration and auto-negotiation, see “Configuring the Ethernet controller” on page 59. For an illustration of the Ethernet activity light location on the server, see “Status indicators” on page 10.

Network connection problems

If the Ethernet controller cannot connect to the network, check the following:

1. Make sure that the cable is installed correctly.

The network cable must be securely attached at all connections. If the cable is attached but the problem persists, try a different cable.

If you use the integrated Ethernet controller, you must use Category 5 cabling. See Appendix A, “Ethernet cable specifications” on page 271 for additional information about Ethernet cable requirements.

If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable. See Appendix A, “Ethernet cable specifications” on page 271 for an illustration of a crossover cable.

Note: To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.

2. Check the Ethernet activity light on the front of the server.

The Ethernet activity light comes on when the Ethernet controller sends or receives data over the Ethernet network.

Note: This light is off when you run the diagnostic programs in the Configuration/Setup Utility program.

Troubleshooting

If the Ethernet activity light is off:

- a. Make sure that the hub and network are operating, and that the correct device drivers are loaded.
 - b. There might be a defective Ethernet connector or cable, or a problem with the hub.
3. Make sure that you are using the correct device drivers that come with your server.
 4. Check for operating system-specific causes for the problem.
 5. Test the Ethernet controller or adapter.

How you test the Ethernet controller or adapter depends on which operating system you are using. Refer to your ServerGuide documentation for details about your operating system.

Diagnostic LEDs

Your server contains two diagnostic LEDs (one green, and one amber) on the Ethernet connector that is located at the rear of the server.

- When the green LED is on, it indicates that the Ethernet controller or adapter is connected to a hub or switch and is receiving link pulses. If this LED is not on, check all connections at the controller or adapter and the hub. Make sure that the hub is transmitting at the correct speed, and that the drivers are loaded.

Also, make sure that you have the correct wiring configuration for the controller or adapter to the hub connection. Some hubs require a crossover cable rather than a straight-through cable.

Notes:

1. This LED is also known as the Link OK light.
 2. The green LED is on when you run the diagnostics loopback test without a cable attached to the controller or adapter.
- When the amber LED is on, it indicates that the Ethernet network is operating at 100 Mbps. When this LED is off, it indicates that the Ethernet network is operating at 10 Mbps.

Note: The amber LED might remain lit if the link is broken during activity.

10/100 Mbps Ethernet controller troubleshooting chart

You can use the following troubleshooting chart to find solutions to Ethernet controller problems that have definite symptoms.

| Controller problems | Action |
|--|--|
| The Configuration/Setup Utility program reports the Ethernet controller interrupt utility as 0 or 255. | <p>The PCI BIOS is not configuring the Ethernet controller or adapter correctly.</p> <p>The PCI BIOS interrupt settings are incorrect. Check for interrupt conflicts with ISA devices. If conflicts are found, reserve the ISA interrupts (see “ISA Legacy Resources” on page 55) so that the PCI BIOS will assign another nonconflicting PCI interrupt value.</p> |
| The Configuration/Setup Utility program reports No PCI Bus. | <p>The Configuration/Setup Utility program has been run on another computer that does not have any PCI slots.</p> <p>Run the Configuration/Setup Utility program on your server so that the PCI BIOS will configure the Ethernet controller or adapter correctly.</p> |
| The server stops running when loading device drivers. | <p>The PCI BIOS interrupt settings are incorrect. Check for interrupt conflicts with ISA devices. If conflicts are found, reserve the ISA interrupts (see “ISA Legacy Resources” on page 55) so that the PCI BIOS will assign another nonconflicting PCI interrupt value.</p> |
| The diagnostics are completed successfully, but the connection fails. | <ol style="list-style-type: none"> 1. Make sure that you are using Category 5 Ethernet cabling when operating the server at either 10 Mbps or 100 Mbps. 2. Make sure that the network cable is securely attached. 3. Make sure that the client and server device drivers are using the same network protocol. |

Troubleshooting

| Controller problems | Action |
|--|---|
| The Ethernet activity light does not come on. | <ol style="list-style-type: none">1. Make sure that you have loaded the network device drivers.2. Check all connections at the Ethernet controller or adapter and the hub.3. The network might be idle. Try sending data from this workstation.4. Use another Ethernet adapter (see "Installing or removing ISA and PCI adapters" on page 82).5. Use another port on the hub.6. Make sure that the hub port is configured for the correct speed (10 Mbps or 100 Mbps).7. If you force the duplex mode, make sure that you also force the speed to either 10 Mbps or 100 Mbps. <p>If the problem still exists, have the system serviced.</p> |
| Data is incorrect or sporadic. | <ol style="list-style-type: none">1. Make sure that you are using Category 5 Ethernet cabling when operating the server at either 10 Mbps or 100 Mbps.2. Make sure that the Ethernet cabling is not next to noise-inducing sources, such as fluorescent lights. |
| The Ethernet controller or adapter stopped working when another adapter was added to the server. | <ol style="list-style-type: none">1. Make sure that the cable is connected to the Ethernet adapter.2. Make sure that your PCI system BIOS is current.3. Reseat the adapter (see "Installing or removing ISA and PCI adapters" on page 82).4. Check for IRQ conflicts with ISA devices. See "Resolving configuration conflicts" on page 57 for information about handling resource conflicts. <p>If the problem still exists, have the system serviced.</p> |

Troubleshooting

| Controller problems | Action |
|--|---|
| The Ethernet controller or adapter stopped working without apparent cause. | <ol style="list-style-type: none"><li data-bbox="706 653 1206 745">1. If you installed an adapter, reseal the adapter (see “Installing or removing ISA and PCI adapters” on page 82).<li data-bbox="706 745 1206 777">2. Try a different connector at the hub or switch.<li data-bbox="706 777 1206 924">3. The network device driver files might be missing or corrupted; reinstall the device drivers (see your operating-system documentation and your ServerGuide instructions, if you used ServerGuide to install your operating system).<li data-bbox="706 924 1206 1039">4. Try a different Ethernet adapter. See http://www.ibm.com/pc/us/compat/ on the World Wide Web for a list of compatible adapters. <p data-bbox="695 1050 1206 1085">If the problem still exists, have the system serviced.</p> |

Checking the system for damage

Checking the system for damage

This section provides instructions on what to do if your system might be damaged.

After dropping it

Look for loose cables and obvious damage. If any cables are loose, reconnect them securely. If there is obvious damage to the system, have it serviced.

If you see no damage, turn on the system. If it works correctly, the system probably did not suffer any damage.

If the system does not work correctly, turn it off and check the adapters and memory modules to ensure that they are connected correctly. Go to “Electrical safety” on page 70 and follow the instructions for opening your system; then, reseat all adapters and memory modules.

If the system still does not work correctly, run the diagnostic programs from the *Enhanced Diagnostics* CD. See “Running the diagnostic test programs” on page 164.

Checking the system for damage

After spilling liquid on it

If liquid gets on the keyboard:

1. Turn off the server.
2. Unplug the keyboard from the back of the server.
3. Turn the keyboard upside down to drain excess liquid.
4. Dry off the keyboard with a lint-free cloth.

After the keyboard is completely dry, plug it in and turn on the server. If it does not work correctly, have the keyboard serviced.

If liquid gets inside the monitor:

1. Turn off the monitor.
2. Turn off the server.
3. Unplug the monitor from the server and the electrical outlet.
4. Have the monitor serviced immediately.

If liquid gets inside the server:

1. Turn off the server and all attached devices.
2. Unplug the server from the electrical outlet and all attached devices.
3. Have the system serviced immediately.

Replacing the battery

If the server battery malfunctions, you must replace it as described in this section.

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

2



CAUTION:

When replacing the battery, use only IBM Part Number 33L3963 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

Note: In the U.S., please call 1-800-IBM-4333 for information about battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

Replacing the battery

To order replacement batteries, call 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Before you begin, be sure you have:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Followed any special handling and installation instructions supplied with the replacement battery.
- Removed the server side cover (see “Preparing to add options” on page 73).

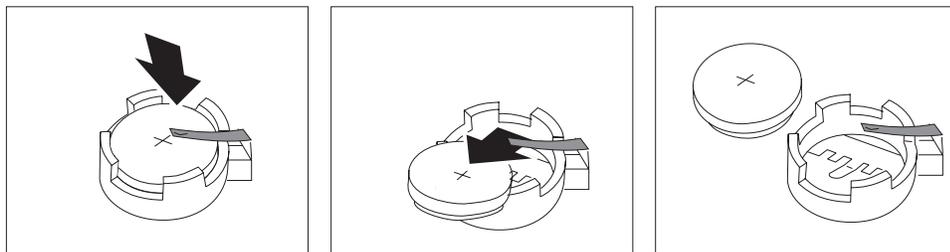
Note: After you replace the battery, you must reconfigure your system and reset the system date and time.

To replace the battery:

1. Locate the battery on the system board (see “System Board Illustration” on page 253).
2. Remove the battery:
 - a. Use one finger to lift the battery clip over the battery.
 - b. Use one finger to slightly slide the battery toward the front of the server. The spring mechanism behind the battery will push it out toward you as you slide it forward.
 - c. Use your thumb and index finger to pull the battery from under the battery clip.

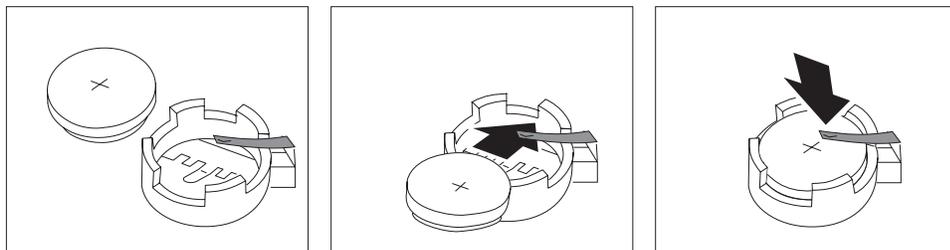
Replacing the battery

- d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



3. Insert the new battery:

- a. Tilt the battery so that you can insert it into the front of the socket, under the battery clip.
- b. As you slide it under the battery clip, press the battery down into the socket.



4. Reinstall the server covers and complete the installation (see “Completing the installation” on page 148).

Note: When you turn on the server for the first time after you replace the battery, an error message might appear. This is normal after battery replacement.

Replacing the battery

5. Start the Configuration/Setup Utility program and reset configuration parameters as needed.
 - To reset the system date and time, go to “Date and Time” on page 43.
 - To reset the power-on password, go to “Setting power-on password modes” on page 43.
 - To reconfigure your system, follow the instructions given in “The Configuration/Setup Utility program” on page 36 (all models).

Replacing the battery

Chapter 6. Getting help, service, and information

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

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:

| | |
|---|--|
| http://www.ibm.com | Main IBM home page |
| http://www.ibm.com/pc | IBM Personal Computing |
| http://www.ibm.com/pc/support | IBM Personal Computing Support |
| http://www.ibm.com/pc/us/ibmpc | IBM Commercial Desktop PCs (U.S.) |
| http://www.ibm.com/pc/us/intellistation | IBM IntelliStation Workstations (U.S.) |
| http://www.ibm.com/pc/us/accessories | Options by IBM (U.S.) |
| http://www.ibm.com/pc/us/netfinity | IBM Netfinity Servers (U.S.) |
| http://www.ibm.com/pc/us/server/sguide | IBM ServerGuide (U.S.) |
| http://www.ibm.com/software/os/warp-server | IBM OS/2 Warp Server |
| http://www.ibm.com/pc/us/netfinity/system_management | IBM Systems Management (U.S.) |

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

You might also want to visit the Web pages of other companies for information about other operating systems, software, and accessories. The following are some other Web sites you might find helpful:

<http://www.lotus.com>

<http://www.tivoli.com>

<http://www.microsoft.com>

<http://www.novell.com>

<http://www.sco.com>

<http://www.adaptec.com>

<http://www.apcc.com>

<http://www.norton.com>

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 235 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 XXXXXXXX.
- 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 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.ibm.com/pc>

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

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

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

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

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

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

http://www.direct.ibm.com/content/home/en_US/aptiva

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

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, such as America Online (AOL), contain information about IBM products. (For AOL, use the “Go to” keyword **IBM Connect**.)

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.¹¹

| 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 |
| 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 |

¹¹ Response time will vary depending on the number and complexity of incoming calls.

| Country | | Telephone number |
|------------------------|------------------------|------------------|
| 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 239.

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.

Chapter 7. Server records and specifications

Whenever you add options to your server, be sure to update the information in this section. Accurate, up-to-date records make it easier to add other options and, if the need should arise, to report a hardware problem.

In addition to server records, this chapter contains specifications. These specifications include product dimensions, environmental operating requirements, the system board layout, jumper settings, and switch settings.

This chapter contains:

| | |
|---|-----|
| Recording the identification numbers | 244 |
| Recording installed devices | 245 |
| System specifications | 251 |
| Environmental specifications | 251 |
| System Board Illustration | 253 |
| Erasing lost or forgotten passwords | 254 |
| Setting the microprocessor speed switches | 258 |
| Setting the ROM operation mode switch (BIOS recovery) | 262 |
| Setting the Ethernet controller operation mode switch | 264 |
| Setting the administrator password switch | 266 |
| Setting the diskette write-protect switch | 268 |

Recording the identification numbers

Recording the identification numbers

Record and retain the following information.

| | |
|---------------------|--|
| Product Name | IBM Netfinity 3000 |
| Machine Type | 8476 |
| Microprocessor Type | _____ (ex: 500 MHz Pentium III) |
| Model Number | _____ <input type="checkbox"/> with preinstalled hard disk drive <input type="checkbox"/> without preinstalled hard disk drive |
| Serial Number | _____ |
| Key Serial Number | _____ |

The server serial number and other identification numbers are located on a label inside the server.

The server serial number is also located on the front bezel. The identification numbers are located near the bottom of the front bezel.

Note: After you unpack your server, locate the keys. At the time of shipment, two keys are attached to the back of the server. Record the key numbers in “Recording the identification numbers” then store them in a safe place. If you lose them, you can order additional keys by calling Illinois Lock Company at (847) 537-1800 or 1-800-299-5880 (<http://www.illinoislock.com>) in the U.S.

Recording installed devices

Use the following tables to keep a record of the options installed in or attached to your system. You can also record your system default configuration settings. This information can be helpful when you install additional options in your server or if you ever need to have your server serviced. 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.

Record the types and SCSI IDs for drives or devices attached to your server in the following table. If you attach a drive or other device to an adapter, be sure to record the descriptive information appropriately.

| <i>Table 13. Internal and external drives and devices</i> | |
|---|---|
| Location | Drive or device description |
| | Internal devices |
| Bay 1 | <u>5.25-inch IDE CD-ROM drive</u> |
| Bay 2 | _____ |
| Bay 3 | _____ |
| Bay 4 | <u>3.5-inch 1.44 MB diskette drive</u> |
| Bay 5 | _____ |
| Bay 6 | <u>3.5-inch hard disk drive</u> (some models) |
| | External devices |
| SCSI ID | _____ |

Recording installed devices

Table 14 (Page 1 of 4). Configuration/setup program defaults and changes

| Option | Default value | New value | Additional information |
|--|---------------------------------|-----------|------------------------|
| System Summary | | | |
| Microprocessor ¹ | _____ | _____ | _____ |
| | (ex: Pentium II ECC) | | |
| Microprocessor Speed ¹ | _____ | _____ | _____ |
| Cache Size (internal) | _____ | _____ | _____ |
| Cache State | [Enabled] | _____ | _____ |
| System Memory | _____ | _____ | _____ |
| Memory Type | ECC | _____ | _____ |
| Extended Memory | _____ | _____ | _____ |
| Shadow RAM | 384 KB | _____ | _____ |
| System ROM (hex) | E0000h — FFFFFh | _____ | _____ |
| Diskette Drive A | 1.44 MB 3.5-inch diskette drive | _____ | _____ |
| Diskette Drive B | [Not Installed] | _____ | _____ |
| Mouse | [Installed] | _____ | _____ |
| ¹ Your server supports one microprocessor only. | | | |
| Product Data | | | |
| Flash EEPROM Revision Level | _____ | _____ | _____ |
| BIOS Date | _____ | _____ | _____ |
| BIOS Mode | Server | _____ | _____ |
| Devices and I/O Ports | | | |
| Mouse | [Installed] | _____ | _____ |
| Diskette Drive A | 1.44 MB 3.5-inch diskette drive | _____ | _____ |
| Diskette Drive B | [Not Installed] | _____ | _____ |
| Serial Port Setup | | | |
| Serial Port A Address (hex) | [3F8h – IRQ 4] | _____ | _____ |
| Serial Port B Address (hex) | [2F8h – IRQ 3] | _____ | _____ |
| USB Setup | | | |
| USB Support | [Enabled] | _____ | _____ |
| USB Keyboard/Mouse Support | [Autodetect] | _____ | _____ |
| Parallel Port Setup | | | |
| Parallel Port (hex) | [378h – IRQ 7] | _____ | _____ |
| Parallel Port Mode | [Extended] | _____ | _____ |
| Parallel Port Extended Mode | [ECP] | _____ | _____ |
| Parallel Port DMA | [DMA 3] | _____ | _____ |
| Parallel Port IRQ | [IRQ 7] | _____ | _____ |
| Video Setup | | | |
| Video Controller | S3 Incorporated. Trio3D. | _____ | _____ |
| Video Memory | 4096 KB | _____ | _____ |
| Palette Snooping | Disabled | _____ | _____ |
| Video Interrupt | [Enabled] | _____ | _____ |

Recording installed devices

Table 14 (Page 2 of 4). Configuration/setup program defaults and changes

| Option | Default value | New value | Additional information |
|--|----------------------|-----------|------------------------|
| IDE Drives Setup | | | |
| IDE Hard Disk Drive 0 | _____ | _____ | _____ |
| IDE Hard Disk Drive 1 | _____ | _____ | _____ |
| IDE CD-ROM Drive 2 | _____ | _____ | _____ |
| IDE Hard Disk Drive 3 | _____ | _____ | _____ |
| Audio Setup | | | |
| Audio Support | [Enabled] | _____ | _____ |
| Audio Output Mode | [Line Out] | _____ | _____ |
| Ethernet Setup | | | |
| Ethernet Support | [Enabled] | _____ | _____ |
| Alert on LAN | DISABLED | _____ | _____ |
| Network Boot | [DHCP] | _____ | _____ |
| MAC Address | 006094310735 | _____ | _____ |
| Start Options | | | |
| Keyboard NumLock State | [On] | _____ | _____ |
| Keyboard Speed | [Fast] | _____ | _____ |
| Disketteless Operation Mode | [Disabled] | _____ | _____ |
| Keyboardless Operation Mode | [Disabled] | _____ | _____ |
| First Startup Device | [CD-ROM] | _____ | _____ |
| Second Startup Device | [Diskette Drive 0] | _____ | _____ |
| Third Startup Device | [Hard Disk 0] | _____ | _____ |
| Fourth Startup Device | [Disabled] | _____ | _____ |
| Power-On Self-Test | [Quick] | _____ | _____ |
| Power-On Logos | [Enabled] | _____ | _____ |
| Power-On F1/Esc Option | [Enabled] | _____ | _____ |
| Power-On Status | [Disabled] | _____ | _____ |
| Virus Detection ² | [Disabled] | _____ | _____ |
| ² The Virus Detection test checks for changes to the boot sector. | | | |
| Date and Time | | | |
| Time | _____ | _____ | _____ |
| Date MM/DD/YYYY | _____ | _____ | _____ |

Recording installed devices

Table 14 (Page 3 of 4). Configuration/setup program defaults and changes

| Option | Default value | New value | Additional information |
|--|---------------|-----------|------------------------|
| System Security | | | |
| Enhanced Security | DISABLED | _____ | _____ |
| Secure IDE Devices and Diskette Drives | [Enable] | _____ | _____ |
| Remote Administration | [Enabled] | _____ | _____ |
| Power-On Password | _____ | _____ | _____ |
| Password Prompt | [Dual] | _____ | _____ |
| Administrator Password | _____ | _____ | _____ |
| Power-On Password Changeable by User | [No] | _____ | _____ |
| Adapter ROM Security | [No] | _____ | _____ |
| AssetCare ³ | [Disabled] | _____ | _____ |
| Asset ID ³ | [Disabled] | _____ | _____ |
| ³ Do not change these values. | | | |
| Advanced Setup | | | |
| Cache Control | | | |
| Cache State | [Enabled] | _____ | _____ |
| Cache Size | 512 KB | _____ | _____ |
| ROM Shadowing (hex) | | | |
| E000h - FFFFh (BIOS) | Enabled | _____ | _____ |
| DC00h - DFFFh | [Disabled] | _____ | _____ |
| D800h - DBFFFh | [Disabled] | _____ | _____ |
| D400h - D7FFFh | [Disabled] | _____ | _____ |
| D000h - D3FFFh | [Disabled] | _____ | _____ |
| CC00h - CFFFh | [Disabled] | _____ | _____ |
| C800h - CBFFFh | [Disabled] | _____ | _____ |
| C400h - C7FFFh | Enabled | _____ | _____ |
| C000h - C3FFFh | Enabled | _____ | _____ |
| PCI Control | | | |
| PCI Adapter Reset | [Enabled] | _____ | _____ |
| PCI Parity | [Enabled] | _____ | _____ |
| PCI Bus Master | | | |
| Network Adapters | [Enabled] | _____ | _____ |
| Mass Storage Adapters | [Enabled] | _____ | _____ |
| Display Adapters | [Enabled] | _____ | _____ |
| Multimedia Devices | Enabled | _____ | _____ |
| Communication Adapters | Enabled | _____ | _____ |
| Serial Adapters | Enabled | _____ | _____ |

Recording installed devices

Table 14 (Page 4 of 4). Configuration/setup program defaults and changes

| Option | Default value | New value | Additional information |
|--|---------------|-----------|------------------------|
| Plug and Play Control | | | |
| Set Device Node | [Enabled] | _____ | _____ |
| Address Decode | [16-Bit] | _____ | _____ |
| Plug and Play Operating System | [No] | _____ | _____ |
| Processor Control | | | |
| Processor 0 ID | 0634 | _____ | _____ |
| Processor Updating | [Enabled] | _____ | _____ |
| ISA Legacy Resources | | | |
| Memory Resources | _____ | _____ | _____ |
| I/O Port Resources | _____ | _____ | _____ |
| DMA Resources | _____ | _____ | _____ |
| Interrupt Resources | _____ | _____ | _____ |
| Power Management | | | |
| ACPI BIOS Mode | [Enabled] | _____ | _____ |
| APM ⁴ | [Disabled] | _____ | _____ |
| Automatic Power On | | | |
| Wake on LAN ⁵ | [Disabled] | _____ | _____ |
| Serial Port A Ring Detect ⁵ | [Disabled] | _____ | _____ |
| Modem Ring Detect ⁵ | [Disabled] | _____ | _____ |
| Wake Up on Alarm ⁵ | [Disabled] | _____ | _____ |
| PCI Wake Up ⁵ | [Disabled] | _____ | _____ |

⁴The Automatic Power Management (APM) feature is not used. ⁵Do not change these values.

The following table shows the defaults for various monitors.

Table 15. Monitor default settings and changes

| Option | Default value | New value | Additional information |
|------------------------------|----------------------|-----------|------------------------|
| Monitor Horizontal Frequency | [Not Used] | _____ | _____ |
| Refresh Rate For 640x480 | [60 Hz] | _____ | _____ |
| Refresh Rate For 800x600 | [60 Hz] | _____ | _____ |
| Refresh Rate For 1024x768 | [43 Hz interlaced] | _____ | _____ |
| Refresh Rate For 1280x1024 | [43 Hz interlaced] | _____ | _____ |
| Refresh Rate For 1600x1200 | [49 Hz interlaced] | _____ | _____ |

Recording installed devices

The following table shows the defaults for system memory and extended memory in your server. Record changes to existing memory and upgrades here.

| Option | Default value | New value | Additional information |
|------------------------|---------------|-----------|---|
| System Memory | _____ | _____ | _____ |
| Extended Memory | _____ | _____ | _____ |
| DIMM 0 | _____ | _____ | <input type="checkbox"/> 32 MB <input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB |
| DIMM 1 | _____ | _____ | <input type="checkbox"/> 32 MB <input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB |
| DIMM 2 | _____ | _____ | <input type="checkbox"/> 32 MB <input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB |
| Total Memory | _____ | _____ | _____ |

Record adapter-slot configuration information for your server in the following table.

| Slot | Type | IRQ | DMA | I/O port | ROM/RAM address | Option description and additional information |
|------------------|------|-------|-------|----------|-----------------|---|
| 1 | ISA | _____ | _____ | _____ | _____ | _____ |
| 2 | ISA | _____ | _____ | _____ | _____ | _____ |
| 3 | ISA | _____ | _____ | _____ | _____ | _____ |
| 1 | PCI | _____ | _____ | _____ | _____ | _____ |
| 2 | PCI | _____ | _____ | _____ | _____ | _____ |
| 3 | PCI | _____ | _____ | _____ | _____ | _____ |
| AGP ¹ | AGP | _____ | _____ | _____ | _____ | _____ |

Notes:

1. The dedicated Accelerated Graphics Port (AGP) slot is for AGP adapters only. For instructions on installing an AGP adapter in this slot, see "Installing or removing AGP adapters" on page 86. For information on the available AGP adapters, go to <http://www.ibm.com/pc/compat/> on the World Wide Web.
2. You may install a video adapter in the dedicated AGP slot connector, in an ISA slot connector, or in a PCI slot connector. However, the server system board does not support the AGP video connector and the integrated video subsystem simultaneously.
3. For information about installing ISA and PCI adapters, see "Installing or removing ISA and PCI adapters" on page 82.
4. Before setting values, review "Resolving configuration conflicts" on page 57 and follow the instructions for avoiding configuration conflicts.

System specifications

The server specifications include product dimensions, environmental operating requirements, the system board layout, jumper settings, and switch settings. These specifications are described in the following sections.

Environmental specifications

The following table contains the environmental specifications for the Netfinity 3000 server.

Size

- Depth: 445 mm (17.5 in.)
- Width: 200 mm (7.9 in.)
- Height: 492 mm (19.4 in.)

Weight

- Maximum configuration (as shipped): 17.3 kg (38 lb)
- Standard configuration (as shipped): 15 kg (33 lb)

Environment

- Air temperature:
 - System on: 10° to 35°C (50° to 95°F) at altitude 0–915 m (3000 ft)
10° to 32°C (50° to 90°F) at altitude 915–2134 m (3000–7000 ft)
 - System off: 10° to 43°C (50° to 110°F)
- Humidity:
 - System on: 8% to 80%
 - System off: 8% to 80%

Heat output

- Approximate heat output in British thermal units (Btu) per hour:
 - Maximum configuration (as shipped): 306 Btu/hour (90 watts)
 - Maximum configuration (theoretical)¹²: 1564 Btu/hour (460 watts)

Electrical input

- Sine-wave input (50/60 Hz) is required
- Input voltage:
 - Low range:
 - Minimum: 90 V ac
 - Maximum: 137 V ac
 - High range:

¹² Under typical maximum configurations, the heat output will be substantially below the theoretical maximum.

- Minimum: 180 V ac
- Maximum: 265 V ac
- Input kilovolt-amperes (kVA) (approximately):
 - Maximum (configuration as shipped): 0.70 kVA

Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.

Acoustical noise-emission values

- Average sound-pressure levels:
 - At operator position:
 - 35 dBA idle
 - 40 dBA operating
 - At bystander position –1 meter (3.3 ft):
 - 33 dBA idle
 - 36 dBA operating
- Declared (upper limit) sound power levels:
 - 4.7 bels idle
 - 5.0 bels operating

Notes:

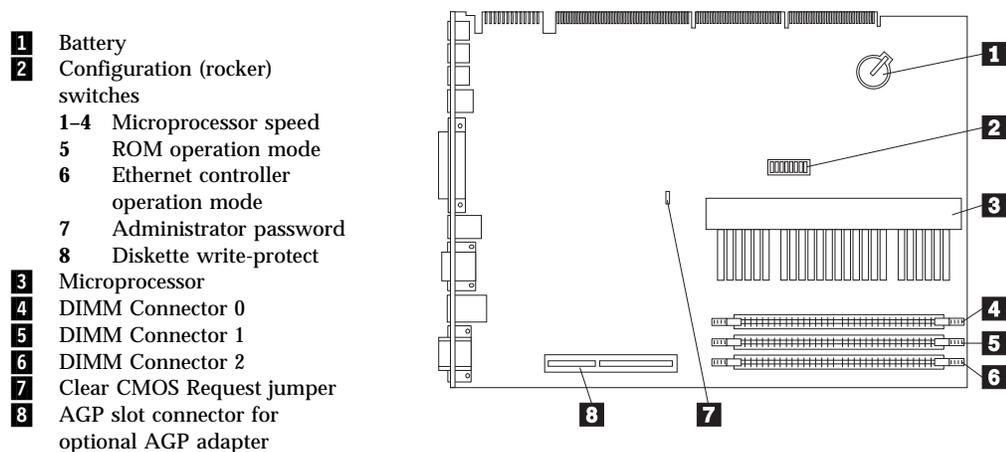
1. These levels were measured in controlled acoustical environments according to procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779, and are reported in accordance with ISO 9296.
2. Actual sound-pressure levels in your location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound power levels indicate an upper limit, below which a large number of computers will operate.

System Board Illustration

The system board, also called the *planar* or *motherboard*, is the main circuit board in your server. It provides basic server functions and supports a variety of devices that are preinstalled or that you can install later.

Some configuration actions are controlled through jumpers on the system board, whereas other actions are controlled through switches. The following sections discuss the jumper and switch settings that you can change.

If you plan to install, remove, or replace hardware in your server, or if you must set jumpers and switches, you will need to know the layout of the system board. The following illustration shows the layout of the system board in your server. The numbered pointers show the components that are discussed in this book.



Notes:

1. An illustration of the system board and additional information are provided on a label inside the server.
2. The configuration switches (1-8) are also known as rocker switches. Their settings are specified later in this chapter.

Erasing lost or forgotten passwords

Erasing lost or forgotten passwords

Note: To set, change, or delete a password, see “System Security” on page 43.

Your server uses *complementary metal-oxide semiconductor (CMOS)* memory on the system board for storing configuration and setup information. CMOS memory maintains information about:

- Date and time
- Security features
- Power-management devices
- Storage devices
- Keyboard and mouse
- ISA legacy configuration information
- Plug and Play configuration information
- Port assignments
- I/O addresses and interrupts
- Other selectable features

Within the security features are the settings for the power-on and administrator passwords. If you need to *erase* a lost or forgotten administrator password, you must erase all configuration and setup information by moving the jumper designated for CMOS memory. This jumper is known as the *Clear CMOS Request* jumper.

Attention administrator password users:

1. If enhanced security is enabled, and you forget or lose the administrator password, you must replace the system board in your server to regain access to the Configuration/Setup Utility program. For more information, see “Using the Enhanced Security features” on page 50.
2. Clearing CMOS memory erases the configuration of your server. Therefore, you must reconfigure the server after clearing CMOS memory. If possible, record your server configuration information *before* moving the Clear CMOS Request jumper.

Erasing lost or forgotten passwords

The jumper is located on the system board with the label *Clear CMOS Request*. To locate this jumper, see “System Board Illustration” on page 253, or refer to the label inside the server.

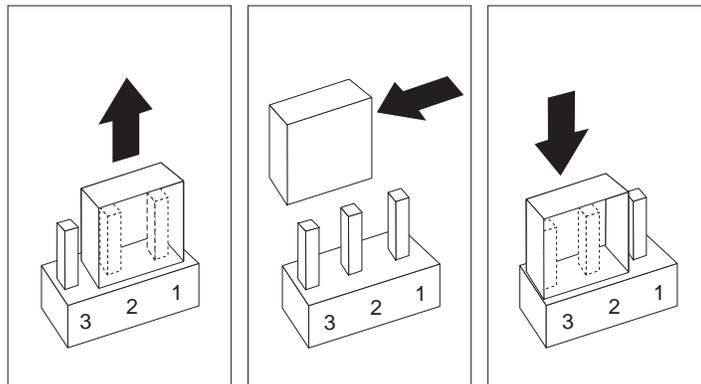
Before you begin:

- Using the Configuration/Setup Utility program, record all configuration information.
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Turn off the server, but do not disconnect the cables.
- Remove the server cover (see “Disconnecting cables and removing the side cover” on page 74).
- Place the server on its side.

1. Locate the *Clear CMOS Request* jumper on the system board (see “System Board Illustration” on page 253).

You might have to remove adapters to gain access to the jumper. See “Installing or removing ISA and PCI adapters” on page 82.

2. Move the jumper from its normal position (pins 1 and 2) to pins 2 and 3. It might be helpful to use needlenose pliers to move the jumper, but be careful not to scrape any system board components or to crush the jumper.



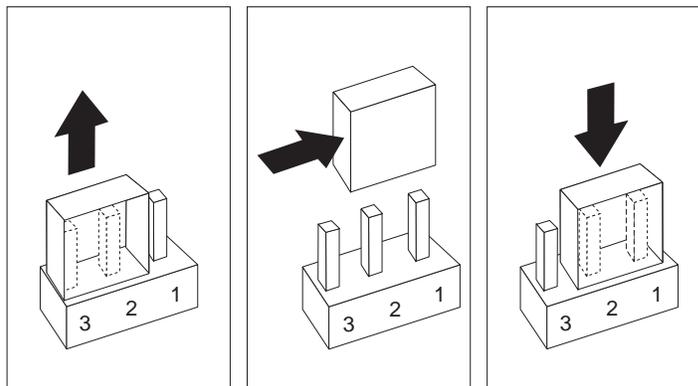
3. Turn the server back on for approximately 10 seconds.

Erasing lost or forgotten passwords

4. Turn off the server.
5. Turn the server back on.
6. CMOS memory is now cleared and the passwords have been erased. After the POST completes, configuration error messages are displayed.

Note: You might not be able to turn off the power using the power switch until POST is nearly complete. Unplug the power cord to turn off your server.

7. Follow the instructions on the screen to continue.
8. When the Configuration/Setup Utility program starts, make the necessary changes, save the settings, and exit setup. You must update the server configuration. See “Updating the server configuration” on page 153 for instructions. When you see a message that instructs you to move the jumper to the normal position, turn off the server.
9. Disconnect the power cord from the rear of the chassis.
10. Remove the server cover, and move the jumper back to its normal position (pins 1 and 2).



11. After clearing CMOS memory, you must reconfigure the server. After reassembling the server (see “Completing the installation” on page 148), use the Configuration/Setup Utility program to reset the date and time, reset any passwords, and reconfigure

Erasing lost or forgotten passwords

the server. For more information, see “Using the Configuration/Setup Utility program” on page 39.

Setting the microprocessor speed switches

When you replace a microprocessor with one that has a different speed¹³, you must change the switch settings on the system board.

Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Turn off the server and all other connected devices.
- Disconnect all external cables attached to the server; then, remove the server cover (see “Preparing to add options” on page 73).
- Locate the *Flash BIOS* in “Remote Administration” on page 52.

Note: If you have not already done so, go to <http://www.ibm.com/pc/support/> on the World Wide Web and download the appropriate flash update program. Review the applicable README files, and use this information to create a *Flash BIOS Diskette*. Perform the POST/BIOS (flash) update procedure (see “Remote Administration” on page 52 for additional information).

1. Locate the configuration switches (also known as rocker switches) on the system board. For more information, refer to the label inside the server, or see “System Board Illustration” on page 253.
2. To set the appropriate microprocessor speed, set switches 1 to 4 as shown in the following tables. It might be helpful to use the end of a small screwdriver to set the switch.

Note: Switches 5 to 8 are not used for microprocessor speed settings.

¹³ MHz denotes internal clock speed of the microprocessor only; other factors also affect application performance.

Attention:

Before you change the settings for switches 1 through 4, be sure that you check the orientation of your server system board to correctly identify the switch number locations. If you change the settings on the wrong switches, you might seriously damage server components or options.

- **266 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|----|----|-----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | On | On | Off | On | Off | Off | Off | Off |

- **300 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|-----|----|-----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | Off | On | Off | On | Off | Off | Off | Off |

- **350 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|-----|-----|----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | Off | Off | On | On | Off | Off | Off | Off |

- **400 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|----|----|-----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | On | On | Off | On | Off | Off | Off | Off |

- **450 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|-----|----|-----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | Off | On | Off | On | Off | Off | Off | Off |

- **500 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|----|-----|-----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | On | Off | Off | On | Off | Off | Off | Off |

- **550 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|-----|-----|-----|----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | Off | Off | Off | On | Off | Off | Off | Off |

- **600 MHz microprocessor speed**

| | | | | | | | | |
|--------------------------------|----|----|----|-----|-----|-----|-----|-----|
| Switch Identifier | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Default Switch Position | On | On | On | Off | Off | Off | Off | Off |

The correct switch settings¹⁴ for your system board were set at the factory. If you change the switches to the wrong settings, you might seriously damage your server's components or options.

¹⁴ Microprocessors listed in these tables were not necessarily available or planned for your model at the time this manual was written. When a microprocessor becomes available for your model, use these switch settings.

Attention:

Processors 450 MHz and higher automatically set the processor speeds.

Locate in the table the microprocessor speed and front side bus speed the microprocessor is rated for, then make sure the jumper switches are set as shown.

Notes:

- a. Visit <http://www.ibm.com/netfinity> (Server Tech Library/Configuration Tools or equivalent selection) to determine which microprocessor upgrade can be used on your model of Netfinity 3000.
 - b. For jumper settings for other speed microprocessors, refer to the label inside the cover of your server.
3. If you receive the error code 167 after you install a new microprocessor, run the Flash Utility program. Insert the *Flash BIOS Diskette* into the primary diskette drive and run the flash program. Follow the instructions in the program.

For additional information on error code 167, see the description in the “POST message table” on page 169.

4. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see “Completing the installation” on page 148), use the Configuration/Setup Utility program to reconfigure the server. For more information, see “Using the Configuration/Setup Utility program” on page 39.

Setting the ROM operation mode switch (BIOS recovery)

If the power to your server is interrupted while POST/BIOS is being updated, your server might not restart correctly. If this happens, perform the following procedure to recover.

Before you begin:

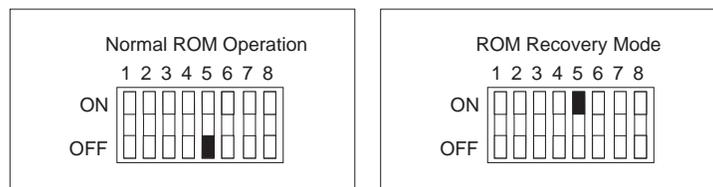
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Turn off the server and all other connected devices.
- Disconnect all external cables attached to the server; then, remove the server cover (see “Preparing to add options” on page 73).
- Locate the *Flash BIOS Diskette* that you created in “Remote Administration” on page 52.

Note: If you have not already done so, go to <http://www.ibm.com/pc/support/> on the World Wide Web and download the appropriate flash update program. Review the applicable README files, and use this information to create a *Flash BIOS Diskette*. Perform the POST/BIOS (flash) update procedure (see “Remote Administration” on page 52 for additional information).

1. Locate the configuration switches (also known as rocker switches) on the system board. For more information, refer to the label inside the server, or see “System Board Illustration” on page 253.
2. To set the ROM operation mode to the appropriate value, set switch 5 as shown in the following illustration. It might be helpful to use the end of a small screwdriver to set the switch.

Attention:

The following illustration is for reference only. Before you change the settings for switch 5, be sure that you check the orientation of your server system board to correctly identify the switch number locations. If you change the settings for the wrong switches, you might seriously damage server components or options.



3. Move the switch to the **ON** position.
4. Insert the *Flash BIOS Diskette* (POST/BIOS update) into drive A.
5. Turn on the server.
6. After the update session completes, turn off the server and remove the diskette from drive A.
7. Move the switch back to the **OFF** position.
8. Reinstall the cover and reconnect any cables that you disconnected.
9. Turn on the server to restart the operating system.
10. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see “Completing the installation” on page 148), use the Configuration/Setup Utility program to reconfigure the server. For more information, see “Using the Configuration/Setup Utility program” on page 39.

Setting the Ethernet controller operation mode switch

When you want to change the Ethernet controller operation mode from Normal to MAC Disabled, you must change the setting of configuration switch 6.

Before you begin:

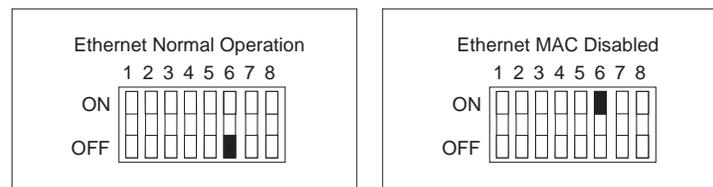
- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Turn off the server and all other connected devices.
- Disconnect all external cables attached to the server; then, remove the server cover (see “Preparing to add options” on page 73).

1. Locate the configuration switches (also known as rocker switches) on the system board. For more information, refer to the label inside the server, or see “System Board Illustration” on page 253.
2. To set the Ethernet controller operation mode to the appropriate value, set switch 6 as shown in the following illustration. It might be helpful to use the end of a small screwdriver to set the switch.

Attention:

The following illustration is for reference only. Before you change the settings for switch 6, be sure that you check the orientation of your server system board to correctly identify the switch number locations. If you change the settings for the wrong switches, you might seriously damage server components or options.

Note: In the following illustration, **MAC** represents medium access control. This refers to the Ethernet controller address.



3. Move the switch to the **ON** position.
4. Make the required adjustments to the Ethernet controller address.
5. Move the switch back to the **OFF** position.
6. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see "Completing the installation" on page 148), use the Configuration/Setup Utility program to reconfigure the server. For more information, see "Using the Configuration/Setup Utility program" on page 39.

Setting the administrator password switch

When you want to set, change, or delete an administrator password that is protected by enhanced security, you must first unlock the administrator password. To do this, change the setting of the administrator password switch from Locked to Unlocked.

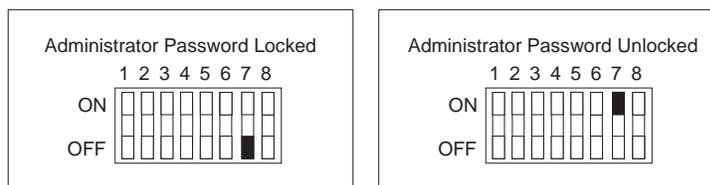
Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Turn off the server and all other connected devices.
- Disconnect all external cables attached to the server; then, remove the server cover (see “Preparing to add options” on page 73).

1. Locate the configuration switches (also known as rocker switches) on the system board. For more information, refer to the label inside the server, or see “System Board Illustration” on page 253.
2. To lock or unlock the administrator password, set switch 7 as shown in the following illustration. It might be helpful to use the end of a small screwdriver to set the switch.

Attention:

The following illustration is for reference only. Before you change the settings for switch 7, be sure that you check the orientation of your server system board to correctly identify the switch number locations. If you change the settings for the wrong switches, you might seriously damage server components or options.



3. Move the switch to the ON position.

Note: You must know the administrator password to change or delete it.

4. Set, change, or delete your password. Follow the instructions on the screen. (See “Using the Administrator Password menu” on page 48.)
 5. Move the switch back to the **OFF** position.
 6. Replace the cover. Then, turn on the server.
 7. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see “Completing the installation” on page 148), use the Configuration/Setup Utility program to set a new administrator password and reconfigure the server. For more information, see “Using the Configuration/Setup Utility program” on page 39.
- Note:* For more information on enhanced security, see “Using the Enhanced Security features” on page 50.

Setting the diskette write-protect switch

The diskette write-protect switch controls whether you can write information to a diskette using a diskette drive. The ability to prevent writing to a diskette is particularly useful if you are concerned about the security of information that can be obtained through a network.

Note: This switch does not affect the ability to read information from a diskette.

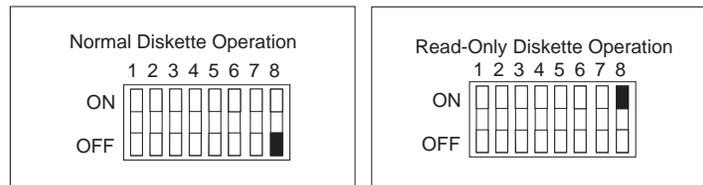
Before you begin:

- Read “Electrical safety” on page 70 and “Handling static-sensitive devices” on page 71.
- Turn off the server and all other connected devices.
- Disconnect all external cables attached to the server; then, remove the server cover (see “Preparing to add options” on page 73).

1. Locate the configuration switches (also known as rocker switches) on the system board. For more information, refer to the label inside the server, or see “System Board Illustration” on page 253.
2. For normal diskette operation or for read-only diskette operation, set switch 8 as shown in the following illustration. It might be helpful to use the end of a small screwdriver to set the switch.

Attention:

The following illustration is for reference only. Before you change the settings for switch 8, be sure that you check the orientation of your server system board to correctly identify the switch number locations. If you change the settings for the wrong switches, you might seriously damage server components or options.



3. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see “Completing the installation” on page 148), use the Configuration/Setup Utility program to reset the date and time, reset any passwords, and reconfigure the server. For more information, see “Using the Configuration/Setup Utility program” on page 39.

Note: To control and specify who has access to the diskettes in your server, use the Configuration/Setup Utility program. Follow the instructions in “Restricting access to IDE devices and diskette drives” on page 52.

Appendix A. Ethernet cable specifications

This appendix contains the specifications for the unshielded twisted-pair (UTP) cables that can be used to connect the server to an IEEE Standard 802.3 network.

The Ethernet controller on your system board provides 10BASE-T and 100BASE-TX support through the RJ-45 connector on the back of your server. When you connect your server to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps or 100 Mbps) on the network and then sets the controller to operate at the appropriate rate.

The following information describes the specifications for the unshielded twisted-pair (UTP) cable that can be used to connect the server to an IEEE Standard 802.3 network.

Attention:

To connect the server's 10BASE-T or 100BASE-TX port to a repeater, use an UTP EIA/TIA-568 Category 5 cable that is terminated with RJ-45 connectors. This is a requirement to meet various governmental standards, including electromagnetic compatibility.

The cables used in 10BASE-T or 100BASE-TX link segments do not require grounding. However, all devices connected to the cables must be grounded.

Connect the appropriate type of UTP cable to the repeater.

- If the port on the repeater is a crossover port (also called an MDI-X port), use a UTP cable that is wired as a straight-through cable.
- If the port on the repeater is not a crossover port (also known as an MDI port), use a UTP cable that is wired as a crossover cable.

Your server contains two diagnostic light-emitting diodes (LEDs) on the Ethernet connector that is located at the rear of the server.

- When the green LED is on, it indicates that the Ethernet controller is connected to a hub or switch and is receiving link pulses. This LED is also known as the Link OK light.

- When the amber LED is on, it indicates that the Ethernet network is operating at 100 Mbps. When this LED is off, it indicates that the Ethernet network is operating at 10 Mbps.

For additional information, see “Diagnostic LEDs” on page 218.

Do not use telephone extension cables to connect the server to a repeater. The wire pairs in those cables are not twisted, and the cables do not meet other requirements for use in a 10BASE-T or 100BASE-TX network. You can identify telephone extension cables by their flat and thin appearance. UTP cables are rounder and thicker than telephone extension cables.

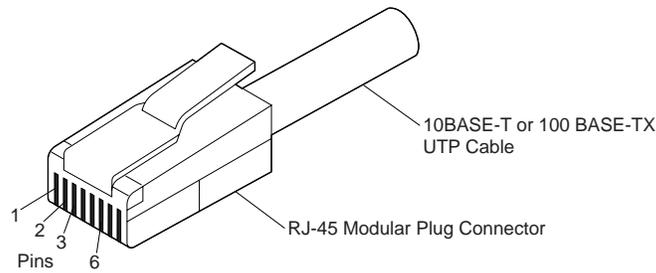
Table 18 describes the specifications for UTP cables used in 10BASE-T and 100BASE-TX link segments. Cables for these link segments must be certified as EIA/TIA-568 Category 5.

| <i>Table 18. Cabling specifications for 10BASE-T and 100BASE-TX link segments</i> | |
|--|--|
| Characteristic | Specification¹ |
| Cable type | UTP cable with two twisted pairs of 22, 24, or 26 AWG ² wire |
| Nominal impedance | 100 Ohms |
| Velocity of propagation | 0.585 c ³ |
| Maximum attenuation | <ul style="list-style-type: none"> • For 10BASE-T: 8 to 10 dB per 100 m at 10 MHz • For 100BASE-TX: 67 dB per 305 m at 100 MHz |
| <i>Notes:</i> | |
| <ol style="list-style-type: none"> 1. Cables that have been certified as EIA/TIA-568 Category 5 meet all 10BASE-T and 100BASE-TX specifications. An EIA/TIA-568 Category 5 cable must be used for 10BASE-T and 100BASE-TX. 2. The cable can contain two to four twisted pairs, but only two of the pairs will be used by the 10BASE-T or 100BASE-TX network. 3. The c represents the velocity of light traveling in a vacuum, which is 300 000 km/sec (186 400 mi/sec). | |

Note:

- AWG = American Wire Gauge
- EIA = Electronics Industries Association
- STP = shielded twisted pair
- TIA = Telecommunications Industries Association

The following figure illustrates the RJ-45 connector.



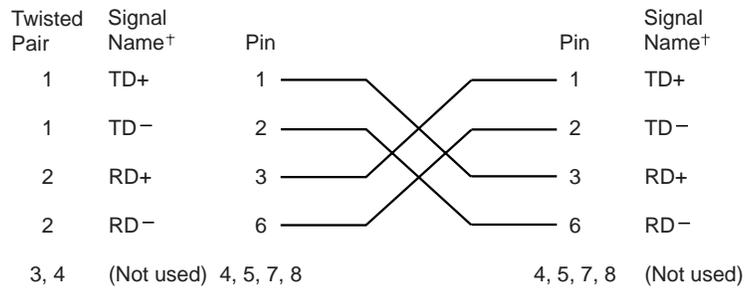
The following figure illustrates the wiring in straight-through cables.

| RJ-45 Modular Connector | | 10BASE-T / 100 BASE-TX | RJ-45 Modular Connector | | |
|-------------------------|--------------------------|------------------------|-------------------------|--------------------------|------------|
| Twisted Pair | Signal Name [†] | Pin | Pin | Signal Name [†] | |
| 1 | TD+ | 1 | ————— | 1 | TD+ |
| 1 | TD- | 2 | ————— | 2 | TD- |
| 2 | RD+ | 3 | ————— | 3 | RD+ |
| 2 | RD- | 6 | ————— | 6 | RD- |
| 3, 4 | (Not used) | 4, 5, 7, 8 | | 4, 5, 7, 8 | (Not used) |

[†] Relative to the device connected to the adapter

The following figure illustrates the wiring in crossover cables.

RJ-45 Modular Connector 10BASE-T / 100BASE-TX RJ-45 Modular Connector



[†] Relative to the device connected to the adapter

Note: For additional information about Ethernet protocols, refer to your Ethernet documentation.

Appendix B. Product warranties and notices

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

Warranty Statements

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

- **United States, Puerto Rico, and Canada (Z125-4753-05 11/97)**
(Part 1 - General Terms on page 275)
- **Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)**
(Part 1 - General Terms on page 278)
- **Worldwide Country-Unique Terms**
(Part 2 - Country-Unique Terms on page 282)

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

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

Machine - IBM Netfinity 3000

Warranty Period* - Three Years

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

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The

Product warranties and notices

warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

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

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

Extent of Warranty

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

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

Items Not Covered by Warranty

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

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

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

Warranty Service

Product warranties and notices

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

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

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

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

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

You also agree to

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

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

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

Production Status

Product warranties and notices

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

Limitation of Liability

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

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

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

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

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

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

Product warranties and notices

this Statement of Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

Machine - IBM Netfinity 3000

Warranty Period* - Three Years

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

The IBM Warranty for Machines

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

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

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

Extent of Warranty

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

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE

Product warranties and notices

LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

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

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

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

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. You may be required to present proof of purchase.

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

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

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

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

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides,
 - b. secure all programs, data, and funds contained in a Machine,

Product warranties and notices

- c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfil their obligations, and
- d. inform IBM or your reseller of changes in a Machine's location.

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

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

Production Status

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

Limitation of Liability

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

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

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

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

Part 2 - Worldwide Country-Unique Terms

ASIA PACIFIC

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

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

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

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

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

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

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement:

The laws of the State of New York govern this Statement.

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

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

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

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

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

Product warranties and notices

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

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

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

Warranty Service

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

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

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

The following terms apply to the country specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section:
2. as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

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

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

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

Product warranties and notices

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

The following paragraphs are added to this Section:
The minimum warranty period for Machines is six months.

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

Extent of Warranty: The second paragraph does not apply.

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

Production Status: The following paragraph replaces this Section:
Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

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

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

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

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

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

Applicability of suppliers and resellers (unchanged).

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

Product warranties and notices

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

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

Applicability of suppliers and resellers (unchanged).

The following replaces the second paragraph of this Section:

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND:

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

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

TURKIYE: Production Status: The following replaces this Section:

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

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

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

The following item is added to this paragraph:

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

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

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

NORTH AMERICA

CANADA: Warranty Service: The following is added to this Section:

To obtain warranty service from IBM, call **1-800-465-6666**.

Notices

UNITED STATES OF AMERICA: Warranty Service: The following is added to this Section:

To obtain warranty service from IBM, call **1-800-IBM-SERV**.

Notices

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Year 2000 readiness and instructions

This is a Year 2000 Readiness Disclosure.

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.

This IBM PC product cannot prevent errors that might occur if software you use or exchange data with is not ready for the Year 2000. IBM software that comes with this product is Year 2000 Ready. However, software from other companies might come with this IBM PC product. IBM cannot take responsibility for the readiness of that software. You should contact the software developers directly if you wish to verify readiness, understand limitations, or look for any software updates.

To learn more about IBM PC products and the Year 2000, visit our Web site at <http://www.ibm.com/pc/year2000>. The information and tools there can help you with your Year 2000 transition plan, especially if you have multiple IBM PCs. IBM encourages you to check periodically for updated information.

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Important Notes

| | |
|----------------|-------------|
| Alert on LAN | Aptiva |
| Asset ID | HelpCenter |
| HelpWare | IBM |
| IntelliStation | Netfinity |
| OS/2 | ServerGuide |
| ThinkPad | Wake on LAN |

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Important notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

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

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

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

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

Electronic emission notices

Federal Communications Commission (FCC) Statement

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

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

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

interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A Statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European community directive conformance statement

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

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

Taiwan electronic emission statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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Power cords

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

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

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

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

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

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

| IBM power cord part number | Used in these countries and regions |
|-----------------------------------|--|
| 13F9940 | Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa |
| 13F9979 | Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe |
| 13F9997 | Denmark |
| 14F0015 | Bangladesh, Burma, Pakistan, South Africa, Sri Lanka |
| 14F0033 | Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia |
| 14F0051 | Liechtenstein, Switzerland |
| 14F0069 | Chile, Ethiopia, Italy, Libya, Somalia |
| 14F0087 | Israel |
| 1838574 | Thailand |
| 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 |

This glossary includes terms and definitions from the following publications.

The American National Dictionary for Information Systems, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42 Street, New York, NY 10036. Definitions are identified by the symbol (A).

The ANSI/EIA Standard 440-A: *Fiber Optic Terminology*. Copies may be purchased from the Electronic Industries Association, 2001 Pennsylvania Avenue, N.W., Washington DC 20006. Definitions are identified by the symbol (E).

The Information Technology Vocabulary, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). These definitions are identified by the symbol (I). Definitions from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T), indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

A

adapter. A printed circuit board that modifies the system unit to allow it to operate in a particular way.

address. (1) A value that identifies a register or a particular part of storage. The value is represented by one or more characters. (2) The location in the storage of a computer where data is stored. (3) To refer to a specific storage location by specifying the value that identifies the location.

address bus. The path used for the transmission of address information in a computer.

ANSI. American National Standards Institute. An organization consisting of producers, consumers, and general interest groups, that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States.

application. The use to which an information processing system is put; for example, a payroll application, an airline reservation application, a network application.

application program. (1) A program that is specific to the solution of an application problem. Synonymous with application software. (T) (2) A program written for or by a user that applies to the user's work, such as a program that

does inventory control or payroll.
(3) A program used to connect and communicate with stations on a network, enabling users to perform application-oriented activities.

architecture. See computer architecture.

asynchronous transmission. Data transmission in which transmission of a character or a block of characters can begin at any time but in which the bits that represent the character or block have equal time duration. Contrast with synchronous transmission.

attenuation. A decrease in magnitude of current, voltage, or power of a signal in transmission between points.

AWG. American Wire Gauge.

B

back up. To copy information, usually to diskette or tape, for safekeeping.

backup. Pertaining to a system, device, file, or facility that can be used in the event of a malfunction or loss of data.

bank. An aggregation of similar devices, such as single inline memory modules, connected to each other and used cooperatively.

baud rate. In remote communications, the transmission

rate that is synonymous with signal events. The baud rate is usually expressed in bits per second.

BBS. Bulletin board system.

binary. (1) Pertaining to a selection, choice, or condition that has two possible different values or states. (I) (A) (2) Pertaining to a fixed radix numeration system having a radix of 2. (I) (A) (3) Pertaining to a system of numbers to the base two; the binary digits are 0 and 1. (A)

BIOS. Basic Input/Output System.

BIOS (Basic Input/Output System). Code that controls basic hardware operations such as interactions with diskette drives, hard disk drives, and the keyboard.

bit. Either of the digits 0 or 1 when used in the binary numeration system. Synonymous with binary digit. (T)

bridge. A functional unit that interconnects two local area networks that use the same logical link control protocol but may use different medium access control protocols.

buffer. (1) A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (A) (2) A portion of storage used to hold input or output data temporarily.

bus. One or more conductors used for transmitting signals, data, or power. See also address bus and data bus.

bus master. A device or subsystem that controls data transfers between itself and a subordinate.

C

cable. The physical medium for transmitting signals; it includes copper conductors and optical fibers.

cache. A buffer storage that contains frequently accessed instructions and data; it is used to reduce access time.

CD. Compact disc. A disc, usually 4.75 inches in diameter, from which data is read optically by means of a laser.

CD-ROM. Compact disc read only memory. High-capacity read-only memory in the form of an optically read compact disc. See also CD.

central processing unit (CPU).
(1) Synonym for processing unit.
(T) (2) The part of a computer that includes the circuits that control the interpretation and execution of instructions. See central processor, processing unit, and processor.

central processor. A processor that contains the sequencing and processing facilities for instruction execution, interruption action, timing functions, initial program

loading, and other machine-related functions.

client. A functional unit that receives shared services from a server. (T)

clock. A device that generates periodic, accurately spaced signals used for purposes such as timing, regulation of the operations of a processor, or generation of interrupts. (T)

code. A collection of instructions that is in a form that can be read and processed by a computer.

collision. An unwanted condition that results from concurrent transmissions on a channel. (T)

compatibility. The capability of a hardware or software component to conform to the interface requirements of a given computer without adversely affecting its functions.

CMOS. complementary metal oxide semiconductor

complementary metal oxide semiconductor (CMOS). A technology that combines the electrical properties of n-type semiconductors and p-type semiconductors. See also NMOS, n-type semiconductor, PMOS, p-type semiconductor. The positive and negative voltage requirements of paired p-type and n-type semiconductors complement each other. A low-power input pulse to a gate of a CMOS device turns one

semiconductor on and the other off. There is no current flow except for capacitance charging and discharging and for switching operations. CMOS devices therefore use considerably less power than other types of semiconductor devices. They are ideal for use in microcomputers and battery-powered devices such as calculators and portable computers.

computer architecture. (1) The logical structure and functional characteristics of a computer, including the interrelationships among its hardware and software components. (2) The organizational structure of a computer system, including hardware and software.

configuration. The manner in which the hardware and software of an information processing system are organized and interconnected. (T)

configure. To set up a computer for operation by describing to the system the devices, optional features, and programs installed in the computer.

connector. An electrical part used to join two or more other electrical parts. (Contrast with port.)

control. The determination of the time and order in which the parts of a computer and the devices that contain those parts perform the input, processing, storage, and output functions.

controller. A device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole.

crossover cable. A type of 10BASE-T cable in which the transmit and receive data pairs are wired so that the transmit pair is terminated at the pin positions used by the receive pair at the opposite end of the cable. A crossover cable is used to connect the 10BASE-T port on an Ethernet controller to a 10BASE-T port on a repeater that does not perform the crossover function.

D

DASD. Direct access storage device.

data. (1) A re-interpretable representation of information in a formalized manner suitable for communication, interpretation, or processing. Operations can be performed upon data by humans or by automatic means. (T) (2) Any representations such as characters or analog quantities to which meaning is or might be assigned. (A)

data bus. A bus used to communicate data internally and externally to and from a processing unit, storage, and peripheral devices. (A)

device. A mechanical, electrical, or electronic piece of equipment designed to serve a special purpose or perform a special function.

device driver. A file that contains the code needed to use an attached device.

diagnostic. Pertaining to the detection and isolation of errors in programs and faults in equipment.

digital. (1) Pertaining to data in the form of digits. (A) (2) Contrast with analog.

DIMM. Dual inline memory module.

direct access storage device (DASD). A nonvolatile-storage device, such as a diskette drive, hard disk drive, or CD-ROM drive, in which access time is effectively independent of the location of the data on the storage medium.

direct memory access (DMA). The transfer of data between memory and input/output devices without microprocessor intervention.

diskette. A small magnetic disk enclosed in a jacket. (T)

diskette drive. The mechanism used to seek, read, and write data on diskettes. It can be installed in, or attached to, a computer.

display. A component capable of displaying information on a viewing surface; for example, a cathode ray tube or a gas panel.

DMA. Direct memory access.

duplex. Pertaining to communication in which data can be sent and received at the same time. Synonymous with full-duplex (FDX).. Contrast with half-duplex (HDX).

E

ECC. Error correcting code.

EEPROM. Electrically erasable programmable read-only memory.

EISA. Extended industry standard architecture.

electrically erasable programmable read-only memory (EEPROM). EPROM that can be reprogrammed while it is in the computer.

EPROM. Erasable programmable read-only memory.

erasable programmable read-only memory (EPROM). A PROM that can be erased by a special process and reused. (T)

extended industry standard architecture (EISA). An expansion bus architecture used in a network server that provides compatibility among hardware components.

Ethernet. A 10-Mbps baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids

contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection (CSMA/CD).

F

FDX. Full-duplex. Synonymous with duplex. Contrast with HDX.

file. A named set of records stored or processed as a unit. (T)

flash memory. See electrically erasable programmable read-only memory (EEPROM).

frame. (1) A data structure that consists of fields, predetermined by a protocol, for the transmission of user data and control data. The composition of a frame, especially the number and types of fields, may vary according to the type of protocol. (T)

frequency. The rate of signal oscillation, expressed in hertz.

G

group address (GADDR). (1) In communications, a multidestination address associated with one or more stations on a network. Contrast with individual address. (2) In Synchronous Data Link Control (SDLC), an address in addition to a

specific address that is common to two or more secondary stations.

H

half-duplex. In data communication, pertaining to transmission in only one direction at a time. Contrast with duplex.

hard disk. A rigid magnetic disk such as the internal disks used in the system units of personal-computer systems and in external hard disk drives.

hard disk drive. A disk drive that reads and writes data on rigid disks and can be installed in or connected to a computer.

hardware. (1) All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (2) The equipment, as opposed to the programming, of a computer. (3) Contrast with software.

HDX. Half-duplex.

hexadecimal. Pertaining to a system of numbers to the base 16; hexadecimal digits range from 0 through 9 and A through F, where A represents 10 and F represents 15.

hot swap. (1) A hard disk subsystem feature of servers and storage enclosures that enables you to remove and replace hard disk drives without turning off the system. (2) To replace a hard disk drive while the system is turned on.

I

IEEE. Institute of Electrical and Electronics Engineers.

IEEE Standard 802.3. A series of standards that define a type of LAN that uses an access method called carrier sense multiple access with collision detection (CSMA/CD) over cabling of various types. The cabling types defined by the standard are thick coaxial (10BASE5), thin coaxial (10BASE2), unshielded twisted pair (10BASE-T), and optical fiber (10BASE-F).

individual address. In communications, an address associated with a particular station on the network. Contrast with group address.

initialization. Preparation of a system, device, or program for operation.

input/output. Pertaining to a device, process, or channel involved in data input, data output, or both.

instruction. A statement that specifies an operation to be performed by a microprocessor, and that identifies data involved in the operation.

Internet Protocol (IP). A protocol used to route data from its source to its destination in an Internet environment.

interrupt level. The means of identifying the source of an

interrupt, the function requested by an interrupt, or the code or feature that provides a function or service.

I/O. Input/output.

IRQ. Interrupt request.

ISA. Industry standard architecture

ISO. International Organization for Standardization. An organization of national standards bodies from various countries established to promote development of standards to facilitate international exchange of goods and services, and develop cooperation in intellectual, scientific, technological, and economic activity.

J

jumper. A connector between two pins on a network adapter that enables or disables an adapter option, feature, or parameter value.

L

LAN. Local area network.

LAN multicast. Sending of a transmission frame that is intended to be accepted by a group of selected data stations on the same local area network. (T)

LED. Light-emitting diode.

load. To bring all or part of a computer program into memory from auxiliary storage so that the computer can run the program.

local area network (LAN). (1) A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T) (2) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network.

logical. (1) Pertaining to content or meaning as opposed to location or actual implementation. (A) (2) Pertaining to a view or description of data that does not depend on the characteristics of the computer system or the physical storage. (A) (3) Contrast with physical. (A)

LUN. Logical unit number.

M

MAC. Medium access control.

math coprocessor. In personal-computer systems, a microprocessor that supplements the operations of the system microprocessor, enabling the computer to perform complex mathematical operations in parallel with other operations.

MAU. Medium attachment unit.

Mbps. Megabits per second.

Mbps. Million bits per second.

MBps. Megabytes per second.

medium access control (MAC).

(1) For local area networks, the method of determining which device has access to the transmission medium at any time. (2) A technique used to establish the sequence of *data stations* that are in temporary control of the *transmission medium*. (T)

MDI. Medium Dependent Interface.

MDI port. The port that acts as the electrical and mechanical interface between the twisted-pair link segment and the medium attachment unit.

MDI-X. A port on a 10BASE-T repeater that performs the crossover function.

memory. Addressable storage space in the computer that is used for temporary storage of instructions and data while a program is running, or for permanent storage of microcode. Contrast with auxiliary storage.

menu. A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T)

microprocessor. A processor whose elements have been miniaturized into one or a few integrated circuits. (T)

milliwatt (mw). One thousandth of a watt.

modem (modulator/demodulator).
(1) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities. (T) (A) (2) A device that converts digital data from a computer to an analog signal that can be transmitted on a telecommunication line, and converts the analog signal received to data for the computer.

multicast. (1) Transmission of the same data to a selected group of destinations. (T) (2) See LAN multicast.

multicast address. See group address.

N

n-type semiconductor. A semiconductor doped with donor impurities that when energized generates a predominance of negative charge carriers (free electrons). Contrast with p-type semiconductor. See also NMOS.

N-type semiconductors have a higher level of conductivity than p-type semiconductors and have faster switching rates, but allow lower-density packing of components. P-type and n-type

semiconductor materials are often layered together to obtain a rectifying action between the two dissimilar materials (CMOS).

nanosecond (ns). One thousand millionth (10^{-9}) of a second.

NetBIOS. Network BIOS. An operating system interface for application programs used on IBM personal computers that are attached to the IBM Token-Ring Network. See also BIOS.

network. (1) An arrangement of nodes and connecting branches. (T) (2) A configuration of data processing devices and software connected for information interchange.

network server. See server.

NMOS. Negative-channel metal oxide semiconductor.

negative-channel metal oxide semiconductor (NMOS). A technology used in the manufacture of field-effect transistors that utilize the properties of an n-type semiconductor material, usually doped silicon, and that when energized, produce a flow of negative charge carriers.

nonvolatile. (1) Pertaining to a storage device whose contents are not lost when power is cut off. (T) (2) Contrast with volatile.

O

OBI. Options by IBM.

operating system. Software that controls the execution of programs and that may provide services such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominantly software, partial hardware implementations are possible. (T)

P

p-type semiconductor. A semiconductor doped with acceptor impurities that, when energized, generates a predominance of positive charge carriers (holes). Contrast with n-type semiconductor. See also PMOS.

P-type semiconductors have a lower level of conductivity than n-type semiconductors and have slower switching rates, but allow higher-density packing of components. P-type and n-type semiconductor materials are often layered together to obtain a rectifying action between the two dissimilar materials.

packet. In data communication, a sequence of binary digits, including data and control signals, that is transmitted and switched as a composite whole. The data, control signals, and possibly error control information are arranged in a specific format. (I)

parallel port. An access point through which a computer transmits or receives data that consists of several bits sent simultaneously on separate wires. Contrast with serial port.

parity bit. A check bit appended to an array of binary digits to make the sum of all the binary digits, including the check bit, always odd or always even. (A)

PCI. Peripheral component interconnect.

performance. One of the two major factors, together with facility, on which the total productivity of a system depends. Performance is largely determined by a combination of throughput, response time, and availability.

physical. (1) Pertaining to actual implementation or location as opposed to conceptual content or meaning. (A) (2) Contrast with logical. (A)

pin. One of the conducting contacts of an electrical connector.

PMOS. Positive-channel metal oxide semiconductor.

port. An access point for data entry or exit. (Contrast with connector.)

positive metal oxide semiconductor (PMOS). Positive-channel metal oxide semiconductor. A technology used in field effect transistors that utilize the properties of a p-type semiconductor material, usually

doped silicon, and that when energized produce a flow of positive charge carriers (holes).

POST. Power-on self-test.

power-on self-test (POST). A series of diagnostic tests that are run automatically by a device when the power is turned on.

processing. The performance of logical operations and calculations on data, including temporary retention of data in microprocessor storage while the data is being operated on.

processing unit. (1) A functional unit that consists of one or more processors and their internal storages. (I) (A) (2) See processor.

processor. A functional unit that interprets and executes instructions. A processor consists of at least an instruction control unit and an arithmetic and logic unit. (T) See microprocessor and central processing unit.

program. (1) A sequence of instructions that a computer can interpret and execute. (2) To design, write, modify, and test computer programs. (I) (A)

programmable read-only memory (PROM). A storage device that, after being written to once, becomes read-only memory. (T) (A)

prompt. A visual or audible message sent by a program to request the user's response. (T)

PUN. Physical unit number.

R

RAID. Redundant array of independent disks.

RAM. Random access memory.

random access memory (RAM). (1) A storage device in which data can be written and read. (2) A storage device into which data is written and from which data is read in a nonsequential manner.

RAS. Reliability, availability, and serviceability.

read. To acquire or interpret data from a storage device, from a data medium, or from another source.

read-only memory (ROM). Memory in which stored data cannot be modified by the user except under special conditions. See also EEPROM, EPROM, and PROM.

record. (1) A set of data treated as a unit. (2) A set of one or more related data items grouped for processing.

refresh. (1) To recharge a memory location in volatile memory with an electric current so that it retains a state or binary value. (2) In computer graphics, the process of repeatedly producing a display

image on a display surface so that the image remains visible.

register. (1) An integrated circuit that contains 8, 16, or 32 storage locations, each of which can store 1 bit of binary data. See also binary. (2) An area that stores binary data while it is being processed by the computer.

repeater. A device used to amplify or reshape signals.

resolution. In video monitors, a measure of the sharpness of an image, expressed as the number of lines and columns on the monitor screen or the number of pels per unit of area.

ROM. Read-only memory.

S

SCSI. Small computer system interface.

segment. A section of cable between components or devices. A segment may consist of a single patch cable, several patch cables that are connected, or a combination of building cable and patch cables that are connected.

serial port. An access point through which a computer transmits or receives data, one bit at a time. Contrast with parallel port.

server. (1) A functional unit that provides shared services to workstations over a network. (2) In

a network, a data station that provides facilities to other stations.

SIMM. Single-inline memory module.

slot. (1) A position in a device used for removable storage media. (2) One of several receptacles in the rear panel of the system unit into which a user can install an adapter.

small computer system interface (SCSI). A standard input/output interface used by personal computers.

SMP. symmetric multiprocessing.

socket. A receptacle for a microchip.

software. (1) All or part of the programs, procedures, rules, and associated documentation of a computer. Software is an intellectual creation that is independent of the medium on which it is recorded. (2) Contrast with hardware.

startup sequence. In personal computers, the order that the computer uses to search the direct access storage devices for an operating system.

storage. A functional unit into which data can be placed, in which it can be retained, and from which it can be retrieved.

straight-through cable. A type of 10BASE-T cable in which the transmit and receive data pairs are

wired so that each signal wire is terminated at the same pin position at each end of the cable. A straight-through cable is used to connect the 10BASE-T port on an Ethernet controller to a 10BASE-T port on a repeater that performs the crossover function.

subsystem. In computers, a secondary or subordinate system, usually capable of operating independently of a controlling system, and usually having a single purpose, such as displaying video or reading from and writing to hard disks. A subsystem can be integrated into the system board or on an adapter.

SVGA. Super video graphics array.

symmetric multiprocessing. In personal-computer systems, a multiprocessing design that enables two or more microprocessors to run concurrently and work independently, with each microprocessor capable of performing any task.

synchronous transmission.
(1) Data transmission in which the time of occurrence of each signal representing a bit is related to a fixed time base. (I) (2) In data communication, a method of transmission in which the sending and receiving of characters are controlled by timing signals. Contrast with asynchronous transmission.

Note: The sending and receiving devices are operated at substantially

the same frequency and are kept in an appropriate phase relationship.

system board. In a system unit, the main circuit board that supports a variety of basic system devices, such as a keyboard or a mouse, and provides other basic system functions.

system unit. In personal-computer systems, the part of the computer that contains the processor circuitry, read-only memory (ROM), random access memory (RAM), and the I/O channel.

T

telephone twisted pair. One or more twisted pairs of copper wire in the unshielded voice-grade cable commonly used to connect a telephone to its wall jack. Also referred to as unshielded twisted pair (UTP).

transceiver. A physical device that connects a host interface to a local area network, such as Ethernet. Ethernet transceivers contain electronics that apply signals to the cable and sense collisions.

Transmission Control Protocol (TCP). A communications protocol used in Internet and in any network that follows the U.S. Department of Defense standards for inter-network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It

assumes that the Internet protocol is the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of protocols that allow cooperating computers to share resources across a heterogeneous network.

transmit. To send information from one place for reception elsewhere. (A)

twisted pair. A transmission medium that consists of two insulated electrical conductors twisted together to reduce noise. (T)

U

unshielded twisted pair (UTP). See telephone twisted pair.

utility program. (1) A computer program in general support of computer processes; for example, a diagnostic program, a trace program, a sort program. (2) A program designed to perform an everyday task such as copying data from one storage device to another.

V

volatile. (1) Pertaining to a storage device whose contents are lost when power is cut off. (T) (2) Contrast with nonvolatile.

W

workstation. (1) A functional unit at which a user works. A workstation often has some processing capability. (2) A terminal or microcomputer, usually one that is connected to a mainframe or to a network, at which a user can perform applications.

write. To make a permanent or transient recording of data in a storage device or on a data medium.

10BASE-T. 10 Mbps baseband twisted pair. Point-to-point twisted-pair cabling and repeaters to provide network services. There is no maximum node count. Maximum cable distance is 100 m. Covered by section 14 of the IEEE 802.3 Ethernet standards.

100BASE-TX. An IEEE 802.3 standard for baseband Ethernet data transmission at 100 Mbps over two pairs of Category 5 unshielded balanced cable or 150 Ohm shielded balanced cable.

Numerics

- 1-800 telephone assistance 224, 235
- 10/100 Mbps Ethernet
 - Controller 4, 59, 217
- 100BASE-TX crossover cable
 - wiring 273, 274
- 100BASE-TX transceiver 143
- 10BASE-T crossover cable
 - wiring 273, 274
- 10BASE-T transceiver 143
- 16-bit devices
 - installation requirements 112, 134
 - setting SCSI IDs 111
- 25-pin parallel port 12, 13
- 4-pin universal serial bus port 14
- 8-bit devices
 - installation requirements 112, 134
 - setting SCSI IDs 111
- 9-pin serial port 12, 14, 41
- 900 number support 238

A

- about this book xxix
- Accelerated Graphics Port (AGP)
 - adapters
 - compatibility 86, 250
 - dedicated slot 86
 - installing 80, 86
 - locations 80, 86
 - features 3
- accessing
 - administrator password
 - switch 266
 - Configuration/Setup Utility
 - program 37
 - diskettes 52, 268
 - drive bays 113

accessing (*continued*)

- Ethernet controller operation
 - mode switch 264
 - microprocessor speed
 - switches 258
 - ROM operation mode
 - switch 262
 - SCSISelect Utility program 62
 - system board 78
- ACPI BIOS mode, setting 56
 - activity light, Ethernet 10, 220
 - adapters
 - AGP slot position 86
 - AGP-connector location 253
 - compatibility 79, 86, 250
 - configuration conflicts 57, 58
 - considerations 80
 - deactivated 58
 - error messages 153
 - Ethernet, configuring 61
 - general information 79
 - graphics adapter connector
 - location 3, 80, 86
 - installing 82, 86
 - ISA slot position 82
 - ISA-connector locations 81
 - legacy 55
 - locations 81, 246, 253
 - PCI slot position 82
 - PCI-connector locations 81
 - Plug and Play 55
 - purpose 79
 - removing 78, 82, 86
 - resource conflicts 55, 153
 - slots 80, 81
 - using, with external devices 135
 - video 3, 80, 86
 - adding
 - AGP adapter 86
 - device drivers 154

- adding (*continued*)
 - external options 133
 - internal drives 114
 - ISA and PCI adapters 82
 - memory modules 98
 - microprocessor upgrades 127
 - security for server 144
 - U-bolt 145
 - address
 - conflicts 57, 58
 - Ethernet controller 264
 - SCSI ID (PUN) 110
 - SCSI ROM 54
 - adjusting
 - chair 20
 - controls 21
 - keyboard 27
 - lighting 21
 - monitor 20
 - administrator password
 - changing 48, 51
 - Configuration/Setup Utility program 46
 - controlling diskette drive access 52
 - deleting 49, 51
 - server startup 46
 - setting 48, 51
 - switch, setting 262, 266
 - using 48
 - Advanced Setup
 - Cache Control 54
 - PCI Bus control 54
 - PCI Control 54
 - Plug and Play Control 55
 - Processor Control 55
 - ROM Shadowing 54
 - air circulation 21, 69, 152
 - air temperature range 251
 - air vents 21
 - altitude, maximum 251
 - America Online 234
 - American National Standards Institute (ANSI) 110
 - American Wire Gauge (AWG) cable 273
 - ANSI (American National Standards Institute) 110
 - antiglare filter 21
 - architecture
 - ISA 34, 80
 - PCI 80
 - system 3
 - arranging workspace 20
 - assigning interrupt requests 54
 - assistance 230
 - attaching
 - See also* connecting
 - U-bolt 145
 - audio
 - default settings 247
 - line in connector 13
 - line out connector 13
 - microphone connector 13
 - output mode 247
 - Australian electronic emission Class A notice 290
 - auto-negotiation 59
 - Automatic Configuration and Power Interface (ACPI) BIOS mode 56
 - auxiliary device
 - See* mouse
- B**
- back view 12
 - backing up
 - low-level format files 65

- bandwidth 60
 - battery
 - accessing 78
 - disposal xxv, 224
 - failure error message 170
 - handling precautions xxv, 224
 - heavy metal 224
 - installing 226
 - location on system board 225, 253
 - ordering replacements 224
 - part number 224
 - removing 225
 - replacing 224
 - safety information xxv, 224
 - baud rate
 - Ethernet controller 60
 - bay panel
 - accessing 113
 - removing 115, 119
 - bays
 - 1–4, installing a drive in 115
 - 1–4, removing a drive from 119
 - 5 and 6, installing a drive in 122
 - 5 and 6, removing a drive from 122
 - drive 102, 104
 - expansion 102
 - external view 16
 - installing drives 112
 - internal drive locations 245
 - internal view 15
 - preinstallation steps 112
 - beep codes
 - POST 161, 192
 - table 193
 - beeps 160
 - BIOS (basic input/output system)
 - mode, ACPI 56
 - not installed message 194
 - blank screen 204
 - bolt-down facility
 - See U-bolt
 - boot
 - See startup
 - bottom cover
 - installing 90
 - removing 89
 - bridge controller 111
 - broken cover lock 206
 - bulletin boards 233
- C**
- cable-down facility
 - See U-bolt
 - cables
 - 16-bit requirements 134
 - 68-pin connector 140
 - 8-bit requirements 134
 - American Wire Gauge (AWG) 273
 - category 5 60, 143, 217, 273
 - connecting
 - power 24, 151
 - signal 24, 151
 - considerations 108, 134
 - crossover 274
 - disconnecting
 - drive 113
 - power 75
 - signal 75
 - during setup 24
 - Ethernet 271
 - for universal serial bus port 14
 - IDE 105
 - internal drive 105
 - lengths 22
 - power xxiii, 105
 - removing 70, 75

- cables (*continued*)
 - safety xxv
 - SCSI 105
 - security 147
 - shielded twisted-pair (STP) 273
 - specifications 271
 - straight-through 273
 - types 105
 - unshielded twisted-pair (UTP) 13, 273
- cabling the server 24, 151
- cache
 - control 54
 - internal level-2 size 3
 - memory 3
 - video 54
- cage
 - See drive bay assembly
- Canadian electronic emission Class A notice 290
- Canadian safety information
 - battery-safety statement xxv
- card
 - See adapters
- Category 5 cables 60, 143, 217, 273
- caution
 - battery handling xxv, 224
 - clearances for air circulation 69, 152
 - electrical safety 70
 - general information 24
 - handling static-sensitive devices 71
 - laser compliance statement xxvi
 - moving the server 2
 - power supply 71
 - statements, description ix
- CD-ROM drive
 - bay locations 104
 - controls 31
- CD-ROM drive (*continued*)
 - emergency-eject hole 16, 32, 201
 - external view 16
 - in-use light 11, 31
 - internal view 15
 - laser compliance statement xxvi
 - preinstalled 102
 - problems 201, 202
 - purpose 102
 - using 30, 31
- CD-ROMs
 - cleaning 31, 201
 - diagnostic 164
 - eject/load button 9, 31
 - Enhanced Diagnostics 159, 164
 - handling 31
 - loading 31
 - problems 201
 - unloading 31
- chair adjustments 20
- changing
 - administrator password 48, 51
 - administrator password switch settings 266
 - configuration settings 39, 40
 - diskette write-protect switch settings 268
 - Ethernet controller operation mode switch settings 264
 - hardware configuration 57, 58
 - memory addresses 57, 58
 - microprocessor speed switch settings 258
 - PCI interrupt requests 54
 - power-on password 47
 - ROM operation mode switch settings 262
 - SCSI ROM address 54
 - software configuration 58, 59

- circulation, air 21, 69, 152
- Class A electronic emission
 - notice 289—290
- cleaning
 - compact discs (CDs) 31, 201
 - the monitor 21
- clear CMOS request jumper 253, 254
- clearances for air circulation 69, 152
- comfort 20
- communication
 - adapter 79
 - modem and fax requirements for the United Kingdom 70
 - protocol for SCSI devices 110
 - requirements xxv
- compatibility
 - adapters 79, 86, 250
 - electromagnetic 60
 - operating systems 127
 - product 34
- complementary metal-oxide semiconductor (CMOS)
 - memory 254
- completing the installation 148
- components, system board 253
- configuration
 - adapter locations 246
 - adapters 153
 - changing hardware 57, 58
 - changing software 58, 59
 - Configuration/Setup Utility program 37
 - conflicts 57
 - default settings 246
 - monitors 249
 - device change 171
 - device records 246, 250
 - erasing information 254
 - configuration (*continued*)
 - errors 36, 57
 - Ethernet adapter 61
 - Ethernet controller 59
 - information 36
 - invalid SCSI 194
 - memory change 172
 - memory modules 97
 - memory-address conflicts 57, 58
 - overview 34
 - parameters, resetting 227
 - peripheral component
 - interconnect (PCI) 34
 - power-on self-test (POST) 34
 - purpose 153
 - recording information 154
 - records, ISA expansion slot 250
 - resolving conflicts 153
 - server, updating 153
 - Start Options 42
 - startup devices 42
 - updating server 153
 - utility programs 34
- Configuration/Setup Utility program
 - administrator password 48
 - configuring devices 41
 - configuring I/O ports 41
 - controlling diskette drive
 - access 52
 - defining system security 43
 - exiting 40
 - ISA legacy resources 153
 - Main Menu 39
 - menu description 39
 - menu items 246
 - power-on password 43
 - purpose 153
 - resource conflicts 153
 - setting date and time 43

- Configuration/Setup Utility
 - program (*continued*)
 - starting 37
 - using 153
- Configure/View Host Adapter
 - Settings
 - description 62
- configuring your server 34
- conflicts, configuration 57
- connecting
 - cables
 - external 24, 151
 - power 24, 151
 - safety information xxv
 - signal 24, 151
 - external options 133
 - internal drives 105
 - telephone line 152
 - U-bolt 145
- connectors
 - AGP adapter 86, 253
 - audio line in 13
 - audio line out 13
 - device records 246
 - Ethernet 12, 13, 143
 - expansion slots 12, 13
 - general information 11
 - graphics adapter 3, 80, 86
 - input/output (I/O) port 142
 - ISA and PCI adapters 82
 - ISA bus 81
 - keyboard 12, 14
 - memory modules 96
 - microphone 13
 - microprocessor 127
 - monitor 12, 14
 - mouse 12, 14, 45
 - parallel device 12, 13, 246
 - PCI bus 81
 - pointing device 12, 14
 - connectors (*continued*)
 - power cable 12
 - printer 12, 13
 - rear view of server 12
 - riser card 81
 - RJ-45 modular 273, 274
 - SCSI
 - description 12
 - purpose 110
 - termination requirements 111
 - serial device 12, 14
 - system board 253
 - universal serial bus (USB) 12, 14
- considerations
 - adapters 80
 - connecting cables 108, 134
 - environmental 224
 - microprocessor upgrade 126
 - planning 24, 69
- controller
 - baud rates 60
 - bridge 111
 - Configure/View Host Adapter
 - Settings 62
 - Ethernet
 - cable specifications 271
 - configuring 59
 - connector (RJ-45) 143
 - description 4
 - error messages 196
 - operation mode switch
 - settings 264
 - pin assignments 143
 - problems 217
 - network 143
 - printer 111
 - SCSI, problems 194
 - UltraSCSI 79, 110, 111
 - video 3, 80, 86

- controlling diskette access 52, 268
- controls
 - CD-ROM drive 31
 - CD-ROM eject/load button 9, 31
 - description 9
 - diskette eject button 9
 - illustration 8
 - memory 4
 - monitor 26
 - power switch 9
- cord, power 292
- cover
 - bottom, installing 90
 - bottom, removing 89
 - expansion-slot, removing 83
 - lock 77, 148, 206
 - side, installing 148
 - side, removing 74
- CPU
 - See microprocessor
- creating a *Flash Utility Diskette* 53
- crossover cable wiring 274
- customer assistance
 - error messages 161
 - ordering publications xxxii
 - telephone numbers xxxii

D

- damaged system
 - dropped 222
 - spilled liquid 223
- danger statements, description ix
- DASD (direct access storage device)
 - hot-swap storage expansion enclosure 133
- data parity error, PCI 54
- Date and Time 43, 227

- date, setting 43, 227
- deactivated adapters 58
- default
 - configuration values 246
 - memory settings 250
 - refresh rates for monitors 249
- defining system security 43
- definition of terms 295
- deleting
 - administrator password 49, 51
 - power-on password 48
- description
 - caution and danger statements ix
 - CD-ROM drive in-use light 11
 - CD-ROM eject/load button 9
 - Configure/View Host Adapter Settings 62
 - diskette drive in-use light 11
 - diskette eject button 9
 - dual-inline memory modules (DIMMs) 96
 - Ethernet activity light 10
 - Ethernet diagnostic LEDs 11, 219
 - features 3, 4, 6
 - Front Side Bus (FSB) 4
 - hard disk drive in-use light 10
 - input/output connectors 11, 12
 - power switch 9
 - power-on light 10
 - SCSI Disk Utilities 64
 - SCSISelect Utility program 62
 - server controls 9
 - ServerGuide 5
 - status indicators 10
- device
 - 16-bit 111, 112, 134
 - 8-bit 111, 112, 134
 - AGP-adaptor location 86, 246, 253

- device (*continued*)
 - communication protocol 110
 - configuration conflicts 57, 58
 - configuration error 171
 - drivers
 - installing 5, 60, 154
 - resources 153
 - input/output (I/O) port 142
 - ISA-adaptor locations 81, 246
 - locations 245, 246
 - logical unit number (LUN) 111
 - PCI-adaptor locations 81, 246
 - physical unit number (PUN) 110, 111
 - pointing, problems 208
 - preinstalled 102
 - priority 110
 - records 246
 - SCSI
 - general information 110
 - problems 194
 - setting SCSI IDs 111
 - startup 42
 - static-sensitive, handling 71
- Devices and I/O Ports
 - parallel port assignment 41
 - serial port assignment 41
- DHCP (dynamic host configuration protocol)
 - error messages 198
- diagnosing server problems 157, 200
- diagnostic LEDs, Ethernet 11, 219
- diagnostic utility programs
 - description, test programs 159
 - diskette 200
 - Enhanced Diagnostics* CD 159, 164
 - error 162
 - tools overview 158
- DIMM
 - See* memory modules
- disconnecting
 - cables
 - drive 113
 - power 75, 113
 - safety information xxv, 70
 - signal 75, 113
 - telephone line 74
 - disk drive, hard
 - See* hard disk drive
 - disk utility programs, SCSI 64
 - diskette drive
 - bay locations 104
 - eject button 9
 - in-use light 11
 - preinstalled 102
 - problems 203
 - purpose 102
 - disketteless operation 247
 - diskettes
 - controlling access 52, 268
 - Enhanced Diagnostics 159, 164
 - option 163
 - POST/BIOS (flash) update 52, 53, 173
 - write-protect switch 268
- display
 - See* monitor
- disposing of batteries xxv, 224
- DMA (direct memory access)
 - assigning system resources 56
 - beep codes 193
 - conflicts 57
 - resources 190
- drive
 - bay assembly location 15
 - bay assembly, front 119
 - bay assembly, rear 122
 - bays 102, 104

- drive (*continued*)
 - brackets 15
 - cables 105
 - CD-ROM 30, 102
 - disconnecting cables 113
 - diskette 102
 - drive bay assembly, front 115
 - external view 16
 - hard disk 102
 - installing
 - all bays 112
 - in bays 1–4 114, 115
 - in bays 5 and 6 122
 - internal 102
 - internal view 15
 - introduction 102
 - location
 - device records 245
 - illustration 102
 - position 112
 - removing 119, 122
 - SCSI 110
 - sizes 102, 104
 - specifications 104
 - tape 102
 - types 102
 - drive bay assembly
 - front 119
 - installing drives 115
 - rear 122
 - removing drives 119, 122
 - drivers, device
 - installing 5, 60, 154
 - dropped server 222
 - dual-inline memory module (DIMM)
 - See also* memory modules
 - description 96
 - installing or removing 98
 - recording 250
 - duplicate keys 244
 - dynamic host configuration protocol (DHCP)
 - See* DHCP (dynamic host configuration protocol)
- E**
- EEPROM
 - configuration information 36
 - Product Data 41
 - EIA (Electronics Industries Association) 273
 - eject button, diskette 9
 - eject/load button, CD-ROM 9, 31
 - ejecting a CD 16, 32, 201
 - electrical
 - input 251
 - outlets 22
 - safety xxv, 70
 - electrically erasable programmable read-only memory
 - See* EEPROM
 - electronic emission Class A
 - notice 289, 290
 - electronic support 233
 - Electronics Industries Association (EIA) 273
 - emergency-eject hole, CD-ROM 16, 32, 201
 - energy-saving features 56
 - Enhanced Diagnostics* CD 159, 164
 - Enhanced Parallel Port (EPP) 41
 - enhanced security 50
 - environmental considerations 224
 - environmental specifications 251
 - error codes, POST 193
 - error messages
 - battery failure 170
 - description 161

- error messages (*continued*)
 - device configuration 171
 - diagnostic 162
 - dynamic host configuration protocol (DHCP) 198
 - Ethernet controller 196
 - memory configuration 172
 - memory size 100
 - numeric 169
 - POST 162, 165, 169
 - remote program load (RPL) 196
 - resource conflicts 153
 - SCSI 162, 194
 - software 162
 - types 161
 - Ethernet activity light 10, 217, 220
 - Ethernet controller
 - activity light 10, 217, 220
 - address 264
 - baud rates 60
 - cable specifications 271
 - changing the IRQ 54
 - configuration 59
 - connector (RJ-45) 13, 143
 - default settings 247
 - description 4
 - device driver 60
 - diagnostic LEDs 11, 219
 - dynamic host configuration protocol (DHCP) 198
 - error messages 196
 - pin assignments 143
 - purpose 4
 - related publications xxxi
 - remote program load (RPL) 196
 - switch, setting 264
 - troubleshooting 217
 - European Community electronic emission Class A notice 290
 - Exit Setup 40
 - expansion bays 102
 - expansion enclosure problems 215
 - expansion slots
 - adapter locations 246
 - adapters 80, 81
 - connectors 13
 - cover, removing 83
 - location 12
 - position, ISA adapter 82
 - position, PCI adapter 82
 - Extended Capabilities Port (ECP) 41
 - extension cords 22
 - external
 - device records 245, 246, 250
 - devices
 - considerations 108, 133, 134
 - options, connecting 133
 - SCSI connector 12, 140
 - SCSI devices, terminating 111
 - views 12, 16, 102
- ## F
- fan
 - front, connector 81
 - front, installing 95
 - front, removing 94
 - front, replacement 95
 - hard disk, connectors 81
 - Fast Ethernet 4, 59, 271
 - fatigue 20
 - fax, getting information by 234
 - FCC Class A notice 289
 - features
 - Accelerated Graphics Port (AGP) 3
 - ACPI BIOS mode, setting 56
 - adapter ROM security 54

- features (*continued*)
 - controls and indicators 8
 - description 3, 4, 6
 - enhanced security 50
 - Ethernet controller 4
 - Front Side Bus (FSB) 4
 - front view 102
 - hardware, advanced 54
 - integrated voltage regulator 3, 126
 - internal 245, 246, 250
 - power management 56
 - RAS 7
 - rear view 12
 - records 245
 - security 144
 - ServerGuide 5
 - summary 3
- fee services 238
- fixed disk
 - See* hard disk drive
- flash (POST/BIOS) update 52, 53, 173
- flash recovery 262
- Flash Utility Diskette*, making 53
- flickering monitor 205
- forgotten password
 - erasing 254
- formatting hard disks 64, 65
- front drive bay assembly 115, 119
- Front Side Bus (FSB) 4
- front view 102

G

- general information
 - adapters 79
 - before installing options 69
 - before you begin 17
 - input/output connectors 11

- general information (*continued*)
 - installing drives 112
 - security 144
 - using CD-ROM drive 30
- general problems 206
- getting started 8, 17
- glare 21
- glossary 295
- graphics, accelerated 3, 80, 86

H

- half-high drives 104
- handling a CD 31
- handling static-sensitive devices 71
- hard disk drive
 - 68-pin connector 141
 - bay locations 104
 - external device port 140
 - fan-connector locations 81
 - in-use light 10
 - internal device port 140
 - preinstalled 102
 - purpose 102
- hard disks, formatting 64, 65
- hardfile
 - See* hard disk drive
- hardware
 - configuration conflicts 58
 - error 162
 - features, advanced 54
 - installation 69
 - removing 78
- heat output 251
- heat sink 127
- heavy-metal batteries 224
- help 230
 - See also* customer assistance
- home page, IBM Personal Computer 229

home page, IBM Personal Computing 232
humidity range 251

I

I/O ports

See also connectors
assigning system resources 56
configuring 41
connector 142

IBM 10/100 Mbps Ethernet

Controller 4, 59, 217

IBM Enhanced Diagnostics 159, 164

IBM service center

See telephone numbers

ID, SCSI 110, 111

IDE (integrated drive electronics)

devices

CD-ROM drive 103
connecting 105
considerations 108
controlling drive access 52
default settings 247

identification numbers 244

identifying system board

components 253

important notes 288

in-use lights

CD-ROM drive 11, 31
diskette drive 11, 203
hard disk drive 10
problems 206

indicators, status 8, 10

Industry Canada electronic emission

Class A notice 290

industry standard architecture (ISA)

See ISA (industry standard architecture)

input voltage 251

input, electrical 251

input, sine-wave 251

installation

bottom cover 90

clearances for air circulation 69, 152

completing 148

hardware 69

preparation 69, 73, 74

side cover 148

installing

AGP adapters 86

battery 226

bottom cover 90

device drivers 5, 60, 154

external options 133

front fan 95

internal drives

in bays 1-4 114, 115

in bays 5 and 6 122

in the rear bay assembly 122

preinstallation steps 112

SCSI 110

ISA and PCI adapters 82

memory modules 98

microprocessor 127, 130

operating system 29

Option Diskettes 163

side cover 148

system board 92

U-bolt 145

integrated drive electronics (IDE)

See IDE (integrated drive electronics) devices

integrated voltage regulator 3, 126

intermittent problems 207

internal

device records 245, 246, 250

devices

considerations 108, 134

internal (*continued*)

- drives
 - bays for 104
 - cables for 105
 - height requirements 104
 - installing in bays 1–4 114, 115
 - installing in bays 5 and 6 122
 - preinstalled 102
 - purpose 102
 - removing from bays 1–4 115, 119
 - removing from bays 5 and 6 122
 - SCSI 110
 - types 104
- options, installed 246
- SCSI connector 140
- SCSI devices, terminating 111
- view 15
- international warranty service 237
- Internet home page 229, 232
- interrupt request (IRQ)
 - assigning PCI 54
 - recording serial 246
- introducing your server 1
- ISA (industry standard architecture)
 - adapter locations 81, 82
 - connector locations 81
 - legacy resources
 - configuring adapters 55
 - updating the server configuration 153
- ISA Legacy Resources 56

J

- jumper
 - clear CMOS request 254
 - location on system board 253

K

- keyboard
 - adjusting 27
 - angle of 20
 - arm and wrist position 20
 - connector 12, 14, 139
 - locked 44
 - pin assignments 139
 - port 139
 - problems 208
- keyboardless operation 247
- keys
 - replacing 244
 - serial number 244
- kits
 - See memory modules

L

- LAN (local area network)
 - configuring the Ethernet controller 59
 - dynamic host configuration protocol (DHCP) 198
 - Ethernet cable specifications 271
 - Ethernet connector 143
 - Ethernet controller
 - messages 196
 - Ethernet pin assignments 143
 - remote program load (RPL) 196
 - troubleshooting the Ethernet controller 217
- laser compliance statement xxvi
- latch, system board 91
- LED (light-emitting diode)
 - See also lights
 - diagnostic, Ethernet 11, 219
 - Ethernet activity 217, 220
 - Ethernet link OK 11, 219

- legacy adapters 55
- lifting the system, caution 2
- lighting 21
- lights
 - CD-ROM drive in-use 11, 31
 - diagnostic, Ethernet 11, 219
 - diskette drive in-use 11
 - Ethernet activity 10, 217, 220
 - Ethernet link OK 11, 219
 - hard disk drive in-use 10
 - not working 206
 - power-on 10, 28
- link OK light 11, 219
- liquid spilled on server 223
- lithium battery caution 170
- loading a CD 31
- locations
 - AGP adapter 86, 253
 - battery 225
 - devices 245
 - drive bays 102, 104
 - drives 245
 - expansion slots 81
 - features 12, 102
 - ISA and PCI adapters 81
 - power switch 9, 26, 28
 - power-on indicator 28
 - processor-upgrade socket 126
 - riser-card connectors 81
 - server 24, 69
 - server identification
 - numbers 244
 - server records 245, 246, 250
 - system memory 96
 - system-board connectors 253
 - termination 111
 - U-bolt 147
- lock, cover 77, 148, 206
- logical unit number (LUN) 111

- low-level format program
 - backing up files 65
 - overview 64
 - starting 65
 - using 65
 - when to use 65
- lower drive bay assembly 122
- LUN (logical unit number) 111

M

- MAC (medium access control) 264
- Main Menu
 - Configuration/Setup Utility
 - program 39
- making a *Flash Utility Diskette* 53
- medium access control (MAC) 264
- memory
 - See also* system memory
 - address conflicts 57, 58
 - assigning system resources 56
 - available 160
 - cache 3
 - CMOS 254
 - configuration error 172
 - connector locations 96
 - default settings 246, 250
 - device records 246
 - microprocessor patch not
 - found 173
 - problems 210
 - size errors 100
- memory modules
 - configuration 97
 - device records 250
 - installing 98
 - location on system board 253
 - purpose 96
 - removing 98
 - size 96

- memory modules (*continued*)
 - speed 96
 - system 96
 - types 96
 - menus
 - Configuration/Setup Utility program 39, 246
 - Configure/View Host Adapter Settings 62
 - SCSI Disk Utilities 64
 - SCSISelect Utility program 62
 - messages
 - battery failure error 170
 - device configuration error 171
 - dynamic host configuration protocol (DHCP) 198
 - Ethernet controller 196
 - memory configuration error 172
 - POST 165, 169
 - remote program load (RPL) 196
 - messages, POST error 193
 - microphone connector 13
 - microprocessor
 - accessing 78
 - control 55
 - installing 127, 130
 - introduction 126
 - location 126
 - location on system board 253
 - options 126
 - POST/BIOS error 173
 - problems 208
 - removing 129
 - replacing 130
 - speed switches, setting 131, 258
 - upgrades 126
 - model number 244
 - modules
 - dual-inline memory modules (DIMMs) 96
 - monitor
 - ACPI BIOS mode 56
 - adjusting of 20
 - cleaning 21
 - configuring 41
 - connector 12, 14
 - controls 26
 - dusting of 21
 - placement of 21
 - port 138
 - power management 56
 - problems 204
 - refresh rates 249
 - self-tests 203
 - motherboard
 - See* system board
 - mouse
 - connector 12, 14
 - locked 44
 - password prompt Off mode 45, 46
 - pin assignments 139
 - port 45, 46, 139
 - problems 208
 - serial 44, 45
 - unattended start mode 45, 46
 - moving the server, caution 2
 - multilingual safety information ix
- N**
- network
 - See also* LAN (local area network)
 - 100BASE-TX 271
 - 10BASE-T 271
 - adapters
 - See* your network-adapter documentation
 - auto-negotiation 59
 - baud rates 60

- network (*continued*)
 - configuring the Ethernet controller 59
 - connection problems 217
 - device driver 60
 - dynamic host configuration protocol (DHCP) 198
 - Ethernet cable specifications 271
 - Ethernet connector 143
 - Ethernet controller
 - messages 196
 - POST/BIOS update 52, 53
 - remote program load (RPL) 196
 - troubleshooting the Ethernet controller 217
- network and server startup support 235
- network and server support services, fee 239
- noise level 252
- nonvolatile random-access memory (NVRAM) 171
- notices
 - battery xxv
 - electronic emission, Class A 289, 290
 - electronic emission, Class A, Australian 290
 - FCC, Class A 289
 - laser compliance statement xxvi
 - miscellaneous 288
 - product 286
 - safety information xxiii
 - Taiwan electronic emission 291
 - trademarks 287, 288
- office space, arranging 20
- Online Housecall 235
- online information services 233
- operating system
 - compatibility 127
 - installing 29
- Option Diskettes, copying 163
- Option ROM 54
- options
 - adapters 79
 - device records 246
 - diskettes 163
 - drives 102
 - external, connecting 133
 - internal drives 104
 - locations 245, 246, 250
 - memory modules 96
 - microprocessor 126, 127, 130
 - planning considerations 69
 - problems 211
 - SCSISelect Utility program 62
 - U-bolt 145
- ordering
 - publications xxxi, xxxii
 - replacement batteries 224
 - replacement keys 244
- ordering support line services 239
- OS/2
 - See also* operating system
 - password prompt Off mode 46
- output mode, audio 247
- output, heat 251
- overview
 - configuration 34
 - getting started 17
 - security 144

O

- occasional problems 207

P

- Packet Driver messages
- parallel port
 - configuration 246
 - configuring 41
 - connector 137
 - description 13
 - Enhanced Parallel Port (EPP) 41
 - Extended Capabilities Port (ECP) 41
 - location 12
 - pin assignments 137
 - problems 213
 - setting to bidirectional 41
- parameters
 - default, configuration 246
- parity, data 54
- part numbers
 - keys 244
 - publications xxxii
 - replacement batteries 224
 - serial 244
- password
 - administrator 48
 - controlling diskette drive access 52
 - lost or forgotten 254
 - power-on 43
 - prompt Off mode 44, 46
 - prompt On mode 43, 46
 - removing 254
 - startup 46
 - using 43
- PC support services, fee 238
- PCI (peripheral component interconnect) architecture
 - adapter locations 81, 82
 - assigning interrupt requests 54
 - connector locations 81
 - data parity error 54
 - PCI (peripheral component interconnect) architecture *(continued)*
 - interrupt request (IRQ) 54
 - Plug and Play technology 55, 79
- PCI Control 54
- performance 60
- peripheral component interconnect (PCI) architecture
 - See PCI (peripheral component interconnect) architecture
- phone numbers
 - See telephone numbers
- physical unit number (PUN) 110, 111
- pin assignments
 - auxiliary device 139
 - Ethernet connector (RJ-45) 143
 - keyboard 139
 - mouse 139
 - parallel connector 137
 - pointing device 139
 - SCSI connector 141
 - serial connector 136
 - universal serial bus 142
 - video (monitor) connector 138
- pin-number assignment, I/O connector 142
- planar
 - See system board
- planning considerations 24, 69
- planning workspace 20
- Plug and Play
 - configuring system resources 55
 - Ethernet controller 60
- Plug and Play Control 55
- pointing device
 - See *also* mouse
 - problems 208

- ports, input/output
 - See also* connectors
 - Accelerated Graphics Port (AGP) 3, 80, 86
 - keyboard 139
 - mouse 45, 139
 - parallel 137
 - See also* parallel port
 - SCSI 140
 - serial 135
 - See also* serial port
 - universal serial bus 142
 - video 138
- POST
 - See* power-on self-test (POST)
- POST/BIOS update 52, 53, 173
- power cables
 - See* power cord
- power cord 292
 - connecting 24, 151
 - connector 12
 - disconnecting 75, 113
 - internal drives 105
 - lengths 22
 - location 22
 - part numbers 292
- Power Management 56
- power supply 3, 15
- power-on
 - light 10, 28
 - starting the server 26
 - switch 9, 28
- power-on password
 - changing 47
 - deleting 48
 - dual mode 46
 - prompt Off mode 44
 - prompt On mode 43, 46
 - server startup 46
 - setting 43, 47, 227
- power-on password (*continued*)
 - unattended start mode 44
 - using 43
- power-on self-test (POST)
 - battery failure error 170
 - beep codes 161, 192, 193
 - during configuration 34
 - during setup 28
 - enhanced 42
 - error 162
 - error messages 165, 169
 - message table 169
 - overview 160
 - quick 42
- precautions
 - electrical safety 70
 - moving the server 2
 - power supply 71
- preface xxix
- preinstallation steps 112
- preinstalled devices 102
- preparing
 - external options for
 - installation 133
 - for installation 69, 73, 74
 - for setup 17, 69
- primary PCI slots 81
- printer
 - controller 111
 - problems 215
 - SCSI 110
- privileged-access password
 - See* administrator password
- problems, solving
 - configuration conflicts 57
 - diagnostic tools
 - Enhanced Diagnostics* CD 159, 164
 - Ethernet LEDs 11, 219
 - error messages 161

- problems, solving (*continued*)
 - Ethernet controller 219
 - expansion enclosure 215
 - intermittent 207
 - keyboard 208
 - memory 210
 - microprocessor 208
 - mouse 208
 - network connection 217
 - option 211
 - parallel port 213
 - POST 165, 169
 - printer 215
 - SCSI repeater card 215
 - serial bus, universal 214
 - serial port 213
 - software 216
 - tools overview 158
- processor
 - See microprocessor
- Processor Control 55
- processor-upgrade socket 126
- product
 - advantages 4, 6, 60
 - compatibility 34
 - identification numbers 244
 - internal and external
 - options 246
 - name 244
 - notices 286
- Product Data 41
- programs
 - advanced diagnostic 64
 - low-level format 64
 - server 153
- prompt Off mode 44
- protecting the server
 - See also server, security features
 - choosing an appropriate
 - location 24, 69

- publications
 - ordering xxxi, xxxii
 - part numbers xxxii
 - related xxxi
- publications, ordering 240
- PUN (physical unit number) 110, 111

R

- RAM (random-access memory) 171
- read-only memory (ROM)
 - See ROM (read-only memory)
- rear drive bay assembly 122
- rear view 12
- receive data 135
- reconfiguring the system 227
- records, device 245
- recovery, ROM 262
- reducing glare 21
- refresh rate, setting 205
- refresh rates for monitors 249
- related publications xxxi
- reliability, availability, and serviceability (RAS) 7
- Remote Administration 52
- remote program load (RPL)
 - error messages 196
- remote technical support 235
- removing
 - adapters 78
 - administrator password 254
 - AGP adapters 86
 - battery 225
 - bay panel 115, 119
 - bottom cover 89
 - drives from the front drive bay
 - assembly 119
 - expansion-slot cover 83
 - front fan 94

- removing (*continued*)
 - hardware 78
 - internal drives from bays
 - 1-4 114, 119
 - internal drives from bays 5
 - and 6 122
 - ISA and PCI adapters 82
 - memory modules 98
 - microprocessor 129
 - power-on password 254
 - server cables 70, 75
 - side cover 74, 77
 - system board 91
 - replacement batteries, ordering 224
 - replacing
 - battery 224
 - bottom cover 90
 - front fan 95
 - keys 244
 - microprocessor 130
 - system board 92
 - requirements for terminating SCSI
 - devices 111
 - resetting configuration
 - parameters 227
 - resetting power-on password 227
 - resolving configuration conflicts 57
 - resource conflicts 153
 - retaining clip 99
 - ribbon cables 105
 - riser card
 - expansion slots 80, 81
 - illustration 81
 - ISA slots 80, 81
 - PCI slots 80, 81
 - RJ-45 connector
 - crossover cable wiring 274
 - illustration 143, 273
 - pin assignments 143
 - straight-through cable
 - wiring 273
 - ROM (read-only memory)
 - adapter security, setting 54
 - defining option caching 54
 - operation mode switch
 - settings 262
 - recovery 262
 - SCSI address, changing 54
 - shadowing 54
 - RPL (remote program load)
 - See remote program load (RPL)
- S**
- safety requirements
 - Australian electronic emission
 - Class A notice 290
 - battery handling xxv, 224
 - caution and danger statements,
 - description ix
 - electrical xxv, 70
 - electronic emission Class A
 - notice 289, 290
 - FCC Class A notice 289
 - general information 24, 69
 - handling static-sensitive
 - devices 71
 - laser compliance statement xxvi
 - saving configuration settings 40
 - scanners, SCSI 110
 - screens
 - blank 204
 - Configuration/Setup Utility Main
 - Menu 39
 - filter 21
 - flicker 205
 - SCSI Disk Utilities 64
 - SCSI (small computer system
 - interface)
 - 16-bit devices 111, 112, 134
 - 68-pin connector 140, 141

- SCSI (small computer system interface) *(continued)*
 - 8-bit devices 111, 112, 134
 - address 111
 - cables 105
 - connectors 12, 110, 140
 - considerations 108, 134
 - controller
 - communication protocol 110
 - Configure/View Host Adapter Settings 62
 - configuring 62
 - termination 111
 - description 110
 - devices 102, 110
 - Disk Utilities 64
 - drive termination 111
 - error 162
 - external device port 140
 - IDs
 - device records 245
 - purpose 111
 - viewing 64
 - installing devices 105
 - internal device port 140
 - logical unit number (LUN) 111
 - low-level disk format 64
 - physical unit number (PUN) 110, 111
 - pin assignments 141
 - problems 194
 - purpose 110
 - repeater card problems 215
 - ROM address, changing 54
- SCSISelect Utility program
 - low-level disk format 64
 - menu description
 - Configure/View Host Adapter Settings 62
 - SCSI Disk Utilities 64
- SCSISelect Utility program *(continued)*
 - starting 62
 - using 62
- SDRAM (synchronous dynamic random-access memory) 3, 4, 96
- Secure IDE and Diskette Drives 52
- security options 144
- security procedures
 - See also* password
 - administrator password 48, 51
 - controlling diskette drive
 - access 52, 268
 - diskette write-protect
 - switch 268
 - enhanced 50
 - general information 144
 - keys 244
 - power-on password 43
 - setting administrator password
 - switch 266
- self-tests, internal 160
- self-tests, monitor 203
- sequence, startup 42
- serial bus, universal
 - See* universal serial bus (USB)
- serial number
 - keys 244
 - server 244
- serial port
 - address 246
 - assignment 41
 - bus, universal 214
 - connector 135
 - description 14
 - location 12
 - mouse 44
 - pin assignments 136
 - problems 213

- server
 - adapter compatibility 79
 - administrator password switch settings 266
 - bottom cover, installing 90
 - bottom cover, removing 89
 - cabling 24, 151
 - CD-ROM drive 30
 - choosing an appropriate location 24, 69
 - connectors 11
 - controls 8
 - damage 222
 - dimensions 251
 - diskette write-protect switch settings 268
 - Ethernet controller operation mode switch settings 264
 - expansion bays 102
 - external view 16
 - front fan, installing 95
 - front fan, removing 94
 - identification numbers 244
 - illustrated views
 - front 102
 - rear 12
 - internal view 15
 - microprocessor speed switch settings 258
 - operating system compatibility 127
 - planning considerations 24, 69
 - preparing for installation 73, 74
 - prompt Off mode 46
 - prompt On mode 43, 46
 - records 245, 246, 250
 - ROM operation mode switch settings 262
 - security features
 - adapter ROM 54
 - administrator password 48, 51
- server (*continued*)
 - security features (*continued*)
 - built-in 43, 144
 - enhanced 50, 51
 - general information 144
 - power-on password 43
 - security cable 147
 - U-bolt 146
 - setting up 17
 - side cover, installing 148
 - side cover, removing 74
 - specifications 251
 - stabilizing feet 23
 - starting 26
 - status indicators 10
 - tracks 148
 - unpacking
 - See the *Start Here* booklet
 - updating configuration 153
 - server startup support 235
 - server support 235
 - ServerGuide
 - See also your ServerGuide package description 5
 - service summary 230
 - service, warranty
 - See telephone numbers
 - services, fee 238
 - setting
 - adapter ROM security 54
 - administrator password 48, 51
 - administrator password switch 266
 - date and time 43, 227
 - diskette write-protect switch 268
 - Ethernet controller operation mode switch 264
 - microprocessor speed switches 258

- setting (*continued*)
 - power-on password 47, 227
 - refresh rates 205, 249
 - ROM operation mode
 - switch 262
 - SCSI IDs 111
- setting up your server 1, 17, 23
 - See also the Start Here booklet*
- Setup program
 - See Configuration/Setup Utility program*
- SGRAM (synchronous graphics random-access memory) 3
- shadowing, ROM 54
- shielded twisted pair (STP)
 - cable 273
- side cover, installing 148
- side cover, removing 74
- signal cables
 - connecting 24, 151
 - disconnecting 75, 113
 - IDE drives 105
 - internal drives 105
 - SCSI drives 105
- sine-wave input 251
- sizes
 - drive 102, 104
 - server 251
 - system memory 96
- slim-high drives 104
- slot
 - AGP-adaptor location 253
 - cover, removing 83
 - expansion 80, 81, 82
 - graphics adapter 80, 86
 - ISA bus 81
 - PCI bus 81
 - position, AGP adapter 86
 - position, ISA adapter 82
 - position, PCI adapter 82
- software
 - configuration conflicts 58
 - error 162, 216
 - problems 216
- solving problems 232
 - configuration conflicts 57
 - diagnostic tools 158
 - expansion enclosure 215
 - intermittent 207
 - keyboard 208
 - memory 210
 - microprocessor 208
 - mouse 208
 - network connection 217
 - option 211
 - overview 157
 - parallel port 213
 - printer 215
 - SCSI controller 194
 - SCSI device 194
 - SCSI repeater card 215
 - serial bus, universal 214
 - serial port 213
 - software 216
 - testing 159
 - troubleshooting charts 200
 - using the *Enhanced Diagnostics* CD 159, 164
- specifications
 - administrator password
 - switch 266
 - clear CMOS request jumper 254
 - dimensions 251
 - diskette write-protect
 - switch 268
 - drive 104
 - environmental 251
 - Ethernet cable 271
 - Ethernet controller operation
 - mode switch 264

- specifications (*continued*)
 - microprocessor speed
 - switches 258
 - ROM operation mode
 - switch 262
 - system-board layout 253
- speed
 - Ethernet controller 59, 271
 - system memory 96
- spilled liquid on server 223
- stabilizing feet 23
- standard Ethernet 59, 271
- Start Options
 - enhanced POST 42
 - startup devices 42
- starting
 - Configuration/Setup Utility
 - program 37
 - low-level format 65
 - SCSISelect Utility program 62
 - server 26
 - without operating system 29
- startup
 - devices 42
 - sequence 42
- static-sensitive devices,
 - handling 71
- status indicators 8, 10
- storage devices 103
- straight-through cable wiring 273
- supervisor password
 - See* administrator password
- support line services, ordering 239
- surge protectors 22
- switch set
 - accessing 78
 - administrator password 266
 - diskette write-protect
 - switch 268
 - Ethernet controller operation
 - mode 264
- switch set (*continued*)
 - location on system board 253
 - microprocessor speeds 258
 - ROM operation mode 262
- synchronous dynamic
 - random-access memory
 - (SDRAM) 3, 4, 96
- synchronous graphics
 - random-access memory
 - (SGRAM) 3
- system architecture 3
- system board
 - accessing 78
 - administrator password switch
 - settings 266
 - battery failure 170
 - description 253
 - diskette write-protect switch
 - settings 268
 - Ethernet controller operation
 - mode switch settings 264
 - identifying components 253
 - installing 92
 - latch 91
 - layout 253
 - memory connectors 96
 - microprocessor speed switch
 - settings 258
 - removing 91
 - ROM operation mode switch
 - settings 262
 - voltage regulator feature 3, 126
- System Information
 - Product Data 41
- system memory
 - features 4
 - increasing 96
 - installing a DIMM 98
 - purpose 96
 - removing a DIMM 98

- system resources 56
- System Security menu
 - Administrator Password 48
 - Enhanced Security 50
 - Power-On Password 43
 - Remote Administration 52
 - Secure IDE and Diskette Drives 52
- system specifications 251
- System Summary 40

T

- tape drive
 - bay locations 104
 - connector 137
 - purpose 102
- technical directory, publications
 - See telephone numbers
- technical support
- technical support, fee 238
- technical support, remote 235
- technical support, warranty 235
- Telecommunications Industries Association (TIA) 273
- telephone assistance 235
- telephone line
 - connecting 152
 - disconnecting 74
 - requirements for the United Kingdom xxv, 70
- telephone numbers
 - ordering batteries 224
 - ordering publications xxxii
- termination 111
- terms, glossary of 295
- testing
 - See also power-on self-test (POST)
 - description, diagnostic programs 159
- testing (*continued*)
 - monitor 203
 - server
 - overview 159
 - using the *Enhanced Diagnostics* CD 159, 164
- TIA (Telecommunications Industries Association) 273
- time, setting 43, 227
- tips 17
- tools 69
- tracks, server 148
- trademarks 287, 288
- transmit data 135
- troubleshooting
 - CD-ROM drive problems 201, 202
 - CD-ROM problems 201
 - charts 200
 - diskette drive problems 203
 - Ethernet controller 217, 219
 - expansion enclosure problems 215
 - general problems 206
 - intermittent problems 207
 - keyboard problems 208
 - memory problems 210
 - microprocessor problems 208
 - monitor problems 203, 204
 - mouse problems 208
 - occasional problems 207
 - option problems 211
 - overview 162
 - parallel port problems 213
 - pointing-device problems 208
 - printer problems 215
 - SCSI repeater card problems 215
 - serial port problems 213
 - software problems 216

- troubleshooting (*continued*)
 - universal serial bus
 - problems 214
- turning on the system
 - location of power switch 9
 - problems 207
- types
 - cable 105, 271
 - drive 104
 - drive bay assemblies 114
 - system memory 96

U

- U-bolt
 - installing 145
 - location 147
- UltraSCSI adapter
 - Configure/View Host Adapter Settings 62
 - enabling support 63
 - SCSI IDs 110
 - termination 111
- unattended start mode 3, 44
- United Kingdom electronic emission Class A notice 290
- United Kingdom safety information
 - See also* Universal English safety information
 - telephone line requirements xxv, 70, 74
- United States electronic emission Class A notice 289
- United States FCC Class A notice 289
- United States safety information
 - See* Universal English safety information
- Universal English safety information
 - battery-safety statement xxv
- universal serial bus (USB)
 - connector 142
 - description 142
 - pin assignments 142
 - port 12, 14
 - problems 214
- unknown power-on password, removing 254
- unloading a CD 31
- unpacking the server
 - See the Start Here booklet*
- unshielded twisted pair (UTP)
 - cable 13, 273
- updating
 - configuration after installing options 153
 - POST/BIOS, over the network 52, 53
- updating server configuration 153
- upgrading
 - memory modules 96
 - microprocessor 126, 127
- upper drive bay assembly 115
- using
 - Administrator Password menu 48
 - Automatic Configuration and Power Interface BIOS Mode 56
 - CD-ROM drive 30
 - clear CMOS request jumper 254
 - Configuration/Setup Utility program Main Menu 39
 - diagnostic tools 158
 - Enhanced Diagnostics* CD 159, 164
 - Enhanced Security features 50
 - Power-On Password menu 43
 - SCSISelect Utility program 62
 - stabilizing feet 23

- utility programs
 - configuration 34
 - Configuration/Setup 37, 153
 - Configuration/Setup Main
 - Menu 39
 - Enhanced Diagnostics* CD 159, 164
 - SCSI disk 64
 - SCSISelect 62

V

- venting of hot air 21
- video
 - adapter 3, 80, 86
 - changing the IRQ 54
 - configuring 41
 - connector location 14, 253
 - default settings 246
 - defining cache buffer 54
 - enabling BIOS cache 54
 - pin assignments 138
 - port connector 138
 - subsystem 3, 80, 86
- view
 - external 16
 - front 102
 - internal 15
 - rear 12
 - SCSI IDs 64
- vital product data (VPD) 7
- voltage
 - input 251
 - regulator feature 3, 126
- VPD (vital product data) 7

W

- warranty
 - statement

- warranty extensions and
 - upgrades 240
- warranty service 235
- weight of server 251
- Windows NT Server
 - See also* operating system
 - password prompt Off mode 46
- work area, arranging 20
- World Wide Web home page 229, 232
- write-protect switch, setting 268

Y

- year 2000 readiness and
 - instructions 287



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