Netfinity 3500

User's Handbook

IBM

Netfinity 3500

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 221.

First Edition (January 1998)

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⚠️ **DANGER:**

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly grounded outlet.

To Connect	To Disconnect
Turn everything OFF.	Turn everything OFF.
First, attach all cables to devices.[1]	First, remove power cord from outlet.[2]
Attach signal cables to receptacles.	Remove signal cables from receptacles.
Attach power cord to outlet.	Remove all cables from devices.
Turn device ON.	
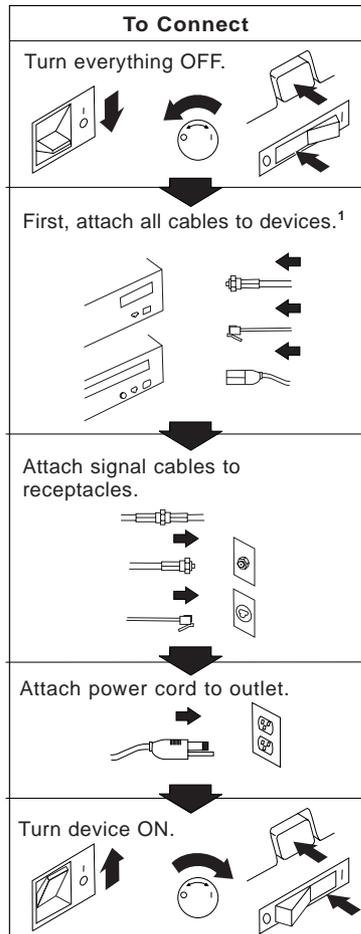
[1] In the U.K., by law, the telephone cable must be connected after the power cord.
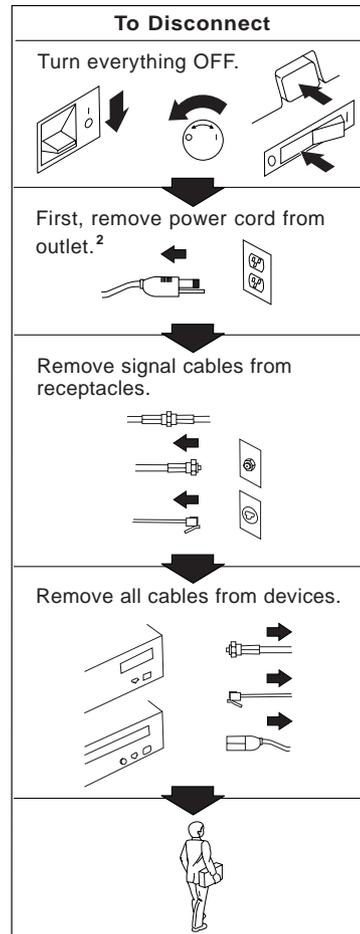
[2] In the U.K., by law, the power cord must be disconnected after the telephone line cable.

 DANGER:

Le courant électrique provenant des câbles d' alimentation, télephoniques et de transmission peut présenter un danger. Pour éviter tout risque de choc électrique, connectez et déconnectez ces câbles comme indiqué ci- dessous lorsque vous installez ou déplacez ce matériel ou les unités connectées, ou que vous soulevez un carter.*

Pour connecter	Pour deconnecter
Mettez tout hors tension.	Mettez tout hors tension.
Connectez d' abord tous les câbles sur les unités.	Débranchez d' abord le cordon d' alimentation de la prise murale.
Connectez les câbles de signaux sur les prises murales.	Déconnectez les câbles de signaux des prises murales.
Branchez le cordon d' alimentation sur la prise murale.	Déconnectez tous les câbles de unités.
Mettez l' unité sous tension.	

*Le cordon d' alimentation doit être branché sur un socle de prise de courant correctement mis à la terre.

Lithium Battery Notice

CAUTION:
Danger of explosion if battery is incorrectly replaced.

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the 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.

ATTENTION
Danger d'explosion en cas de remplacement incorrect de la batterie.

Remplacer uniquement par une batterie IBM de type 33F8354 ou d'un type équivalent recommandé par le fabricant. La batterie contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

Ne pas :

- **Lancer ou plonger dans l'eau**
- **Chauffer à plus de 100°C (212°F)**
- **Réparer ou désassembler**

Mettre au rebut les batteries usagées conformément aux règlements locaux.

Laser Compliance Statements

This section contains laser compliance statements for the United States, Canada, and the United Kingdom.

United States, Canada, and United Kingdom

Some IBM server 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.

When a CD-ROM drive is installed, note the following.

CAUTION:
Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

Opening the CD-ROM drive might result in exposure of hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. **Do not open.**

Some CD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following.

DANGER

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

Canada
Conformité aux normes relatives aux appareils à laser

L'unité de CD-ROM est un appareil à laser dont la classification est identifiée par l'étiquette ci-dessous, apposée sur l'unité :

```
CLASS 1 LASER PRODUCT
LASER KLASSE 1
LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT
APPAREIL À LASER DE CLASSE 1
EN 60825
```

Aux États-Unis, l'unité de CD-ROM IBM est certifiée conforme aux normes indiquées dans le sous-chapitre J du DHHS 21 CFR relatif aux produits à laser de classe 1. Dans les autres pays, elle est certifiée être un produit à laser de classe 1 conforme à la norme IEC 825.

CAUTION:
N'ouvrez pas l'unité. L'utilisateur ne peut effectuer aucun réglage ni aucune opération de maintenance à l'intérieur.

Les produits à laser de classe 1 ne sont pas considérés comme dangereux. L'unité de CD-ROM renferme un laser de classe 1 à l'arséniure de gallium, d'une puissance nominale de 0,14 milliwatt, fonctionnant dans la gamme de longueurs d'onde de 765 à 815 nanomètres.

Laser Compliance Statements

This book provides instructions on how to configure your IBM Netfinity 3500 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 3500 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 3500 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.

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 3500 server:

- The *IBM Service and Support* pamphlet contains important information and phone numbers to call for different types of support for your server.

- The ServerGuide package, which contains several CD-ROMs, describes the advantages of IBM ServerGuide and describes how to use the ServerGuide software.

- The Netfinity 3500 *Setup and Installation* booklet contains detailed information about setting up your server, attaching cables, and installing an operating system.

The *IBM Netfinity 3500 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 the trained service technicians. (Diagnostic diskettes 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 3500 Server

We appreciate your decision to purchase an IBM® Netfinity® 3500 server. Your Netfinity 3500 server is a high-performance, symmetric multiprocessing (SMP) 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 3500 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 3500 server model and other IBM server products at the following World Wide Web address:

`http://www.us.pc.ibm.com/server/`

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 194. You will need these numbers when you register your server with IBM. After you register your server, you can receive information about updates, performance tips, and compatibility. To register your server, go to the following World Wide Web address:

`http://www.pc.ibm.com/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 183.

If you have not yet set up your server, refer to the *Setup and Installation* booklet for detailed information about attaching cables and installing an operating system.

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

CAUTION:

Two people are required to move or lift the server. Therefore, to avoid possible injury while moving or lifting the server, ask another person to help you.

This chapter contains:

Features at a Glance

The following table summarizes the features of the Netfinity 3500 server.

Microprocessor

- Intel® Pentium® II microprocessor with MMX™ technology
- 16 KB of level-1 cache memory
- 512 KB of level-2 cache memory integrated into microprocessor
- Clock rate varies by model

Memory

- Four 3.3 V, synchronous, 168-pin, unbuffered, dual in-line memory-module (DIMM) sockets
- Expandable to 512 MB
- 66 MHz, synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC)
- Support for 32 MB, 64 MB, and 128 MB DIMMs in either single-sided or double-sided configurations
- Flash memory for system programs

Diskette Drive

- Supports one diskette drive
- Standard: One 3.5-inch, 1.44 MB

Hard Disk Drives

- Number and capacities of hard disk drives vary by model
- Server supports up to four internal hard disk drives

CD-ROM Drive

- Standard: IDE

Keyboard and Auxiliary Device

- Keyboard
- Three-button mouse

Expansion Slots

Supports up to five adapters:

- One shared PCI/ISA slot
- Three dedicated PCI slots
- One dedicated ISA slot

Standard: One dedicated Accelerated Graphics Port (AGP) slot for video adapter

Expansion Bays

- One 3.5-inch or 5.25-inch drive bay
- Four 3.5-inch drive bays
- Number of bays available for expansion varies by model

    Standard: One dedicated 5.25-inch drive bay for CD-ROM drive

Upgradable POST and BIOS

- POST/BIOS upgrades (when available) to update EEPROM on the system board

Security Features

- Bolt-down capability
- Side cover lock
- Power-on and administrator passwords
- Security-error indicator
- Selectable drive-startup sequence
- Unattended start mode

Power Supply

- 330 W
- Auto-sensing function
    - 50/60 Hz
    - 100–127 V ac or 200–240 V ac
- Built-in overload and surge protection

Integrated Functions

- Voltage regulator for microprocessors
- Two serial ports
- Two universal serial bus (USB) ports
- One parallel port
- Mouse port
- Keyboard port
- 16-bit UltraSCSI controller
    - One external connector (16-bit)
    - One internal connector (16-bit)
- Full-duplex 10/100 Mbps Ethernet controller
    - 10BASE-T/100BASE-TX port
    - Integrated Direct Memory Access (DMA) Buffer Management Unit for low microprocessor and bus utilization
- Video adapter in Accelerated Graphics Port (AGP)
    - 4 MB synchronous graphics random-access memory (SGRAM), 100 MHz

What Your IBM Netfinity 3500 Server Offers

The unique design of your IBM Netfinity 3500 server takes advantage of advancements in SMP, data storage, networking, and memory management. Your server offers:

- Impressive performance using an innovative approach to SMP

  The Netfinity 3500 server supports up to two Intel Pentium II microprocessors. Your server comes with one Intel Pentium II microprocessor installed on the system board. You can install a second microprocessor in your server to enhance performance and provide SMP capability.

- Large system memory

  The memory bus in your server supports up to 512 MB of system memory. The memory controller provides support for 66 MHz, synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC).

- Integrated network environment support

  Your server supports various network environments. Your Netfinity 3500 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).

- IBM ServerGuide™

  ServerGuide provides compact disc (CD) based programs to help simplify your server setup and network operating system installation. In addition, all of the included application programs are yours to install, and no software activation keys are required. You can use ServerGuide to:

  - Install your copy of a network operating system. Device drivers are provided as needed.

  - Replicate an installation for five or more Microsoft Windows NT Server 4.0 systems.

- Install the application programs that come with ServerGuide.

- Dial-in to IBM at any time[1] using IBM Update Connector, a dial-up program that automatically updates your server Basic Input/Output System (BIOS) level, device drivers, and various programs.

- Create service and support diskettes for most IBM servers.

- View or print various online technical publications.

For more information, refer to the ServerGuide package that comes with your server.

• Your Netfinity 3500 server comes with the IBM Enhanced Diagnostics CD-ROM. This CD-ROM contains the server diagnostic test 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 124.

Your IBM Netfinity 3500 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 221 for additional information.

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[1] Response time will vary, depending on the number and nature of calls received.

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 built-in RAS features on the IBM Netfinity 3500 server. Many of these features are explained in the following chapters of this book.

- Built-in, menu-driven configuration programs
- Built-in, menu-driven small computer system interface (SCSI) configuration programs
- Built-in, menu-driven setup programs
- Menu-driven diagnostic programs on CD-ROM
- Power-on self-test (POST)
- Customer support center 24 hours per day[2]
- Cooling fans with speed-sensing capability
- Error checking and correcting (ECC) memory
- Error codes and messages
- Upgradable POST and BIOS
- Parity checking on the SCSI bus, keyboard interface, and serial ports
- LANDesk® and Netfinity enabled
- Vital product data (VPD), including serial number information and replacement part numbers, stored in nonvolatile memory, making remote maintenance of your server more efficient.
- Power Managed - Advanced Configuration and Power Interface (ACPI) level
- Advanced Desktop Management Interface (DMI) features

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

Controls and Indicators

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

Server Controls

Power Switch

CD-ROM
Eject/Load Button

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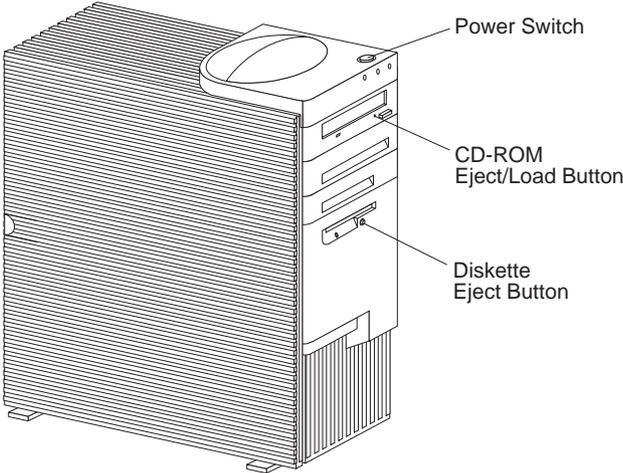
Power Switch: Press this switch to turn your server on or off.

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 20 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.

Status Indicators

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

Power-On Light
Hard-Disk Drive In-Use Light
Ethernet Activity Light
CD-ROM Drive In-Use Light
Diskette Drive In-Use Light
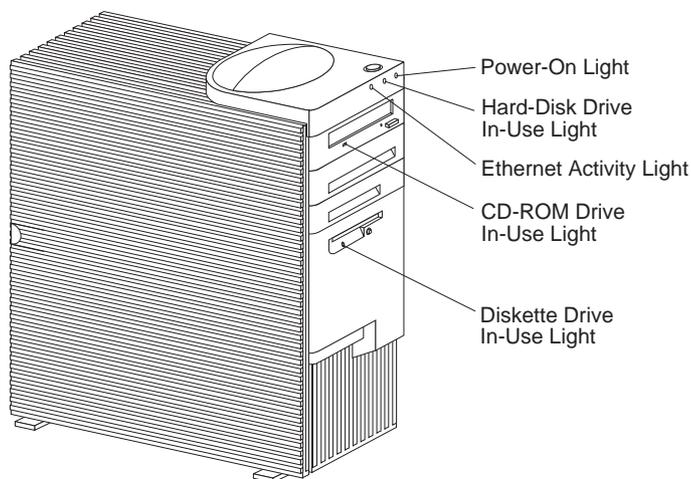
Power-On Light: This light comes on when you turn on your server by pressing the power switch.

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.

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 97.

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.
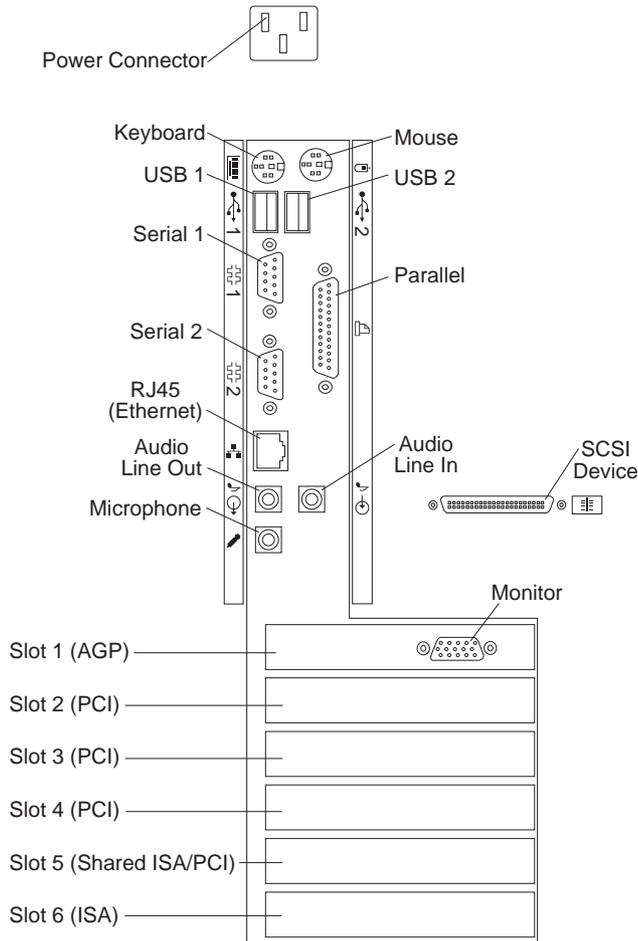
Power Connector: The server power cable connects here.

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

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

Input/Output Connectors

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

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.

SCSI Connector: SCSI devices attach here. For more information, see "Adding External SCSI Devices" on page 98, "Attaching External Options" on page 99, and "SCSI Connectors" on page 104.

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 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 more information about cables, see Appendix A, "Ethernet Cable Specifications" on page 217.

Serial Connectors: Attach signal cables for modems or other serial devices to the 9-pin serial connectors of serial ports 1 and 2. See "Serial Port Connectors" on page 99 for port assignment information.

Keyboard Connector: The keyboard cable connects here.

Monitor Connector: The monitor signal cable connects here.

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 59.

Note: The monitor connector is located on the graphics adapter installed in slot 1.

Input/Output Connectors

This chapter describes how to use your server. 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 3500 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 51 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 the *Setup and Installation* booklet that comes with your server.

This chapter contains:

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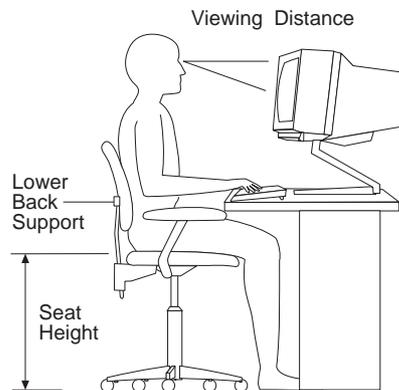
Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance,

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

- 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 233.

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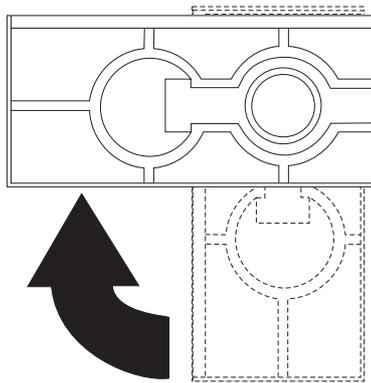
When you need to access the inside of the server to install options, you might find it easier to place the server on its side, so that the system board is facing you. If you do so, rotate the feet in towards the server, so that they do not break off due to the weight of the server.

Using the CD-ROM Drive

An IDE CD-ROM drive is a standard feature on all Netfinity 3500 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.
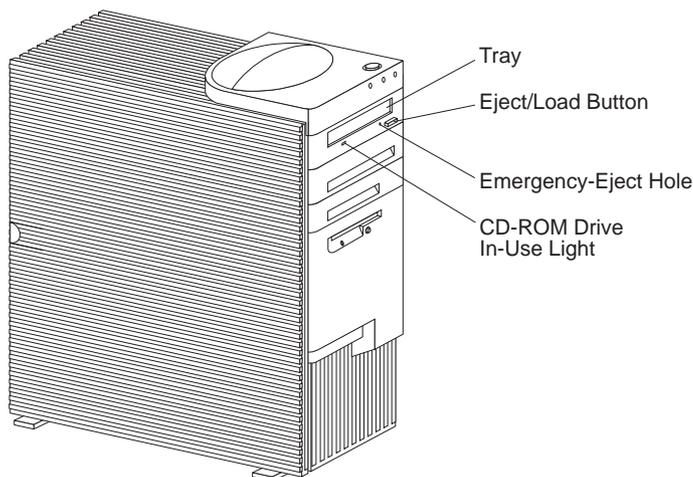
Handling a CD

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

To load and unload a CD into 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.

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.

Before You Install Software

Use ServerGuide to verify that you have the proper working environment for the specific operating system that you are installing.

1. Follow the instructions provided in your ServerGuide package to install your operating system and device drivers.

   See "What Your IBM Netfinity 3500 Server Offers" on page 4 for information on the ServerGuide package.

2. Use the tables provided in Chapter 7, "Server Records and Specifications" on page 193 to record the server serial number, model number, and type number. If you installed options, also update the device-records tables in Chapter 7, "Server Records and Specifications."

What to do next?

- To get help with your installation, refer to the *IBM Service and Support* pamphlet.

- To install application programs, refer to the application program documentation.

- To learn more about your server, see Chapter 1, "Introducing Your Netfinity 3500 Server" on page 1.

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

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 supports 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)

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.us.pc.ibm.com/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 193. 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 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 Program" on page 26.

2. Set jumpers or switches on the server's system board.

   See Chapter 7, "Server Records and Specifications" on page 193.

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 51.

   Reserve ISA legacy resources for ISA adapters. See "ISA Legacy Resources" on page 40.

5. Resolve configuration conflicts.

   See "Resolving Configuration Conflicts" on page 42.

6. Install software programs, including device drivers.

   Refer to the information that comes with your IBM ServerGuide package for more information.

The Configuration/Setup 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" on page 46). 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 193) before making any changes.

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.)
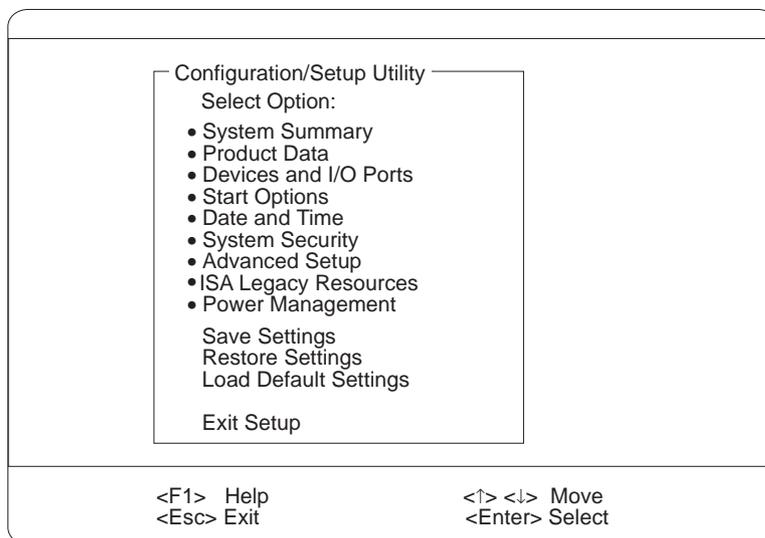
2. When the message `Press F1 to enter Configuration/Setup` appears, press **F1**. The Configuration/Setup Utility program menu appears. For information about the menus, see "Using the Configuration/Setup Utility Program" on page 28.

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 will be able to *view* limited information in the Configuration/Setup Utility program, but you will not be able to *change* any settings.

4. If a configuration error occurs, a prompt appears before the operating system starts (see "Resolving Configuration Conflicts" on page 42).

Using the Configuration/Setup Utility Program

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

```
┌────────────────────────────────────────────────────────────────┐
│  ┌─ Configuration/Setup Utility ─┐                               │
│  │     Select Option:            │                               │
│  │  • System Summary             │                               │
│  │  • Product Data               │                               │
│  │  • Devices and I/O Ports      │                               │
│  │  • Start Options              │                               │
│  │  • Date and Time              │                               │
│  │  • System Security            │                               │
│  │  • Advanced Setup             │                               │
│  │  •ISA Legacy Resources        │                               │
│  │  • Power Management           │                               │
│  │                               │                               │
│  │     Save Settings             │                               │
│  │     Restore Settings          │                               │
│  │     Load Default Settings     │                               │
│  │                               │                               │
│  │     Exit Setup                │                               │
│  └───────────────────────────────┘                               │
│                                                                  │
│     <F1>  Help              <↑> <↓> Move                         │
│     <Esc> Exit              <Enter> Select                       │
└────────────────────────────────────────────────────────────────┘
```

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 [ ].

- 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**.

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.

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.

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. Select **Devices and I/O Ports.**

2. Select a device or port. If necessary, press **Enter** to display an additional menu.

3. Use the Left Arrow (←) or Right Arrow (→) key to advance through the settings.

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 drives in your server. Each time that you turn on the server, it checks the drives as it looks for the operating system. The order in which the system checks the drives is the drive-startup sequence.

Note: The hard disk drive is the default startup device when no other devices are ready.

To set the startup sequence:

1. Select **Start Options**.

2. Select **Startup Sequence**.

3. Select the sequence and devices from the choices provided.

4. If **Automatic Power On Startup Sequence** is *Enabled*, select the sequence and devices from the choices provided.

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).

Select **Date and Time**; then, use the Left Arrow (←) or Right Arrow (→) key to advance through each data field. 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.

Using the Power-On Password Menu

The power-on password can deter unauthorized access to the system. When you set the power-on password, you can choose one of three password prompt modes.

On   The system prompts the user for the power-on password during startup. If you have a mouse connected to the mouse port, it will remain locked until you enter the power-on password.

> *Notes:*
>
> 1. If **Update POST/BIOS from network** is enabled, you cannot select **On**. If the power-on password mode is set to **On** when **Update POST/BIOS from network** is enabled, it resets automatically to **Dual**.
>
> 2. Whenever the power-on password function is set, the system does not support any locally or remotely scheduled shutdowns or restarts. Therefore, be sure to use the power-on password protection (lockout function) that your operating system provides.

Off   The system does not prompt the user to enter the power-on password during startup.

If you have a mouse connected to the mouse port, the password prompt Off mode prevents the system from detecting that a mouse is attached.

Notes:

1. The mouse and keyboard are not active until you enter the power-on password, even if an operating system has been installed in the server.

2. The password prompt Off mode does not support any locally or remotely scheduled shutdowns or restarts. Therefore, do not use a power-on wakeup or lockout function.

3. A serial mouse is not affected by the password prompt Off mode.

To adjust the server configuration so that the operating system does not display an error or stop operating when the mouse port is disabled:

Operating System	Instructions
OS/2®	Do one of the following: • 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. • Remove the mouse driver statement from the CONFIG.SYS file.
Microsoft Windows NT Server	When the mouse port disabled error message appears, enter 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.

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

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.

Dual   If you press the power switch to start the server, the server operates in password prompt On mode.

If you start the server by an unattended method, such as remotely over a LAN, the server operates in password prompt Off mode.

To set or change a power-on password:

1. Select **Power-On Password**.

2. Enter your password 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.

3. Enter your password again.

4. At **Password Prompt**, select **Off**, **On**, or **Dual**. Press the Left Arrow (←) or Right Arrow (→) key to toggle between selections.

   Note: If **Update POST/BIOS from network** is enabled, you cannot select **On**. In this case, select **Dual**. If the password prompt mode is set to **On** when **Update POST/BIOS from network** is enabled, the mode will automatically be reset to **Dual**.

5. Select **Change Power-On Password**, and follow the instructions on the screen.

Notes:

1. If a power-on password is set and then forgotten, you must remove the server cover and move a jumper on the system board. (Refer to "Using the Clear CMOS Request Jumper to Erase Forgotten Passwords" on page 204 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. Select **Power-On Password**.

2. 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. Select **Administrator Password**.

2. Enter your password 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.

3. Enter your password again.

4. Define the **Power-On Password Changeable by User** field. 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.

5. Select **Change Administrator Password** and follow the instructions on the screen.

Note: 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 a jumper on the system board. (See "Using the Clear CMOS Request

Jumper to Erase Forgotten Passwords" on page 204 for further information.)

- If enhanced security is enabled, you must replace the system board.

To delete an administrator password:

1. Select **Administrator Password**.

2. Select **Delete Administrator Password** and follow the instructions on the screen.

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 will be able to view limited information in the Configuration/Setup Utility program, but you will not be able to 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:

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 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 system programs update 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.us.pc.ibm.com/server/`

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 update 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 51 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 215 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.

4. Move the switch back to the **OFF** position after you have set, changed, or deleted your password.

5. 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. Select **Secure IDE Devices and Diskette Drives** from the System Security menu; then, press **Enter**.

2. Select a device; then, press the Left Arrow (←) or Right Arrow (→) key to toggle the entry to **Disable**.

Updating POST/BIOS Update over the Network

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 POST/BIOS Update setting:

1. Select **POST/BIOS Update**.

2. Select **Update POST/BIOS from network**.

3. To enable update POST/BIOS over the network, select **Enabled**. To disable, select **Disabled**.

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 13 on
page 196 for the default settings for these features.

The system might malfunction 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.

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

Select **Set Device Mode** to control the device node. When you change this value to **Disabled**, the system is unable to 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 42 for information about handling resource conflicts.

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

- Memory
- 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.

Using the Automatic Configuration and Power Interface 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 ACPI is supported.

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, 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 43 and "Resolving Software Configuration Conflicts" on page 43, respectively, for additional information. See Chapter 5, "Solving Problems" on page 117 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 Program" on page 26 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 56 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 Adapters" on page 61.

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.

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 3500 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 at the other end of the network 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 3500 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. Refer to your Ethernet documentation for additional information.

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.

- You must install a device driver to enable your operating system to address the Ethernet controller. Use ServerGuide to install this device driver. Refer to your ServerGuide package for instructions on installing device drivers. For more information about ServerGuide, see "What Your IBM Netfinity 3500 Server Offers" on page 4.

Fast Ethernet operates at a data rate of 100 Mbps; that is, ten times faster than standard Ethernet. However, except for the different operating speeds, Fast Ethernet and standard Ethernet are structurally identical. Applications and protocols that are currently installed on a standard Ethernet system can be seamlessly migrated to a Fast Ethernet system. (In a very small number of cases, minor tuning might be required to adjust the application to the faster response time of 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 controller for your operating system before you use the Ethernet controller.

The Ethernet controller supports the auto-detection mode only. When you install your device drivers and configure the Ethernet controller for use with your operating system, do not select the 10BASE-T mode. To ensure proper operation of your controller, always select the default parameters provided.

Notes:

1. For troubleshooting information, see "Troubleshooting the 10/100 Mbps Ethernet Controller" on page 173.

2. 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.us.pc.ibm.com/server/`

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 diagnostics and record the server's Ethernet configuration information before you install the adapter.

Using the SCSISelect Utility

Your server 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 3500 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.

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 *Low On / High On.* Do not change this value.

- Boot Device Configuration

  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.

  Note: 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.

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 you see the following message, 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.

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.

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

- Become familiar with the safety and handling guidelines specified under "Safety Information" on page vii, "Electrical Safety" on page 54, and "Handling Static-Sensitive Devices" on page 55. 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

⚠

CAUTION:
Electrical current from power, telephone, and communication cables can be hazardous. To avoid any shock hazard, disconnect all power cords and cables as described in the following information.

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.

⚠

CAUTION:
Never remove the cover on the power supply. If you have a problem with the power supply, have your system serviced.

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.)

- 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 54 and "Handling Static-Sensitive Devices" on page 55.
- Read "Using the Stabilizing Feet" on page 19.

CAUTION:
To avoid possible injury while moving or lifting the server, ask another person to help you.

Disconnecting Cables and Removing the Cover

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

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

   Notes:

   a. For more information about the rear connectors, see "Input/Output Connectors" on page 10.

   b. For more information about ports, including universal serial bus (USB), see "Connecting External Options" on page 97.
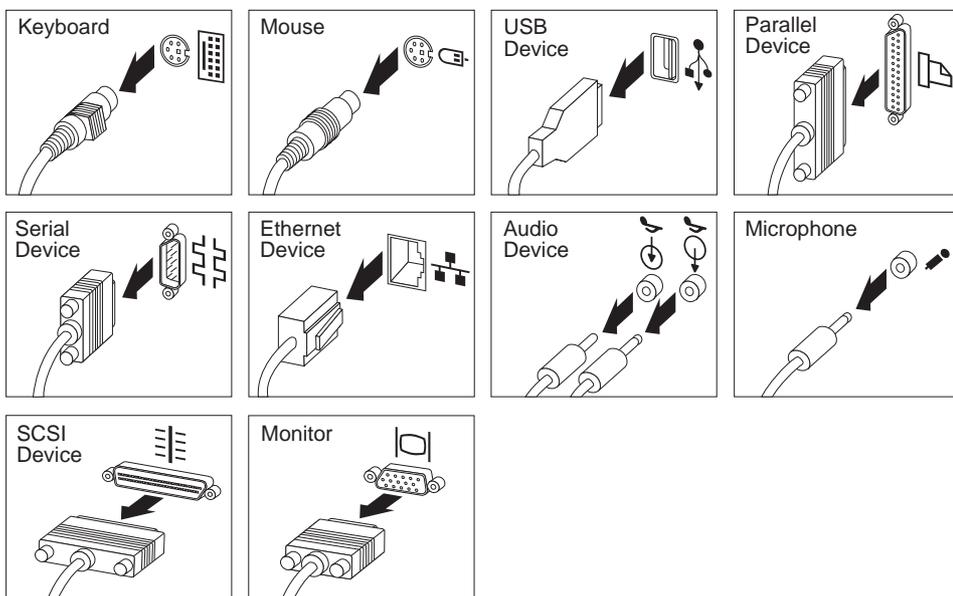
7. If necessary, unlock the server side cover.

8. 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.

9. Set the door aside.
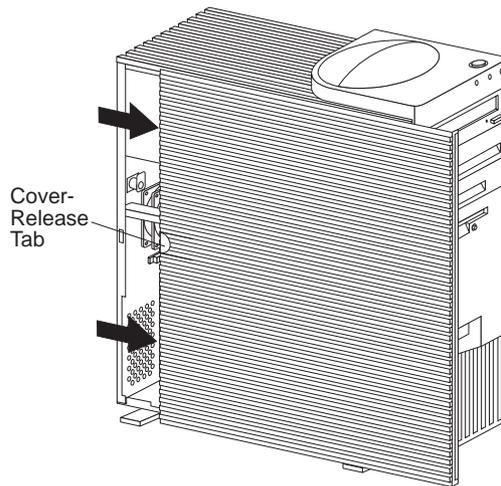
Accessing the System Board

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, place the server on its side, so that the system board is facing you, on a flat, sturdy surface, such as a table.

Note: To see a list of the system-board components and an illustration that shows their locations, see "System Board Illustration" on page 203.

Working with Adapters

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

Note: For a complete list of the adapters that your server supports, go to http://www.us.pc.ibm.com/compat/ on the World Wide Web, or contact your IBM marketing representative.

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 40.

Adapter Considerations

Your server supports ISA and PCI adapters. You can install up to six adapters in the connectors on the system board. These connectors are known as *expansion slot* connectors.. The expansion slots are located on the rear of the server (see "Input/Output Connectors" on page 10 for an illustration).

Your server system board contains two 16-bit, ISA-bus expansion slot connectors and four 32-bit, PCI-bus expansion slot connectors. One expansion slot connector is a shared PCI/ISA slot connector. One slot connector supports only ISA adapters; the remaining slot connectors support only PCI adapters. Your server supports only 5.0-volt adapters on the PCI bus.

Notes:

1. Slot 1 is an Accelerated Graphics Port (AGP). You can install only a special AGP graphics adapter in this slot. Your server comes with an AGP graphics adapter installed in this slot.

2. You can install only a half-length PCI adapter in expansion slot 2. You can install half-length and full-length adapters in expansion slots 3 through 6.

3. If you have high-performance PCI adapters, such as RAID adapters, install them in expansion slots 3, 4, or 5. Do not use slot 2 for high-performance PCI adapters.

4. If a component in the server or on the adapter interferes with the installation, use another slot.

The following figure shows the location of the expansion slot connectors on the system board.

Slot 1 (AGP)
Slot 2 (PCI)
Slot 3 (PCI)
Slot 4 (PCI)
Slot 5 (Shared PCI/ISA)
Slot 6 (ISA)
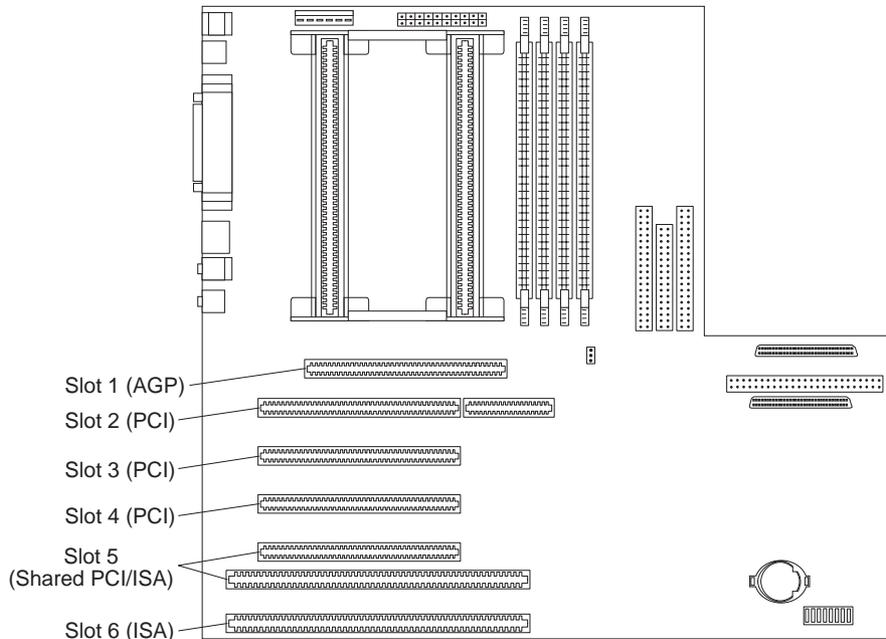
Note: Expansion slot 5 is a shared slot. Shared slots can be occupied by an adapter attached to either the PCI slot connector or the adjacent ISA slot connector, but not both.

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.

Installing or Removing Adapters

This section gives the procedure for installing an adapter. If you want to remove an adapter, reverse the order of the following steps.

Notes:

1. See "Input/Output Connectors" on page 10 for an illustration of the expansion slots on the rear of the server.

2. If you remove an adapter, be sure to reassign the system resources as available for ISA legacy adapters. See "ISA Legacy Resources" on page 40.

Before you begin:

- Read "Electrical Safety" on page 54 and "Handling Static-Sensitive Devices" on page 55.
- Read the documentation that comes with the option.

To install an adapter:

1. Review the instructions that come with the adapter to determine if it must be installed in an AGP, PCI, or ISA expansion slot; otherwise, use any empty, bus-compatible slot.

2. Remove the server cover (see "Preparing to Add Options" on page 56).

3. 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.

Adapter

Card Retainer

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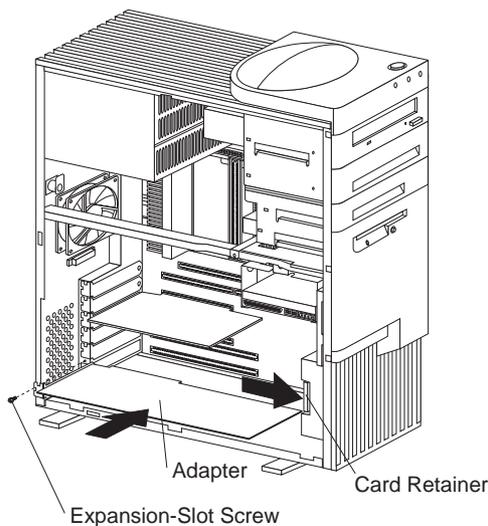
4. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the server; then, remove the adapter from the package.

5. Install the adapter:

    a. Carefully grasp the adapter and align it with the expansion slot.

> *Note:* When installing full-length adapters in slots 3 through 6, align the end of the adapter with the card guide on the fan housing. When you remove an adapter, you must press the card retainer inward to slide an adapter out of the server.

    b. Press the adapter *firmly* into the expansion slot connector.

    c. Replace the expansion-slot screw on the top of the adapter bracket.

    d. If necessary, connect any internal cables to the adapter. Refer to the documentation that comes with the option.

6. If you installed an ISA legacy adapter, go to "ISA Legacy Resources" on page 40 to assign system resources.

7. If you want to install or remove any other options, do so now. Otherwise, go to "Completing the Installation" on page 113.

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 512 MB. You can add memory to your server to increase system performance. Your server has four connectors for installing system-memory modules. These connectors are referred to as banks 0 through 3.

Memory Connectors
3 2 1 0
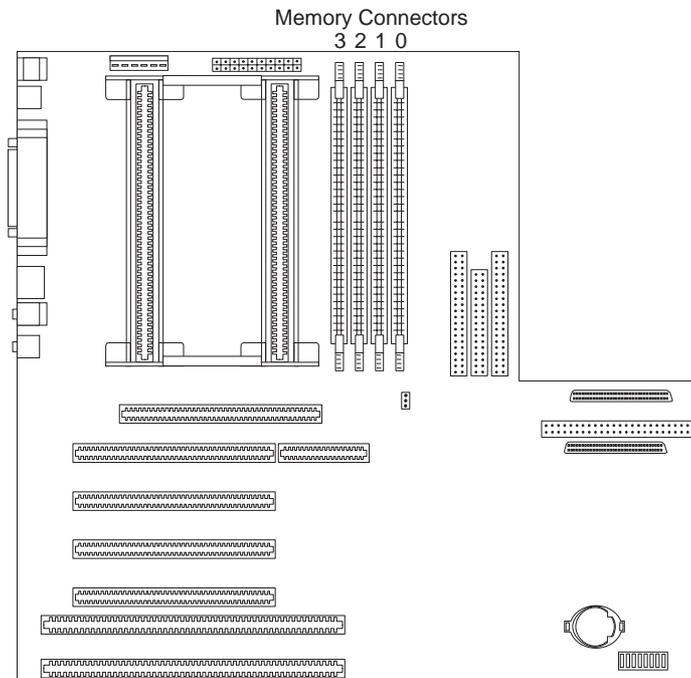
Working with Memory Modules

The memory modules that your server uses are *dual-inline memory modules (DIMMs)*. The DIMMs that come with your server are synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC). These memory modules have a speed of 66 MHz. You can add extra memory modules or replace existing memory modules.

Notes:

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

2. Install DIMMs with a maximum height of 6.35 cm (2.5 inches).

3. Use only 3.3 V unbuffered DIMMs.

4. The server supports 32 MB, 64 MB, and 128 MB DIMMs.

5. When you are installing memory modules, install them in adjacent connectors, with no vacant memory connectors in between.

6. If you are installing DIMMs of different sizes, install the DIMMs with greater memory capacity starting with the connector closest to the edge of the system board (Bank 0).

7. 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 28.

8. For more information about the DIMMs that your server supports, go to the following World Wide Web address:

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

Memory Configuration

When you are adding or removing memory, a basic rule to follow is to fill each system memory connector sequentially, starting at *Bank 0.*

Table 1 shows the suggested memory configurations for your server. The contents of this table and additional information can be found on a label located inside your server. Again, alternate configurations are possible.

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

Table 1. Memory Configurations				
Total Memory	**Bank 0**	**Bank 1**	**Bank 2**	**Bank 3**
32	32	0	0	0
64	64	0	0	0
64	32	32	0	0
96	32	32	32	0
128	128	0	0	0
128	64	64	0	0
256	128	128	0	0
256	128	64	64	0
512	128	128	128	128

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.

Before you begin:

- Read "Electrical Safety" on page 54 and "Handling Static-Sensitive Devices" on page 55.
- Read the documentation that comes with the option.
- Read "Accessing the System Board" on page 58.

Notes:

1. Each memory connector contains two keys (dividers), which are used to assure that a memory-module can be installed only in the correct position.

2. A retaining clip at each end of the connector locks the memory module into place.

3. For information about memory configuration, see Table 1 on page 65.

To install a DIMM:

1. Remove the server cover (see "Preparing to Add Options" on page 56). Table 1 on page 65.

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.
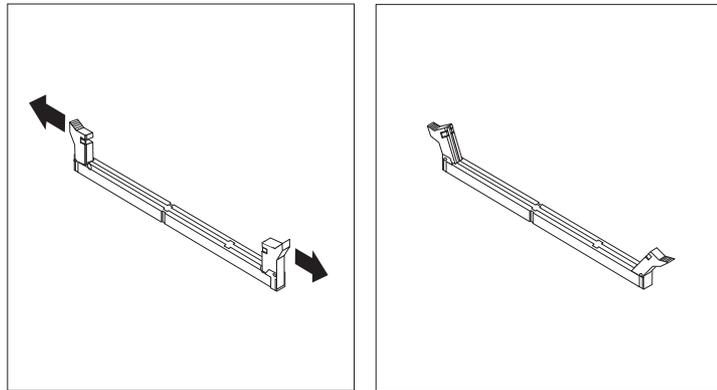
4. Touch the static-protective package containing the DIMM to any *unpainted* metal surface in the server; then, remove the DIMM.

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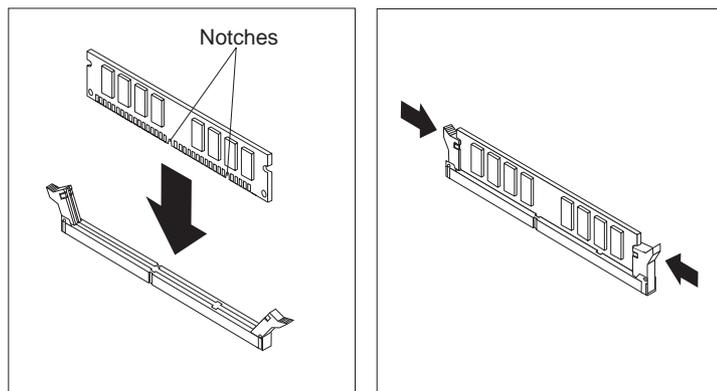
> *Note:* Adding or removing DIMMs changes the configuration information in the server. When you restart the server, the system displays POST error 164. Start the Configuration/Setup Utility program and select **Save Settings.**

7. To install another DIMM, repeat steps 3 through 6 on page 67.

8. If you want to install or remove any other options, do so now. Otherwise, go to "Completing the Installation" on page 113.

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.* The bays are referred to as bay 1, bay 2, and so on.

Your server comes with one 3.5-inch, 1.44 MB diskette drive, one 5.25-inch CD-ROM drive, and, in some models, a 3.5-inch hard disk drive. The following illustration shows the server front view, with the side panel removed.

Power Switch

CD-ROM Drive

Open Bay

Open Bay

3.5-Inch Diskette Drive

Open Bay

3.5-Inch Hard Disk Drive
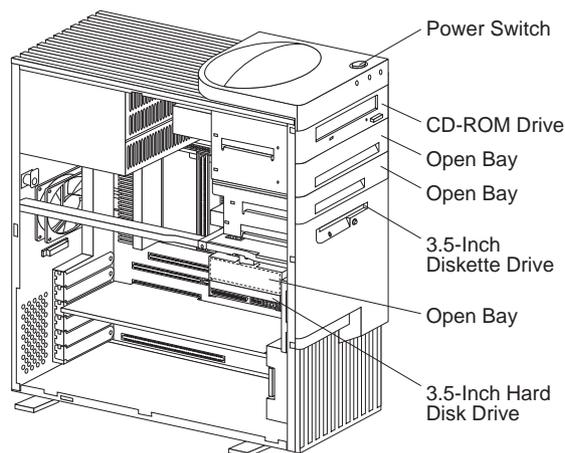
CD-ROM Drive: Your server comes with an integrated drive electronics (IDE) CD-ROM drive.

Expansion Bays

> **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 71 and "Preinstallation Steps (All Bays)" on page 76.
>
> **Diskette Drive:** The 3.5-inch, 1.44 MB[3] diskette drive uses 1 MB (unformatted) or 2 MB (unformatted) diskettes.

Your server comes with an IDE CD-ROM drive installed in bay 1 and a 3.5-inch diskette drive installed in bay 4. Some models come with a preinstalled 3.5-inch hard disk drive in bay 6; open-bay models come with bay 6 empty.

The following illustration shows the locations of the bays in your server.

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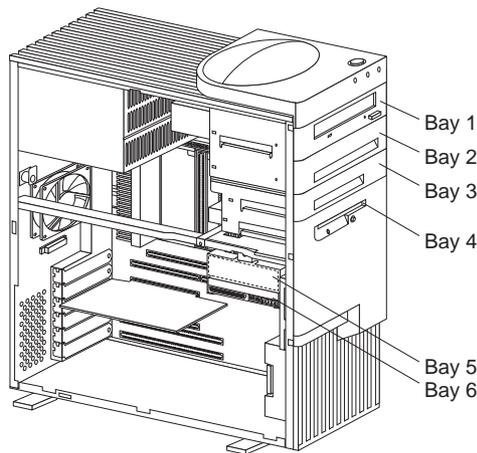
3 MB equals approximately 1 000 000 bytes; total user-accessible capacity may vary depending on operating environment.

Drive Specifications

Table 2 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	5.25-inch	CD-ROM drive	41.3 mm (1.6 in.)[7]
2	3.5-inch[4] 5.25-inch	Removable media[5] drive, hard disk drive	25.4 mm (1.0 in.) 41.3 mm (1.6 in.)[7]
3	3.5-inch	Removable media[5] drive, hard disk drive	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[6]	25.4 mm (1.0 in.) 41.3 mm (1.6 in.)[7],[8]

Table 2. Maximum Allowable Drive Sizes

---

[4] To properly install a 3.5-inch drive in bay 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.

[5] Removable media include CD-ROMs, optical discs, diskettes, and tapes. However, the server only supports one diskette drive (standard in bay 4).

[6] 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 31 for information about changing the startup sequence.

[7] Drives that are higher than 41.3 mm (1.6 in.) cannot be installed.

[8] 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 and system board. 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 end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.

- Flat *signal cables* for connecting IDE and diskette drives to the system board. Signal cables are sometimes called *ribbon cables.* The following ribbon signal cables come with your server to connect IDE and diskette drives:

    - The IDE signal cable has three connectors. One of these connectors is attached to the CD-ROM drive, one is a spare, and the third attaches to the primary IDE connector on the system board.

    - One signal cable has one connector for attaching the diskette drive to the diskette-drive connector on the system board.

- A flat SCSI *signal cable* for connecting devices to the SCSI adapter.

Since your server is equipped with an UltraSCSI controller, 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, Channel A SCSI connector on the system board. This cable provides four connectors for attaching other internal SCSI devices.

For more information about SCSI devices, see "SCSI Drives" on page 74.

Note: To locate connectors on the system board, see "System Board Illustration" on page 203.

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

- The diskette drive, hard disk drive, and CD-ROM drive that are preinstalled in your server come with power and signal cables attached. 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.

- If two IDE devices are used on a single cable, one must be designated as the primary or master device and the other a secondary or subordinate device; otherwise, some of the IDE devices might not be recognized by the system. The primary or secondary designation is determined by switch or jumper settings on each IDE device.

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

- To attach an external SCSI drive, you must install an appropriate adapter in the server.

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.

SCSI Drives

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 3500 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.us.pc.ibm.com/server/ on the World Wide Web.

SCSI Physical Unit Numbers

When more than one physical device is connected to the same UltraSCSI *controller*, the devices compete for support from the UltraSCSI controller. Because the UltraSCSI controller 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 controller 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 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 controller in your server supports SCSI IDs 0 to 15; ID 7 is reserved for the controller. 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" on page 46 for more information.)

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

SCSI Logical Unit Number

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

All Netfinity 3500 servers come with an UltraSCSI controller on the system board. This UltraSCSI controller provides termination for one end of the SCSI bus (cable) in your server. However, the SCSI bus must be terminated at both ends only. Any SCSI devices that are installed must have their termination set to Disabled.

- 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.

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 54 and "Handling Static-Sensitive Devices" on page 55.
> - Read the documentation that comes with the option.
> - Read "Termination Requirements" on page 75.
> - 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 3500 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 cover (see "Preparing to Add Options" on page 56).

2. Choose the bay in which you want to install the drive. (Refer to Table 2 on page 71 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 and static shield installed.

   d. If you remove a drive that has removable media and you do not intend to install a new drive immediately, reinstall the static shield and bay panel for that bay.

   To access drive bays 1 through 4, go to step 4 on page 77.

   To access drive bays 5 and 6, go to step 5 on page 80.

4. **To access bays 1 through 4:**

   a. If the drive that you are installing has removable media, remove the bay panel from the drive bay by using a flat-blade screwdriver to pry the tab on the left edge of the panel, as shown.
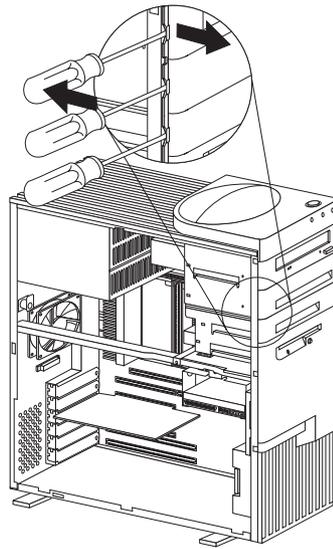
b. Remove the top cover by using a flat-blade screwdriver to release the tab on the left edge, as shown.
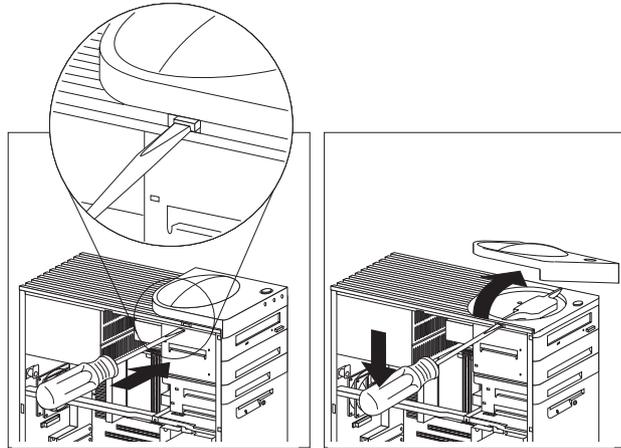
c. Disconnect the power and signal cables attached to the drives in the upper drive bracket.

   Note: If an additional cable (audio) is connected to the CD-ROM drive, also disconnect that cable.

d. Remove the screws that secure the top and the bottom of the upper drive bracket.
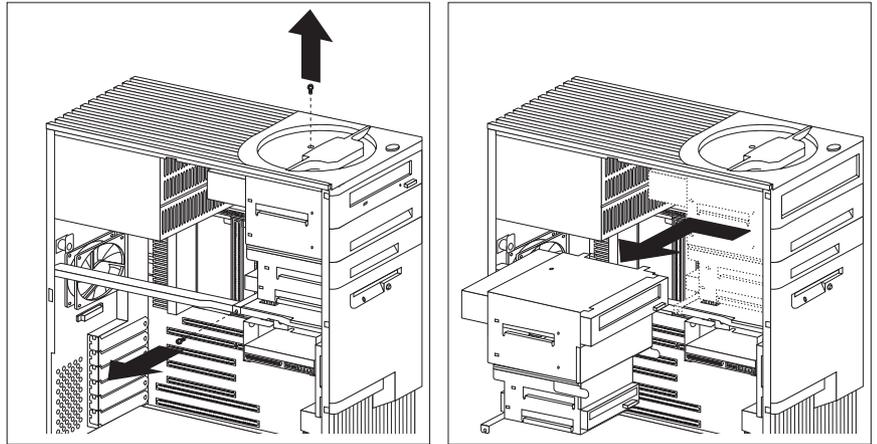
e. Slide the drive bracket to the rear approximately 25 mm (1.0 in.); then, slide it sideways until it is out of the server.

f. If the drive that you are installing has removable media, remove the static shield from the drive bay where you are installing the drive.

g.

5. **To access bays 5 and 6:**

    a. Remove the screw that secures the lower drive bracket.
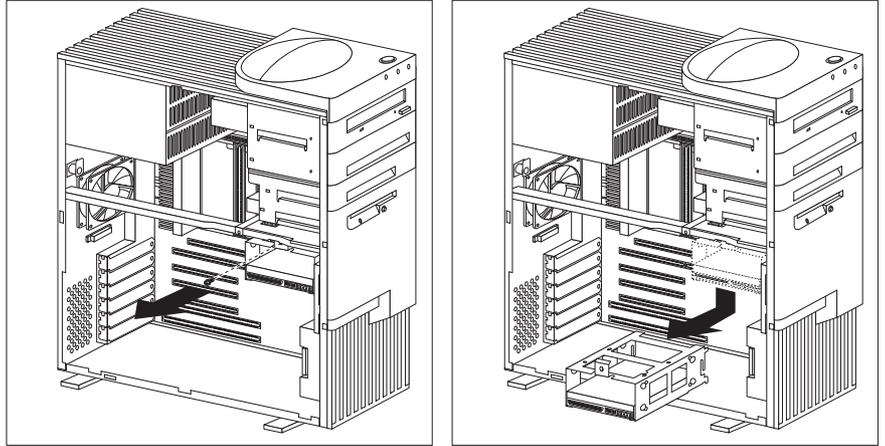
    b. Lower the front of the drive bracket, lift up on the rear, and slide it out.

    c. If necessary, disconnect the power and signal cables attached to the drives in the lower drive bracket.

    d. Continue with step 6.

6. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag.

7. 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.

What to do next?

- To install a drive in bays 1 through bay 4, go to "Installing or Removing Drives in Bays 1 through 4."
- To install a drive in bays 5 and 6, go to "Installing or Removing Drives in Bays 5 and 6" on page 85.

Installing or Removing Drives in Bays 1 through 4

This section gives the procedure for installing a drive in bays 1 through 4. If you want to remove a drive, skip steps 2 through 4 on page 82, and step 6 on page 82.

Before you begin:

- Read "Electrical Safety" on page 54 and "Handling Static-Sensitive Devices" on page 55.
- Read "Preinstallation Steps (All Bays)" on page 76 and the instructions that come with the option.
- Read "Termination Requirements" on page 75.

Notes:

1. See "Drive Specifications" on page 71 for the drive types and sizes that you can install in bays 1 through 4.

2. You might need to disconnect cables from drives that are already installed in the server.

1. Remove the server cover (see "Preparing to Add Options" on page 56).

2. Your server comes with a tray installed in bay 2. If you are installing a 5.25-inch drive in bay 2, you must first remove the tray. To do this, remove the four screws on the bottom of the tray.

3. If a tray is attached to a drive that you intend to install, you must remove the tray before installing the drive. Follow the instructions in the documentation that comes with the drive.

4. Using the instructions that come with the drive, together with these instructions, verify that any switches or jumpers on the drive are set correctly. Change the settings if necessary. For information about termination requirements, see "Termination Requirements" on page 75.

5. Remove the upper drive bracket. See step 4 on page 77.

6. Touch the static-protective package containing the new drive to any *unpainted* metal surface; then, remove the drive.

Attention:
To ensure that the drive functions properly, do not overtighten the screws.

7. If you are installing a drive in bay 1, 3, or 4, go to step 8.

   If you are installing a 3.5-inch drive in bay 2:

   a. Loosen the screws on the sides of the tray; then, place the drive on the tray.

      Note: These are captive screws; therefore, they cannot be removed.

   b. Align the screw holes on the sides of the drive with the screw holes on the sides of the tray; then, tighten the screws.

8. Install the drive into the upper drive bracket so that the power and signal cable connectors are facing the rear of the server. Align the screw holes; then, insert and tighten the four screws.
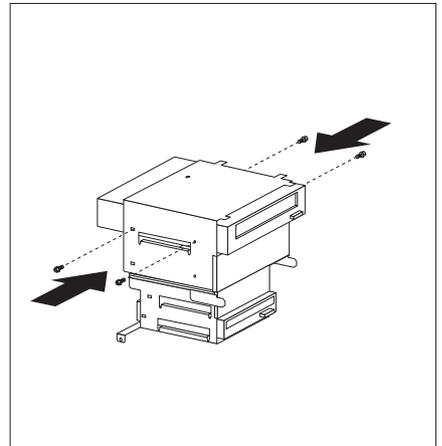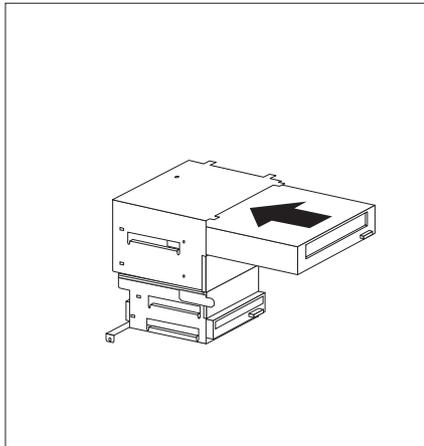
9. Reinstall the upper drive bracket and secure it with screws at the top and bottom.
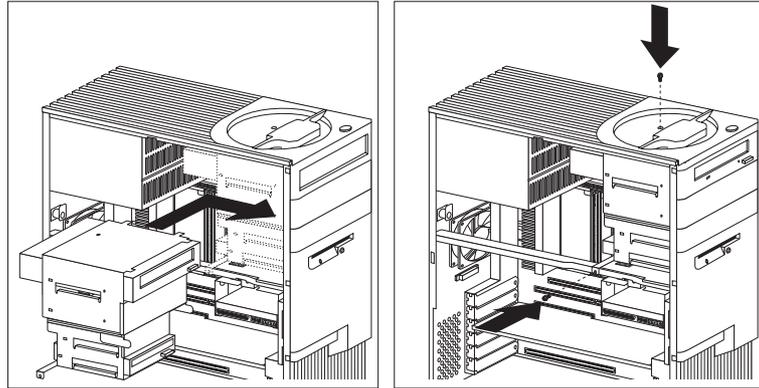
10. Reconnect the cables that you disconnected in step 4c on page 78.

   Note: In some models, the CD-ROM drive has three connectors. Be sure to reconnect the appropriate cables to all three connectors.
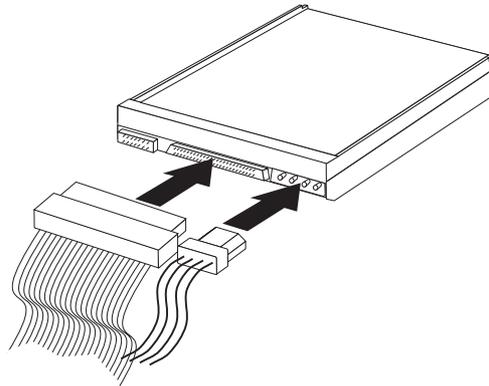
11. If you want to install or remove any other options, do so now. Otherwise, go to "Completing the Installation" on page 113.

Installing or Removing Drives in Bays 5 and 6

This section gives the procedure for installing a drive in bays 5 and 6. If you want to remove a drive, skip steps 3 and 4.

Note: You can install only 3.5-inch hard disk drives in bays 5 and 6.

Before you begin:

- Read "Electrical Safety" on page 54 and "Handling Static-Sensitive Devices" on page 55.
- Read "Termination Requirements" on page 75.

Note: You might need to disconnect cables from drives that are already installed in the server.

To install a drive in bays 5 and 6:

1. Remove the server cover (see "Preparing to Add Options" on page 56).

2. Remove the lower drive bracket, as described in step 5 on page 80.

3. Touch the static-protective package containing the new drive to any *unpainted* metal surface; then, remove the drive.

4. Using the instructions that come with the drive, together with these instructions, verify that any switches or jumpers on the drive are set correctly. Change the settings if necessary. For information about termination requirements, see "Termination Requirements" on page 75.

Attention:
To ensure that the drive functions properly, do not overtighten the screws.

5. Install the drive into the lower drive bracket so that the power and signal cable connectors are facing the open side of the server. Align the screw holes and insert two screws on each side of the drive assembly near the bottom, as shown.
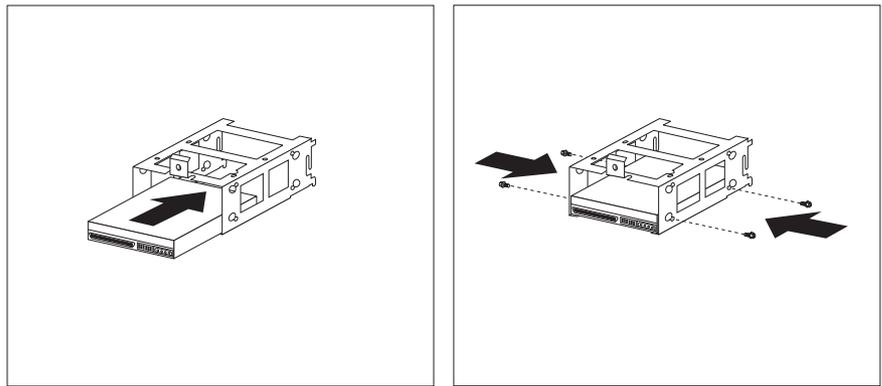
Attention:

a. If your server comes with a drive installed in bay 6, two screws are attached to each side of the drive assembly.

   If you remove a drive from bay 6 and install another drive in that bay, use the screws that come with the preinstalled drive.

b. If you are installing a drive in bay 5, turn the drive upside down before you slide it into the bay. This ensures that the drive connector will align with and attach properly to the cable connector.

   When you install the four screws that come with the drive, attach them to the drive from the top.

c. If you are installing a drive in bay 6, hold the drive with the connector side up before you slide it into the bay.

If your server is an open-bay model, when you install the four screws that come with the drive, attach them to the drive from the bottom.
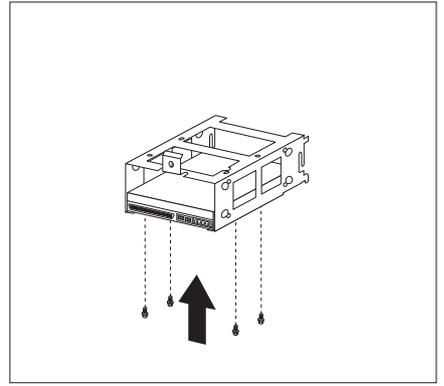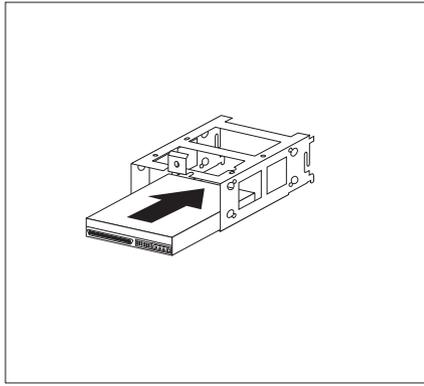
6. Reinstall the lower drive bracket and secure it with the screw.
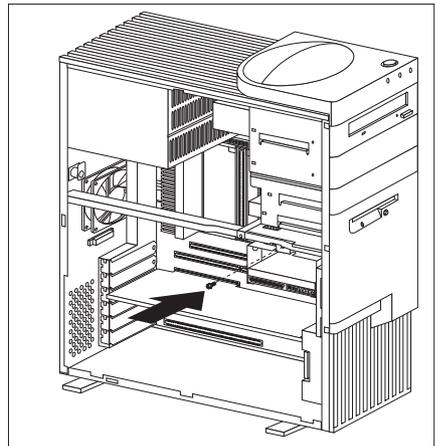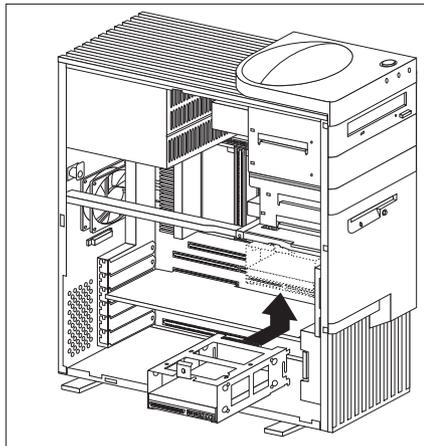
7. Reconnect the cables that you disconnected in step 5c on page 80.
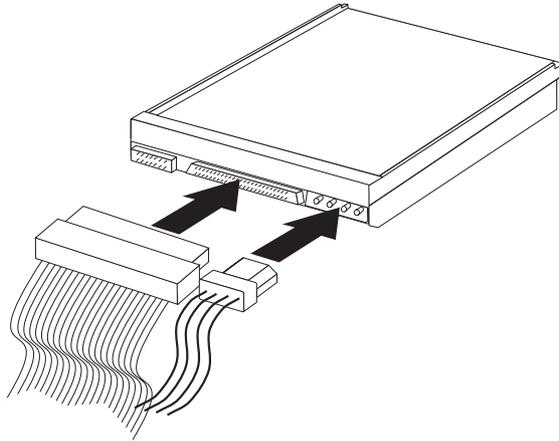
8. To install a drive in bays 1 through 4, go to "Installing or Removing Drives in Bays 1 through 4" on page 81.

9. If you want to install or remove any other options, do so now. Otherwise, go to "Completing the Installation" on page 113.

Working with Microprocessors

Your server comes with an Intel Pentium II microprocessor. This microprocessor incorporates MMX technology with built-in ECC L2 cache. 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 90.

When you install an additional microprocessor, your Netfinity 3500 server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between microprocessors. This can enhance performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

The voltage regulator function is built into the system board. This feature supports each microprocessor on the system board. If you install a second microprocessor, it must operate at the same voltage as the primary microprocessor to ensure proper operation of the voltage regulator feature.

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 54 and "Handling Static-Sensitive Devices" on page 55.
- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server BIOS. ServerGuide includes IBM Update Connector, a dial-up program that keeps 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 PC Company Bulletin Board System (BBS). See Chapter 6, "Getting Help, Service, and Information" on page 183 for the appropriate World Wide Web addresses and bulletin board telephone numbers.
- Obtain an SMP operating system (optional). For a list of supported operating systems, see http://www.us.pc.ibm.com/server/ on the World Wide Web.
- Read "Accessing the System Board" on page 58.

Attention:

- If you install an additional microprocessor that is different from the currently installed microprocessor, your server operation might be unreliable. To prevent this, use a microprocessor with the same internal and external clock speed, and the same cache size and voltage requirements as those of the currently installed microprocessor. Microprocessor internal and external clock frequencies and cache size must be identical.

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

For additional information about microprocessor speeds, clock frequencies, and jumper settings, see Chapter 7, "Server Records and Specifications" on page 193.

⚠️

CAUTION:
If your server has been operating, the heat sinks on the installed microprocessor will be hot. You can avoid getting a burn while removing an existing microprocessor or installing an additional one, if you let the components cool for 10 minutes before continuing with the procedures described in this section.

Notes:

1. The microprocessor in your server comes with an attached heat sink. The microprocessor plugs into the primary 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. When you add a second microprocessor, it must operate at the same speed as the primary microprocessor. For information about the appropriate switch settings, see "Setting the Microprocessor Speed Switches" on page 209, or see the label inside the server cover. 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 203.

To install a microprocessor:

1. Remove the server cover (see "Preparing to Add Options" on page 56).

2. If your server does not come with an air baffle, go to step 3.

   If your server comes with an air baffle, remove the air baffle:

   a. If cables are in the way, move them.

   b. Locate the three small levers on the air baffle that protrude through the holes on the rear of the server.
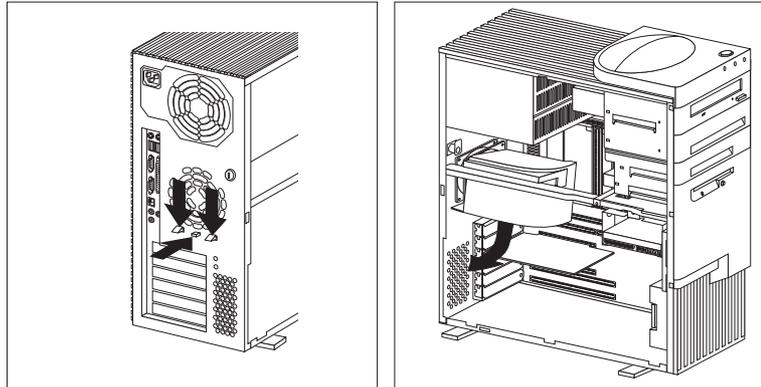
   c. Press the levers down, toward the bottom, until they unlock.

   d. Slide the air baffle away from the rear of the server.

   e. Tilt the air baffle toward the microprocessors, and slide it out, under the metal bar and away from the two microprocessor/heat-sink assemblies.

   f. Remove the air baffle from the server, and save it for later use.

3. If you are installing a second microprocessor in the server, go to step 5 on page 94.

   If you are replacing an existing microprocessor, go to step 4 on page 93.

4. Remove the microprocessor:

   a. Locate the appropriate microprocessor socket (primary or secondary) on the system board. (See the illustration in "System Board Illustration" on page 203.)

   b. Place your index fingers on the small retainer tabs on the top of the microprocessor. Push in toward the microprocessor until the tabs release.
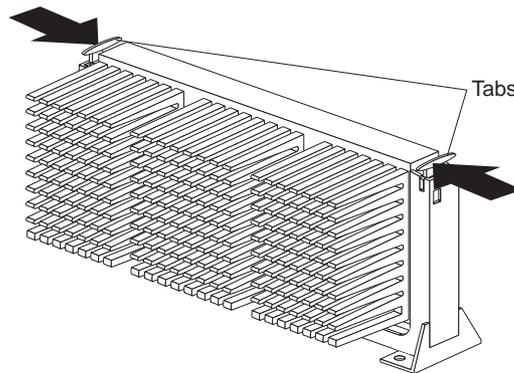
Tabs

c. Carefully place one hand on the server frame and pull the microprocessor up and out of the connector with the other hand.
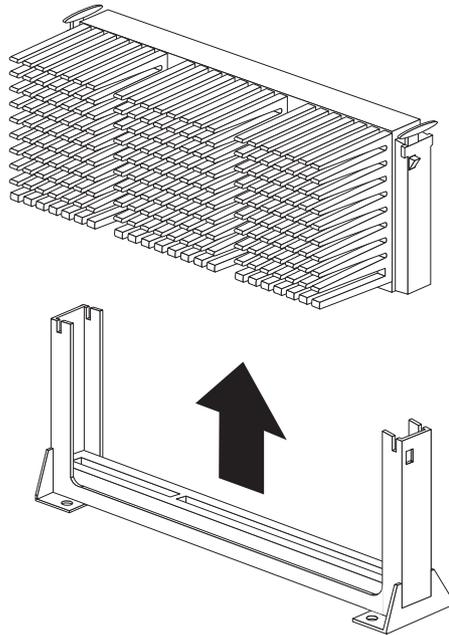
d. Store the old microprocessor in a static-protective package.

e. Go to step 7 to install the replacement microprocessor.

5. Locate the secondary microprocessor socket on the system board. (See the illustration in "System Board Illustration" on page 203.)

6. Remove the terminator card in the secondary microprocessor socket.

7. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface in the server; then, remove the new microprocessor.

8. Press in on the retainer tabs until they click.

   Note: For the location of the retainer tabs, see the illustration in
   step 4b on page 93.

9. Align the new microprocessor with the appropriate connector
   (primary or secondary) on the system board and slide it into the
   guides. Press the microprocessor down until it snaps into place
   and is fully seated in the connector.

10. Pull outward on the retainer tabs.
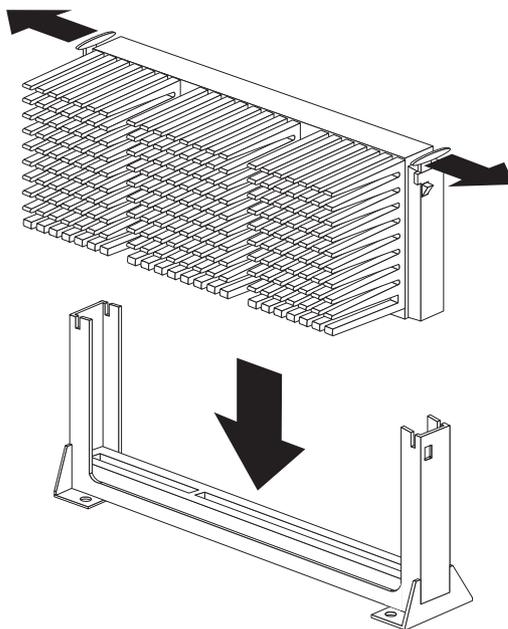
11. If your server comes with an air baffle, reinstall it. To reinstall the air baffle, follow the instructions in step 2 on page 92 in reverse order.
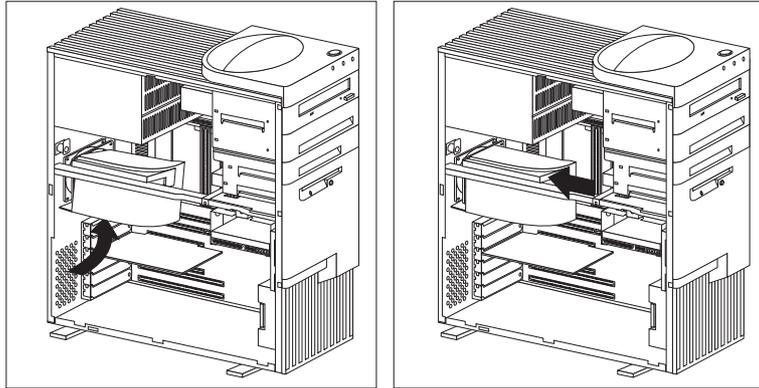
12. If you replace the microprocessor with one that has a different speed, you must change the switch settings on the system board. To locate the switches, see "System Board Illustration" on page 203. For information about the appropriate switch settings, see "Setting the Microprocessor Speed Switches" on page 209, or see the label inside the server cover.

13. Go to Table 13 on page 196 to update the microprocessor information; then, return here.

14. Since 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 28.

    You might also need to make changes to your operating system.

    • If your operating system does not support SMP, install one of the SMP operating systems that your server supports. See http://www.us.pc.ibm.com/server/ on the World Wide Web.

    • If your operating system does support SMP, refer to your operating-system documentation. You might need to make changes so that the operating system recognizes the new microprocessor.

15. If you want to install or remove any other options, do so now. Otherwise, go to "Completing the Installation" on page 113.

Connecting External Options

To connect external options (SCSI drives and storage enclosures, printers, modems, and other serial and parallel devices), refer to the documentation that comes with the options.

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

The IBM PC Server Enterprise Expansion Enclosure is one of several SCSI storage enclosures that you can attach to your server. You can connect the storage enclosure to the external SCSI connector on a separately installed SCSI adapter. Contact your IBM reseller or IBM marketing representative for additional information.
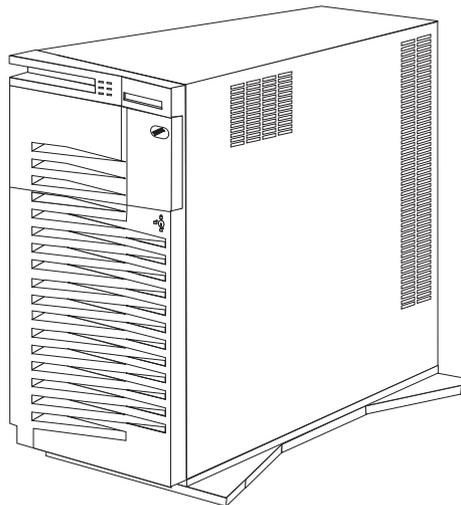
Adding External SCSI Devices

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 controller on the system board can support a maximum of 15 devices.

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 69 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.us.pc.ibm.com/server/

- Your server 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 Fast SCSI devices to the UltraSCSI controller, do not exceed 3 meters (9.8 feet) total length for all cables (internal and external)

  - If you only connect Fast SCSI devices to the UltraSCSI controller, do not exceed 6 meters (19.7 feet) total length for all cables.

  - If you connect four or less UltraSCSI devices to the UltraSCSI controller, do not exceed 1 meter (3.3 feet) total length for all cables.

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, the

transfer rate to the UltraSCSI devices must be limited to Fast transfer rates. You accomplish this by using the SCSISelect Utility program. See "Using the SCSISelect Utility" on page 46 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 3500 server, you must connect it to the external SCSI 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.

Attaching External Options
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 chapter to connect it to the server.

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.

```
   1           5
 ╭─────────────╮
 │ ○ ○ ○ ○ ○ │
 │  ○ ○ ○ ○  │
 ╰─────────────╯
   6           9
```
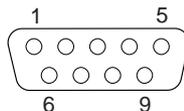
Table 3 shows the pin-number assignments for the serial port connectors. The pin-number assignments conform to the industry standard.

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		

Table 3. Serial Port Connector Pin-Number Assignments

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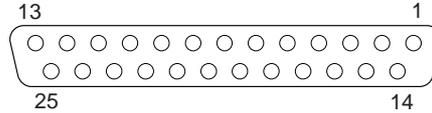
This parallel port connector conforms to the Institute of Electrical and Electronics Engineers (IEEE) Standard 1284. There are three standard modes of operation:

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

Table 4 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		

Table 4. Parallel Port Connector Pin-Number Assignments

Video Port Connector

The video port is where you can attach a video monitor to your Netfinity 3500 server. Your server provides a 15-pin video port connector.
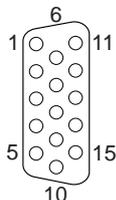
Table 5 shows the pin-number assignments for the video port connector.

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)

Table 5. Video Port Connector Pin-Number Assignments

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.
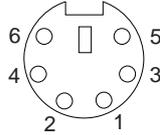
Table 6 shows the pin-number assignments for the keyboard and
auxiliary-device port connectors.

Pin	Signal
1	Data
2	Not connected
3	Ground
4	+5 V dc
5	Clock
6	Not connected

*Table 6. Keyboard and Auxiliary-Device Port Connectors Pin-Number
Assignments*

SCSI Connectors

Your server comes with an 16-bit UltraSCSI controller on the system board. This controller has two 68-pin, shielded, high-density connectors. You can use these connectors to install SCSI devices in your server or to attach an external SCSI device to your server.

See "SCSI Drives" on page 74 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 controller. 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 3500 server.

For information about termination requirements, see "Termination Requirements" on page 75.

External SCSI Connector

A 16-bit, 68-pin external SCSI cable is installed in your server. The external SCSI cable provides a connector to which you can attach an external SCSI device.

Table 7 shows the pin-number assignments for the 68-pin SCSI connectors.

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

Table 7. The 68-Pin SCSI Port Connector Pin-Number Assignments

Universal Serial Bus 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 3500 server does not support a keyboard attached to the system USB port.

Your Netfinity 3500 server comes with two USB ports. Table 8 shows the pin-number assignments for the USB port connectors.

Pin	Signal
1	VCC
2	–Data
3	+Data
4	Ground

Table 8. USB Port Connector Pin-Number Assignments

Ethernet Connector

The system board in your Netfinity 3500 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 44 for additional information about the Ethernet controller.

Table 9 shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.
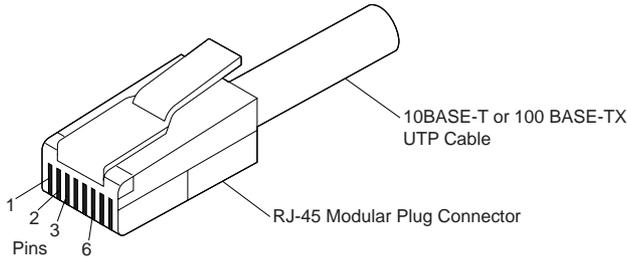
Pin	Signal	Pin	Signal
1	Transmit data+	5	Reserved
2	Transmit data–	6	Receive data–
3	Receive data+	7	Reserved
4	Reserved	8	Reserved

Table 9. Ethernet Connector Pin-Number Assignments

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 32 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 207.

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 3500 server by installing a U-bolt and security cable on the rear of your 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 54 and "Handling Static-Sensitive Devices" on page 55.

Adding Security Options

1. Remove the server cover (see "Preparing to Add Options" on page 56).

2. Use a tool, such as a screwdriver, to remove the two metal knockouts.

Metal
Knockouts
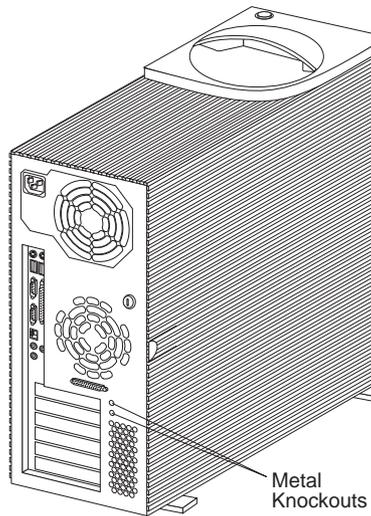
3. Insert the U-bolt through the rear panel; then, attach and tighten the nuts with an appropriately sized or adjustable wrench.
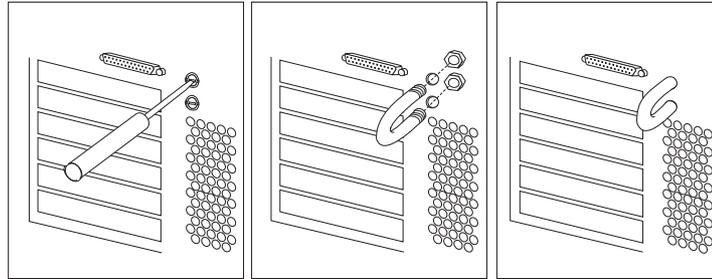
4. If you have completed installing the U-bolt and do not want to install any other internal options, replace the server cover and reconnect all external cables and power cords. (See "Completing the Installation" on page 113 if you need additional information.)
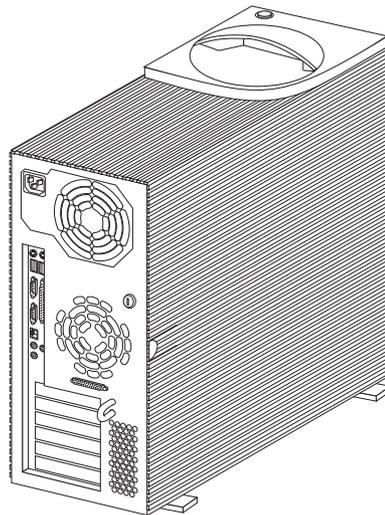
5. Thread the cable through the U-bolt and around an object that is not a part of or permanently secured to the building structure or foundation, and from which it cannot be removed; then, fasten the cable ends together with a lock.

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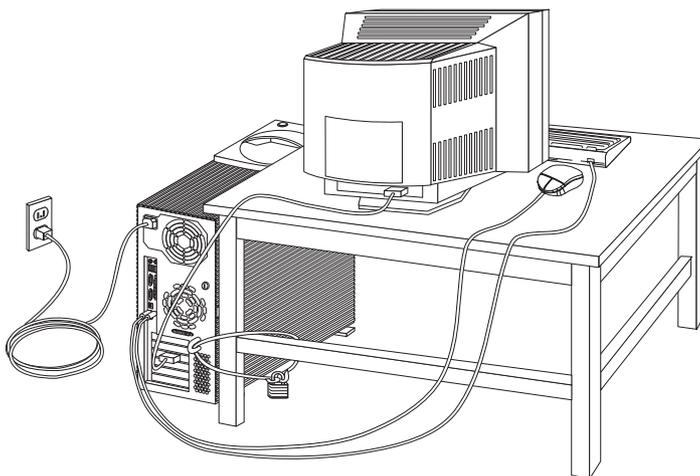
Completing the Installation

┌─ **Before you begin:** ──────────────────────────────┐
- Complete all the installation procedures for the internal
  options that you have chosen to install.
- Read "Electrical Safety" on page 54.
└──┘

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. Install the side cover:

   a. Align the top and bottom cover tabs with the corresponding notches on the frame of the server.

   b. Slide the side cover to the rear, as shown in the following illustration. Make sure that the cover is latched into position.
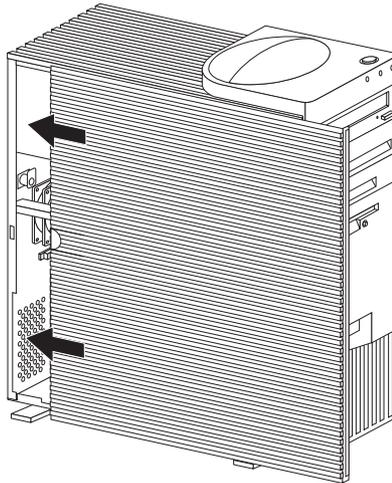
4. Lock the side cover.

   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 194.

   Attention:
   In the United Kingdom, by law, the telephone cable must be connected *after* the power cord.

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

6. 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.

7. 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 115.

Updating the Server Configuration

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 need to 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, 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 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.

2. To run the Configuration/Setup Utility program, follow the instructions in "Using the Configuration/Setup Utility Program" on page 28.

3. 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 31).

4. When you install an ISA legacy adapter, you must allocate system resources to support it (see "ISA Legacy Resources" on page 40).

5. For more information handling resource conflicts, see "Resolving Configuration Conflicts" on page 42.

Record the new configuration information in Chapter 7, "Server Records and Specifications" on page 193.

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, ServerGuide 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.

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.

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 42.

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-ROM that comes with your server. These programs are the primary method of testing the system board, memory, and other standard features of your Netfinity 3500 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, serial port, parallel port, keyboard, and mouse.

An IBM Enhanced Diagnostic CD-ROM comes with your server.

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.

See "Running the Diagnostic Test Programs" on page 124 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 32.)

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 125 and "POST Message Table" on page 129.

If you hear no beep at all during POST, see "Troubleshooting Charts" on page 157. You might need to have your system serviced.

POST Beep Codes

POST also generates beep codes to indicate successful completion or the detection of an error.

- One beep and 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 150.

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.

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 125 and "POST Message Table" on page 129. Also see "Power-On Self-Test (POST) Beep Codes" on page 150.

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 157 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 119 for a description of the diagnostic programs that come with your server.

To start the IBM Enhanced Diagnostics using the CD that comes with your server, do the following:

1. Turn off your server and any attached devices.

   Note: Do not press **Ctrl+Alt+Del.**

2. Turn on all attached devices; then, turn on your server.
3. Place the IBM Enhanced Diagnostic CD in the CD-ROM drive.
4. Select **Exit Setup** and follow the prompts. The diagnostics program will load. Follow the instructions on the screen to run the diagnostics program.

Attention:

1. When you finish running diagnostic and utility programs, remove the CD from the CD-ROM drive and turn off the server.

2. Do not discard this CD. Store it in a safe place for later use.

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

1. Insert a blank, 3.5-inch diskette into diskette drive A.
2. Follow the previous instructions for starting the IBM Enhanced Diagnostics CD.
3. Select the menu choice for making a backup diskette.
4. Follow the instructions on the screen.

To start the IBM Enhanced Diagnostics using your backup diagnostic diskette, do the following:

1. Turn off your server and any attached devices.
2. Insert the IBM Enhanced Diagnostics backup diskette into diskette drive A.
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 28. If the procedure in "Using the Configuration/Setup Utility Program" on page 28 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 128.

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 127), your operating system will start automatically (unless there is an unresolved problem with the startup device).

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.

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 124.
POST error code or message appears.	"POST Message Table" on page 129.
Blank screen, unreadable screen, or other unusual response occurs.	"Troubleshooting Charts" on page 157.

If you are unable to resolve a problem and need assistance, refer to Chapter 6, "Getting Help, Service, and Information" on page 183.

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 54, "Handling Static-Sensitive Devices" on page 55, and "Preparing to Add Options" on page 56 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 28.

2. If a password prompt appears with a POST message, type the administrator or power-on password; then, press **Enter.**

POST Message	Description
101 102 106	A failure occurred during the system board and microprocessor test. *Action:* Have the system serviced.

POST Messages

POST Message	Description
110 111	A memory parity failure occurred during testing of the system board. *Action:* Run the diagnostic programs to verify that a problem exists in a DIMM. (See "Running the Diagnostic Test Programs" on page 124 for information on running the diagnostic programs that come with your server.) See "Working with Memory Modules" on page 63 if you need to reconfigure the system memory to aid in identifying the defective DIMM. If you cannot identify the defective DIMM in this way, have the system serviced.
114	An adapter read-only memory (ROM) error occurred. *Action:* 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. If you cannot isolate and correct the problem, have the system serviced.
121	A hardware error occurred. *Action:* Have the system serviced.
151	A real-time clock (RTC) error occurred. *Action:* Have the system serviced.
161	The battery on the system board is dead. **CAUTION:** **The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge it, disassemble it, heat it, incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations.** **Replace the battery with the same or equivalent type recommended by the manufacturer. Danger of explosion if lithium battery is incorrectly replaced.** *Action:* Replace the battery. For additional information on battery use, disposal, and replacement, see "Lithium Battery Notice" on page ix and "Replacing the Battery" on page 179. 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 28.)

POST Message	Description
162	A change in device configuration occurred. This error occurs under one or more of the following conditions:

- 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 *Erasing Lost or Forgotten Passwords* procedure was performed. This procedure also erases configuration data.
- An invalid checksum is detected in CMOS memory (nonvolatile RAM).

Action:

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 28 for further information and instructions on saving the configuration.

4. If you added or changed a microprocessor, you must update the system programs. See "Updating the Server Configuration" on page 115 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 124 for information on running the diagnostic programs that come with your server.)

If the problem cannot be isolated and corrected, have the system serviced.

POST Messages

POST Message	Description
163	The clock is not working correctly.
	Action: 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 179.)
	If this does not correct the problem, have the system serviced.
	Until the system is serviced, the server can be used, but any application programs that use the date and time will be affected.
164	A change in the memory configuration occurred. This message might appear after you add or remove memory, or incorrectly install memory.
	Note: The server can be used with decreased memory capacity until the error is corrected.
	Action:
	1. If you added memory, see "Working with Memory Modules" on page 63 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 28.
	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 124 for information on running the diagnostic programs that come with your server.)
	If the problem cannot be isolated and corrected, have the system serviced.
167	An installed microprocessor is not supported by the current POST/BIOS.
	Action:
	1. Obtain the latest POST/BIOS update diskette image.
	2. Perform the POST/BIOS (flash) update procedure.
175	A failure occurred during testing of the system board and microprocessor.
	Action: Have the system serviced.

POST Message	Description
176	The server cover has been removed.
	Action: 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.
186	A system board or hardware security error has been cleared.
	Action: The administrator password was entered to clear POST message 176. No further action is required.
187	The administrator password and startup (boot) sequences have been cleared. POST message 162 will normally display also.
	Action: See POST message **162**
20X	A failure occurred during the memory test. This error can be caused by:
	• Incorrectly installed memory • A failing memory module • A system-board failure
	Action:
	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, reseat the memory modules. (See "Working with Memory Modules" on page 63.) Verify that the memory modules are configured correctly. (See Chapter 3, "Configuring Your Server" on page 23.)
	2. Run the diagnostic programs to verify the problem. (See "Running the Diagnostic Test Programs" on page 124 for information on running the diagnostic programs that come with your server.)
	If the problem cannot be isolated and corrected, have the system serviced.

POST Messages

POST Message	Description
301 303	An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping. *Action:* Ensure that: 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 10 for the location of the keyboard connector.) *Note:* 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.
601	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. *Note:* You can use the server, but one or more diskette drives might not work. *Action:* Verify that all diskette drive cables are properly installed and securely connected. 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 124 for information on running the diagnostic programs that come with your server.)
602	The server cannot start the diskette in the drive. The diskette might be damaged or formatted incorrectly. *Action:* 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.) If this does not correct the problem, have the system serviced.

POST Message	Description
604	A failure occurred during a diskette-drive test.
	Action:
	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 28.
	2. Run the diagnostic programs. (See "Running the Diagnostic Test Programs" on page 124 for information on running the diagnostic programs that come with your server.)
	3. If the diagnostic programs detect a failure, replace the diskette drive.
	If the problem cannot be isolated and corrected, have the system serviced.
662	A diskette drive configuration error occurred.
	Action:
	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 28.
	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 28 for information and instructions on saving the configuration.
	3. Run the diagnostic programs. (See "Running the Diagnostic Test Programs" on page 124 for information on running the diagnostic programs that come with your server.)
	If the problem persists, have the system serviced.
762	A math coprocessor configuration error occurred.
	Action: Have the system serviced.
11XX	A serial port error occurred.
	Where **XX** is the serial port number.
	Action: Have the system serviced.

POST Message	Description
1762	A hard disk configuration error occurred.
	Action:
	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 28.)
	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 28 for additional information and instructions on saving the configuration.
	If the problem cannot be isolated and corrected, have the system serviced.
178X	A failure occurred during testing of the hard disk drive or a primary or secondary IDE device.
	Action:
	1. Run the diagnostic programs. (See "Running the Diagnostic Test Programs" on page 124 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.
	If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1800	A PCI adapter has requested a hardware interrupt that is not available.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61. For information on setting interrupts, see "PCI Control" on page 39.

   Note: If you remove an ISA legacy adapter, set the hardware interrupt used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Messages

POST Message	Description
1801	A PCI adapter has requested memory resources that are not available.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the memory resources used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1802	A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the I/O address used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Messages

POST Message	Description
1803	A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the memory address used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1804	A PCI adapter has requested a memory address that is not available.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the memory address used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1805	A PCI adapter read-only memory (ROM) error occurred.

Action: 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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1850	A Plug and Play adapter has requested a hardware interrupt that is not available.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61. For information on setting resources, see "ISA Legacy Resources" on page 40.

   Note: If you remove an ISA legacy adapter, set the hardware interrupt used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1851	A Plug and Play adapter has requested memory resources that are not available.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the memory resources used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1852	A Plug and Play adapter has requested an I/O address that is not available, or the Plug and Play adapter might be defective.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the I/O address used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1853	A Plug and Play adapter has requested a memory address that is not available, or the Plug and Play adapter might be defective.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the memory address used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1854	A Plug and Play adapter has requested a memory address that is not available. *Action:* 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. For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28. 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 Adapters" on page 61. *Note:* If you remove an ISA legacy adapter, set the memory address used by the removed adapter to **Available** before installing another adapter. 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. If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1855	A Plug and Play adapter read-only memory (ROM) error occurred.
	Action: Remove all Plug and Play adapters that are not required for system startup, and reinstall them one at a time, powering on after each is reinstalled. When message 1855 displays, replace the adapter that you just installed.
	If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1856	A Plug and Play adapter has requested a DMA address that is not available.

Action:

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.

   For information about PCI and ISA adapters, see "Working with Adapters" on page 59. For information about Plug and Play and legacy (non-Plug and Play) adapters, see "ISA Legacy Resources" on page 40. 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 28.

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 Adapters" on page 61.

   Note: If you remove an ISA legacy adapter, set the DMA address used by the removed adapter to **Available** before installing another adapter.

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.

If the problem cannot be isolated and corrected, have the system serviced.

POST Message	Description
1962	A startup sequence error occurred.
	Action:
	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 28.
	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 Adapters" on page 61.
	If the problem cannot be isolated and corrected, have the system serviced.
8603	A pointing device or system board error occurred.
	Action: Have the system serviced.
I9990301	A hard disk drive failure occurred.
	Action: Have the system serviced.
Other Numbers	The server POST found an error.
	Action: Follow the instructions on the screen.

Power-On Self-Test (POST) Beep Codes

One beep and the appearance of text on the monitor indicates 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 Code Table

For the following beep codes, 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. An *x* in an error message can represent any number.

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

Beep Code	Probable Cause
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

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	Description
All	One or more of the following might be causing the problem:
	• 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
	Action:
	Verify that:
	• 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 75 for more information about SCSI termination. • The SCSI devices are configured correctly.
	If the above are correct, run the diagnostic programs for additional information about the failing device. If the error recurs, have the system serviced.

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  Media test failed; check the cable.
```

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 computer. Check the cable to ensure that it is properly connected.

Other error messages that might occur are shown in Table 10 on page 154.

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

Ethernet Controller Messages

Table 10 (Page 1 of 3). Ethernet Controller Messages

Error Code	Description
RPL-ROM-ERR: 100	The integrated Ethernet controller cannot be found.
RPL-ROM-ERR: 101	The integrated Ethernet controller was unable to initialize.
RPL-ROM-ERR: 102	The integrated Ethernet controller could not be reset controller.
RPL-ROM-ERR: 103	There are multiple Ethernet controllers or adapters in the system. Specify the correct serial number in the NET.CFG file.
RPL-ROM-ERR: 104	The integrated Ethernet controller EEPROM is faulty or not present.
RPL-ROM-ERR: 106	The integrated Ethernet controller is configured for Plug and Play in a non-Plug and Play system.
RPL-ROM-ERR: 110	The integrated Ethernet controller RAM failed the memory test.
E61	Service boot (startup) canceled; that is, the boot diskette image was not downloaded from the network.
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.

Table 10 (Page 2 of 3). Ethernet Controller Messages

Error Code	Description
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.
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.

Ethernet Controller Messages

Table 10 (Page 3 of 3). Ethernet Controller Messages

Error Code	Description
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

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 119 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 124 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.	Follow the instructions in "Using the CD-ROM Drive" on page 20 for using the CD-ROM drive, handling a CD, and loading a CD.
	Clean the CD by wiping it with a soft, lint-free cloth, from the center of the CD to the outer edge. Do *not* clean the CD in a circular pattern. This can cause loss of data.
	If this does not correct the problem, clean the optical-head lens. Discs for cleaning the lens are available from your place of purchase.
	If a problem still exists, have the system serviced.
The CD-ROM drive tray is not working.	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.
	Note: In some models, you might have to remove the front bezel from the CD-ROM drive to access the emergency-eject hole.
	If the drive still does not work correctly, have the system serviced.

CD-ROM Drive Problems	Action
The server does not recognize the CD-ROM drive.	Your server comes with an IDE CD-ROM drive. Verify that:

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 28.

2. The server is checking for the CD-ROM drive in the startup sequence. Use the Configuration/Setup Utility program to verify this.

3. The CD is good and not damaged.

   If the CD is damaged, replace it.

4. The CD is inserted correctly in the drive.

5. The CD contains the necessary files to start the system (the CD must be startable).

   Note: The CD that comes with your server is startable.

6. The CD-ROM drive cable is properly installed and securely connected.

7. Your software program is OK. See **Software Problems** at the end of these troubleshooting charts.

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 47.

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.

Troubleshooting

Diskette Drive Problems	Action
The diskette drive in-use light stays on, or the system bypasses the diskette drive.	If there is a diskette in the drive, verify that: 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 28. 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. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, have the system serviced.

Monitor Self-Tests	Action
General monitor problems.	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. If you still cannot find the problem, check the **Monitor Problems** troubleshooting chart for possible solutions. If the problem cannot be isolated and corrected, have the monitor and system serviced.

Monitor Problems	Action
The screen is blank.	Verify that: 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 connected to the monitor and the monitor connector (video port) on the graphics adapter that comes installed in your server. To find the location of the video port, see "Input/Output Connectors" on page 10. 4. The graphics adapter is correctly installed in slot 1, the Accelerated Graphics Port (AGP). Your server comes with a graphics adapter installed in this slot. For the location of the AGP, see "Working with Adapters" on page 59. If the items above are correct and the screen remains blank, have the system serviced.
Only the cursor appears.	Have the system serviced.
The monitor works when you turn on the system, but goes blank when you start some application programs.	Verify that: 1. The primary monitor signal cable is securely connected to the monitor and the monitor connector (video port) on the graphics adapter that comes installed in your server. To find the location of the video port, see "Input/Output Connectors" on page 10. 2. The graphics adapter is correctly installed in slot 1, the Accelerated Graphics Port (AGP). Your server comes with a graphics adapter installed in this slot. For the location of the AGP, see "Working with Adapters" on page 59. 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. If the problem cannot be isolated and corrected, have the monitor and system serviced.

Troubleshooting

Monitor Problems	Action
The monitor works when you turn on the system, but goes blank after some period of server inactivity.	The server is probably set for energy savings with the Advanced Power Management (APM) feature. This feature is not available and therefore, has a default setting of **Disabled**. If the APM feature setting has been enabled, change the setting back to **Disabled**. If the problem cannot be isolated and corrected, have the system serviced.
The screen flickers.	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. **Attention:** Using a resolution or refresh rate that is not supported by your monitor might damage it. 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. If this does not correct the problem, have the monitor and system serviced. *Note:* To reset the refresh rate, use a utility program, such as AnyView Professional or WinMode.

Monitor Problems	Action
Wavy, unreadable, rolling, distorted screen, or screen jitter.	If the monitor self-tests show that the monitor is working properly, verify that:

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:

   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.

Note: An enhanced monitor signal cable with additional shielding might be available for your monitor. Contact your IBM reseller or marketing representative for information.

If the problem still exists, have the monitor and system serviced.

Monitor Problems	Action
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: 1. All cables are securely connected to the proper connectors on the server. For the location of the connectors, see "Input/Output Connectors" on page 10. 2. The server cover is properly installed. 3. The power outlet functions properly. 4. 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: 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 75. If the items above are correct, have the system serviced.

Microprocessor Problems	Action
The server emits a continuous tone during POST.	A microprocessor is not working properly. 1. Verify that the secondary microprocessor is seated properly. 2. If your server contains two microprocessors, remove the secondary microprocessor and restart the server. If the server starts properly, replace the old secondary microprocessor. 3. If you have only one microprocessor, replace it. Restart the server. If the problem still exists, have the system serviced.

Keyboard, Mouse, or Pointing-Device Problems	Action
All or some keys on the keyboard do not work.	Verify that: 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 10. If the problem cannot be isolated and corrected, have the keyboard and system serviced.
The mouse or pointing device does not work.	Verify that: 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 10. 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.

Memory Problems	Action
The amount of memory displayed is less than the amount of memory installed.	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).

Verify that:

1. The memory modules are properly seated and securely connected.
2. You have installed the correct type of memory for your server (see "Working with Memory Modules" on page 63).
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 28.

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 124 for additional information.) The system might have detected a defective DIMM and automatically reallocated memory to enable your server to continue to operate.

If the problem cannot be isolated and corrected, have the system serviced.

Option Problems	Action
An IBM option that used to work does not work now.	Verify that all of the option hardware and cable connections are secure.
	If the option comes with its own test instructions, use those instructions to test the option.
	If the failing option is a SCSI option, verify that: 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. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the system.
	For more information, refer to your SCSI documentation and see Chapter 4, "Installing Options" on page 51.
	If the items above are correct and the diagnostic tests found no problem, have the server and option serviced.

Option Problems	Action
An IBM option that was just installed does not work.	Verify that: 1. The option is designed for the system. 2. You followed the installation instructions that come with the option and the instructions in Chapter 4, "Installing Options" on page 51. 3. You have not loosened any other installed options or cables. 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 these adapter (as well as the documentation for any other installed adapters) to determine the resources required for each adapter. 5. All option files (if required) are installed correctly. See "Installing Files from Option Diskettes" on page 123 for information on installing option files. 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 28. If the problem persists, run the diagnostic programs. (See "Running the Diagnostic Test Programs" on page 124 for additional information on running the diagnostic programs that come with your server.) If the problem cannot be isolated and corrected, have the server and the option serviced.

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: 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 30 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 Adapters" on page 61. If the items above are correct, have the system serviced.

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: 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 30 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 Adapters" on page 61. 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.

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: 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 30 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 Adapters" on page 61. If the items above are correct, have the system serviced.
A USB device does not work.	Verify that: 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 28. 2. The USB clock speed matches the clock speed of the USB device. If the items above are correct, have the system serviced.

Troubleshooting

Universal Serial Bus (USB) Port Problems	Action
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.

Printer Problems	Action
The printer does not work.	Verify that: 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 10. *Note:* Non-IBM printer cables might cause unpredictable problems. 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 28. 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.

Expansion Enclosure Problems	Action
The SCSI expansion enclosure used to work, but does not work now.	Verify that all SCSI expansion enclosure hardware and cable connections are secure.
	Verify that:
	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. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the system.
	For more information, see your SCSI and expansion enclosure documentation.
	If the SCSI expansion enclosure comes with its own test instructions, use those instructions to test it. In addition, test the power supply.
	If the items above are correct and the test programs found no problem, have the server and SCSI expansion enclosure serviced.
The SCSI Repeater Card used to work, but does not work now.	Verify that all SCSI Repeater Card hardware and cable connections are secure.
	Verify that:
	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. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the system.
	For more information, see your SCSI documentation.
	If the SCSI Repeater Card comes with its own test instructions, use those instructions to test it.
	If the items above are correct and the test programs found no problem, have the server and SCSI Repeater Card serviced.

Software Problems	Action
Is your software program OK?	To determine if problems are caused by the software, verify that: 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. *Note:* If you have just installed an adapter or memory, you might have a memory address conflict. 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. 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. If the items above are correct and the problem remains, contact your place of purchase or service technician for help.

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 44. For an illustration of the Ethernet activity light location on the server, see "Status Indicators" on page 9.

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 217 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 (a UTP cable that is wired as a straight-through 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.

   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 (see "Configuring the Ethernet Controller" on page 44).

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.	The PCI BIOS is not configuring the Ethernet controller or adapter correctly.
	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 40) so that the PCI BIOS will assign another non-conflicting PCI interrupt value.
The Configuration/Setup Utility program reports No PCI Bus.	The Configuration/Setup Utility program has been run on another computer that does not have any PCI slots.
	Run the Configuration/Setup Utility program on your server so that the PCI BIOS will configure the Ethernet controller or adapter correctly.
The server stops running when loading device drivers.	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 40) so that the PCI BIOS will assign another non-conflicting PCI interrupt value.
The diagnostics are completed successfully, but the connection fails.	1. Make sure that the network cable is securely attached.
	2. Make sure that you are using Category 5 cabling when operating the server at either 10 Mbps or 100 Mbps.

Controller Problems	Action
The Ethernet Activity light does not come on.	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 Adapters" on page 61).
	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 forced the duplex mode, make sure that you also force the speed to either 10 Mbps or 100 Mbps.
	8. If you manually configured the duplex mode, make sure that you also manually configured the speed.
	If the problem still exists, have the system serviced.
Data is incorrect or sporadic.	Make sure that you are using Category 5 cabling when operating the server at either 10 Mbps or 100 Mbps.
The Ethernet controller or adapter stopped working when another adapter was added to the server.	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 Adapters" on page 61).
	If the problem still exists, have the system serviced.

Controller Problems	Action
The Ethernet controller or adapter stopped working without apparent cause.	1. Reseat the adapter (see "Installing or Removing Adapters" on page 61). 2. Try a different connector at the hub or switch. 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). 4. Try a different Ethernet adapter. See http://www.us.pc.ibm.com/server/ on the World Wide Web for a list of compatible adapters. If the problem still exists, have the system serviced.

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.

⚠

CAUTION:
Observe all safety and electrostatic precautions listed in this book to avoid personal injury or damage to your system.

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 54 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 Diagnostic CD-ROM. See "Running the Diagnostic Test Programs" on page 124.

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 and the requirements in the "Lithium Battery Notice" on page ix.

CAUTION:
This product contains a lithium battery. The lithium battery presents a fire, explosion, or severe burn risk if handled incorrectly.

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type lithium battery recommended by the manufacturer of the battery currently installed in your server. Dispose of the battery as required by local ordinances or regulations and the manufacturer's instructions.

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.

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.

Replacing the Battery

> **Before you begin, be sure you have:**
>
> - Read "Electrical Safety" on page 54 and "Handling Static-Sensitive Devices" on page 55.
>
> - Followed any special handling and installation instructions supplied with the replacement battery.
>
> - Removed the server side cover (see "Preparing to Add Options" on page 56).

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 203).

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.

   d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.
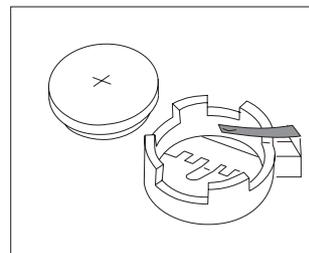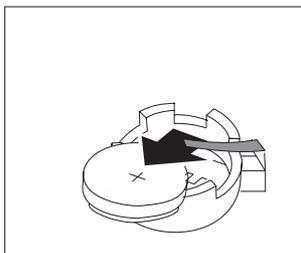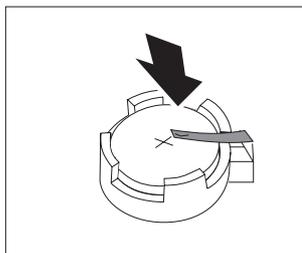
3. Insert the new battery:

   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.
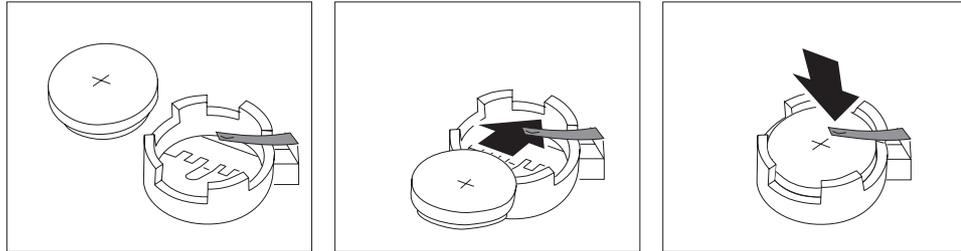
4. Reinstall the server covers and complete the installation (see "Completing the Installation" on page 113).

   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.

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 32.

   • To reset the power-on password, go to "Using the Power-On Password Menu" on page 32.

   • To reconfigure your system, follow the instructions given in "The Configuration/Setup Program" on page 26 (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.pc.ibm.com`	IBM Personal Computer home page
`http://www.us.pc.ibm.com/desktop/`	IBM Commercial Desktop home page (U.S.)
`http://www.us.pc.ibm.com/server/`	IBM PC Server and Netfinity Server home page (U.S.)
`http://www.us.pc.ibm.com/options/`	IBM Options home page (U.S.)

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

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

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

This chapter contains:

Before You Call for Service

Many server 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 server or software. Also, be sure to read the information in any README files that come with your software.

Most servers, operating systems, and application programs come with documentation that contains troubleshooting procedures and explanations of error messages. (For troubleshooting and error information about your server, see Chapter 5, "Solving Problems" on page 117.) The documentation that comes with your server also contains information about the diagnostic tests that you can perform (see "Running the Diagnostic Test Programs" on page 124).

If you receive a POST error code when you turn on your server, refer to the POST error-message charts in Chapter 5, "Solving Problems" on page 117. If you do not receive a POST error code, but suspect a hardware problem, refer to the troubleshooting information in Chapter 5, "Solving Problems," or run the diagnostic tests.

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

Getting Customer Support and Service

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

Using Electronic Support Services

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

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

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

In addition, the latest device driver updates are available.

The IBM PC Company 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 PC Company BBS:

- In the U.S., call 1-919-517-0001.
- In Canada:
    - In Halifax, call 902-420-0300.
    - In Montreal, call 514-938-3022.
    - In Toronto, call 905-316-4255 or 416-956-7877.
    - In Vancouver, call 604-664-6461 or 604-664-6464.
    - In Winnipeg, call 204-934-2735.

Commercial online services that contain information about IBM
products include:

- CompuServe

    Use the following GO words: APTIVA®, IBMPS2, ThinkPad®,
    PowerPC®, ValuePoint™, IBMSVR, or IBMOBI.

- PRODIGY

    Use the Jump command; type **IBM** and select **PC Product
    Support.**

- America Online

  Use the "Go to" keyword **IBM Connect**.

Using the World Wide Web

On the World Wide Web, the IBM Personal Computers home page has information about IBM Personal Computer products and support. The address for the IBM Personal Computer home page is:

```
http://www.pc.ibm.com
```

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

```
http://www.us.pc.ibm.com/intellistation/world/
```

```
http://www.us.pc.ibm.com/desktop/
```

```
http://www.us.pc.ibm.com/server/
```

```
http://www.us.pc.ibm.com/thinkpad/
```

```
http://www.us.pc.ibm.com/options/
```

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

Getting Information by Fax

If you have a touch-tone telephone and access to a fax machine, in the U.S. and Canada you can receive by fax free marketing and technical information on many topics, including hardware, operating systems, and local area networks (LANs). You can call the IBM PC Company 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 PC Company Automated Fax System, do the following:

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

Getting Help by Telephone

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

- Setting up your server 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:

- Serial numbers of your server, 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 server when you call.

These services are available 24 hours a day, 7 days a week.[9]

- In the U.S. and Puerto Rico, call 1-800-772-2227.
- In Canada, call 1-800-565-3344.
- In the United Kingdom, call 01475-555055.

---

[9] Response time will vary depending on the number and complexity of incoming calls.

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

Getting Help Around the World

If you need to move your server 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.

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 servers that are not connected to a network. Technical support is provided for IBM servers 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 server
- Installing and configuring non-IBM options in IBM servers
- Using IBM operating systems in IBM and non-IBM servers
- 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 190.

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" on page 190.

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 IBM reseller or IBM marketing representative.

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 though 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.

Ordering Publications

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.

Recording the Identification Numbers

Record and retain the following information.

Product Name	IBM Netfinity 3500
Machine Type	**8644**
Microprocessor Type	Pentium II
Model Number	_____
	☐ with preinstalled hard disk drive
	☐ without preinstalled hard disk drive
Serial Number	_____
Key Serial Number	_____

Table 11. Server Identification Numbers

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: Two identical keys are provided with your server. At the time of shipment, they are attached to the back of the server. Store the keys in a safe place. Locksmiths are not authorized to duplicate these keys. If you lose them, you must order replacement keys from the key manufacturer. The key serial number and the address of the manufacturer are on a tag attached to the keys. Record this information in the space provided in the above table. Store the tag in a safe place.

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.

Location	Drive or Device Description
	Internal Devices
Bay 1	5.25-Inch IDE CD-ROM Drive
Bay 2	_____
Bay 3	_____
Bay 4	3.5-Inch 1.44MB Diskette Drive
Bay 5	_____
Bay 6	3.5-Inch Hard Disk Drive (some models)
	_____ (Open bay models)
	External Devices
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____

Table 12. Internal and External Drives and Devices

Recording Installed Devices

Table 13 (Page 1 of 4). Configuration/Setup Program Defaults and Changes

Option	Default Value	New Value	Additional Information
System Summary			
Microprocessor[1]	Pentium II ECC	_____	_____
Microprocessor Speed	_____	_____	_____
Secondary Microprocessor[1]	Pentium II ECC	_____	_____
Secondary Microprocessor Speed	_____	_____	_____
System Memory	64 MB	_____	_____
Memory Type	ECC	_____	_____
Extended Memory	31 MB	_____	_____
Cache Size (internal)		_____	_____
Cache State	[Enabled]	_____	_____
Shadow RAM	384 KB	_____	_____
System ROM	E0000h — FFFFFh	_____	_____
Diskette Drive A	1.44 MB 3.5-inch diskette drive	_____	_____
Diskette Drive B	[Not Installed]	_____	_____
Mouse	[Installed]	_____	_____
[1]Both microprocessors must have the same cache size and type, and the same clock speed.			
Product Data			
Flash EEPROM Revision Level	_____	_____	_____
BIOS Date	_____	_____	_____
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	[3F8h – IRQ 4]	_____	_____
Serial Port B Address	[2F8h – IRQ 3]	_____	_____
USB Setup			
USB Support	[Enabled]	_____	_____
Parallel Port Setup			
Parallel Port	[3BCh – IRQ 7]	_____	_____
Parallel Port Mode	[Extended]	_____	_____
Parallel Port Extended Mode	[Bidirectional]	_____	_____
Parallel Port DMA	No DMA	_____	_____
Video Setup			
Video Controller	S3 Incorporated. 86C357	_____	_____
Video Memory	4096 KB	_____	_____
Video Interrupt	[Disabled]	_____	_____

Table 13 (Page 2 of 4). Configuration/Setup Program Defaults 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]	_____	_____
IDE Drives Setup[2]			
IDE CD-ROM Drive 0	_____	_____	_____
IDE Hard Disk Drive 1	_____	_____	_____
IDE Hard Disk Drive 2	_____	_____	_____
IDE Hard Disk Drive 3	_____	_____	_____
Audio Setup			
Audio Support	[Enabled]	_____	_____
Audio Output Mode	[Line Out]	_____	_____
Ethernet Setup			
Ethernet Support	[Enabled]	_____	_____
Network Boot	[Disabled]	_____	_____
MAC Address	_____	_____	_____
SCSI Setup			
SCSI Support	[Enabled]	_____	_____
[2]IDE hard disk drives are not supported.			
System Security			
Enhanced Security	[Disabled]		
Secure IDE Devices and	[Enable]	_____	_____
Diskette Drives		_____	_____
POST/BIOS Update	_____	_____	_____
Power-On Password	[On]	_____	_____
Administrator Password	_____	_____	_____
Adapter ROM Security	[No]	_____	_____

Recording Installed Devices

Table 13 (Page 3 of 4). Configuration/Setup Program Defaults and Changes			
Option	Default Value	New Value	Additional Information
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	[Hard Disk 0]	_____	_____
Third Startup Device	[Disabled]	_____	_____
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[3]	[Disabled]	_____	_____
[3]The Virus Detection test checks for changes to the boot sector.			
Advanced Setup			
Cache Control			
L2 Cache State	[Enabled]	_____	_____
L2 Cache Size	_____	_____	_____
ROM Shadowing (hex)			
E0000h – FFFFFh (System BIOS)	Enabled		
DC000h – DFFFFh	[Disabled]	_____	_____
D8000h – DBFFFh	[Disabled]	_____	_____
D4000h – D7FFFh	[Disabled]	_____	_____
D0000h – D3FFFh	[Disabled]	_____	_____
C4000h – C7FFFh	[Enabled]	_____	_____
C0000h – C3FFFh	Enabled		
C8000h – CBFFFh	[Enabled]	_____	_____
PCI Control			
PCI Adapter Reset	[Enabled]	_____	_____
PCI Parity	[Enabled]	_____	_____
PCI Bus Master		_____	_____
Network Adapters	[Disabled]	_____	_____
Mass Storage Adapters	[Enabled]	_____	_____
Display Adapters	[Disabled]	_____	_____
Multimedia Devices	Enabled	_____	_____
Communication Adapters	Enabled	_____	_____
Serial Adapters	[Enabled]	_____	_____

Table 13 (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			
Processor Updating	[Enabled]		
ISA Legacy Resources		_____	_____
Memory Resources	_____	_____	_____
DMA Resources	_____	_____	_____
I/O Port Resources	_____	_____	
Interrupt Resources	_____	_____	
Power Management			
ACPI BIOS Mode	[Disabled]	_____	_____
APM[4]	[Disabled]	_____	_____
Automatic Power On		_____	_____
Wake on LAN™	[Disabled]	_____	_____
Serial Port A Ring Detect	[Disabled]	_____	_____
Modem Ring Detect	[Disabled]	_____	_____
Wake Up on Alarm	[Disabled]	_____	_____
PCI Wake Up	[Disabled]	_____	_____
[4]The Automatic Power Management (APM) feature is not used.			

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	32 MB or 64 MB	_____	_____
Extended Memory	512 MB	_____	
Bank 0	_____	_____	□ 32 MB □ 64 MB □ 128 MB
Bank 1	_____	_____	□ 32 MB □ 64 MB □ 128 MB
Bank 2	_____	_____	□ 32 MB □ 64 MB □ 128 MB
Bank 3	_____	_____	□ 32 MB □ 64 MB □ 128 MB
Total Memory	_____	_____	

Table 14. RAM Default Settings and Changes

Record expansion-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
6	ISA	_____	_____	_____	_____	_____
5[1]	Shared	_____	_____	_____	_____	_____
4	PCI	_____	_____	_____	_____	_____
3	PCI	_____	_____	_____	_____	_____
2	PCI	_____	_____	_____	_____	_____
1	AGP[2]	_____	_____	_____	_____	_____

Notes:

1. Slot 5 is shared by adjacent PCI and ISA connectors.

2. Slot 1 is an Accelerated Graphics Port (AGP).

3. Before setting values, review "Resolving Configuration Conflicts" on page 42 and follow the instructions for avoiding configuration conflicts.

Table 15. Expansion-Slot Configuration Information

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 3500 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)[10]: 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:
    - 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:
    - 42 dBA idle
    - 46 dBA operating
  - At bystander position–1 meter (3.3 ft):
    - 36 dBA idle
    - 40 dBA operating
- Declared (upper limit) sound power levels:
  - 5.1 bels idle
  - 5.5 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.

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[10] Under typical maximum configurations, the heat output will be substantially below the theoretical maximum.

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.

1	5 V auxiliary power connector
2	Primary microprocessor socket
3	Power switch connector
4	Secondary microprocessor socket
5	DIMM sockets (memory connectors)
6	Secondary IDE connector
7	Diskette drive connector
8	Primary IDE connector
9	Channel A SCSI connector (68 pin)
10	Channel B SCSI connector (50 pin)
11	Channel B SCSI connector (68 pin)
12	Clear CMOS Request (password) jumper (J7E1)
13	Rocker switches
14	Battery
15	RAIDport connector
16	ISA slot connectors
17	PCI slot connectors
18	AGP slot connector

Notes:

1. The RAIDport connector is not used.
2. The configuration switches (1–8) are also known as rocker switches. Their settings are specified later in this chapter.
3. An illustration of the system board and additional information are provided on a label inside the server.

Using the Clear CMOS Request Jumper to Erase Forgotten Passwords

Note: To set, change, or delete a password, see "System Security" on page 32.

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.

Attention:

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 36.

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 CMOS jumper.

The jumper is located on the system board with the label *Clear CMOS Request* (J7E1). To locate this jumper, see "System Board Illustration" on page 203, 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 54 and "Handling Static-Sensitive Devices" on page 55.
- Power off the server.
- Remove the server cover (see "Disconnecting Cables and Removing the Cover" on page 56).

---

1. Locate the *Clear CMOS Request* jumper (J7E1) on the system board. For more information, see "System Board Illustration" on page 203, or refer to the label inside the server.

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 crush the jumper or to scrape any system-board components.
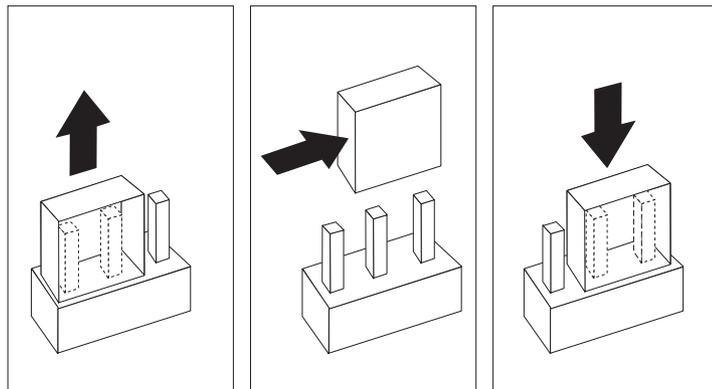
3. Reinstall the server cover and reconnect the cables (see "Completing the Installation" on page 113 for instructions).

4. Turn the server back on for approximately 10 seconds.

   CAUTION:
   Do not touch any components while power is on.

5. Turn off the server. CMOS memory is now cleared.

   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.

6. Disconnect the cables, remove the server cover, and move the jumper back to its normal position (pins 1 and 2).
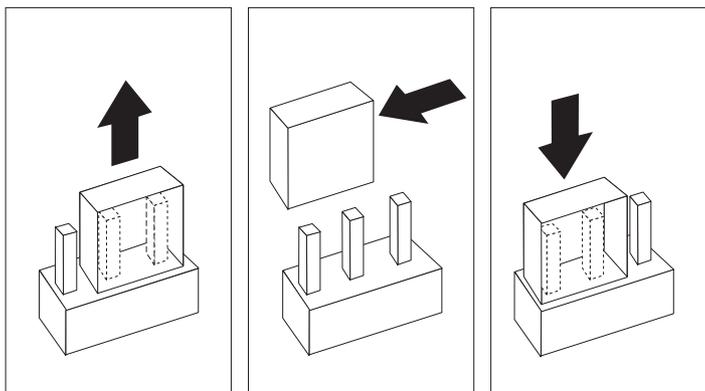
7. After clearing CMOS memory, you must reconfigure the server. After reassembling the server (see "Completing the Installation" on page 113), use the Configuration/Setup Utility program to reset the date and time, reset any passwords, and reconfigure the server. For more information, see "Using the Configuration/Setup Utility Program" on page 28.

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 54 and "Handling Static-Sensitive Devices" on page 55.
- 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 56).

---

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 203.

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.
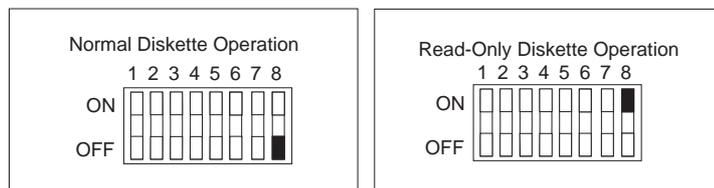
3. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see "Completing the Installation" on page 113), use the Configuration/Setup Utility program to reset the date and time, reset any passwords, and reconfigure the server. For more information, see "Using the Configuration/Setup Utility Program" on page 28.

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 38.

Setting the Microprocessor Speed Switches

When you replace a microprocessor with one that has a different speed, you must change the switch settings on the system board.

Note: When you add a second microprocessor, it must operate at the same speed as the primary microprocessor.

Before you begin:

- Read "Electrical Safety" on page 54 and "Handling Static-Sensitive Devices" on page 55.
- 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 56).

---

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 203.

2. To set the appropriate microprocessor speed, set switches 1 to 4 as shown in the following illustration. 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.
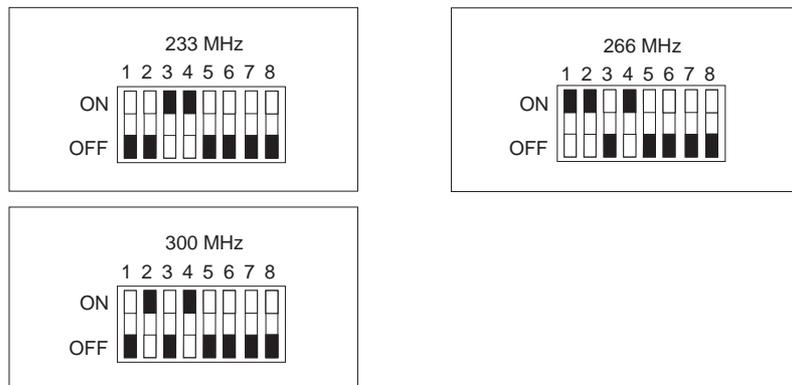
Table 16. Microprocessor Switch Settings

3. After changing configuration switch settings, you must reconfigure the server. After reassembling the server (see "Completing the Installation" on page 113), use the Configuration/Setup Utility program to reconfigure the server. For more information, see "Using the Configuration/Setup Utility Program" on page 28.

Setting the ROM Operation Mode Switch

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 54 and "Handling Static-Sensitive Devices" on page 55.
> - 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 56).

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 203.

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.
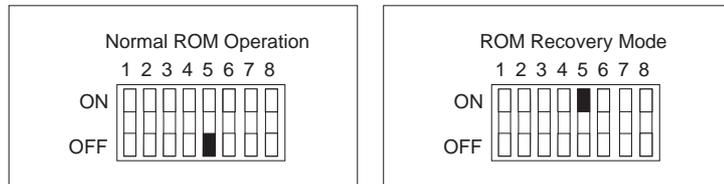
3. Move the switch to the **ON** position.

4. Insert the POST/BIOS update (flash) diskette 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 113), use the Configuration/Setup Utility program to reconfigure the server. For more information, see "Using the Configuration/Setup Utility Program" on page 28.

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 54 and "Handling Static-Sensitive Devices" on page 55.
- 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 56).

---

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 203.

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.

   Note: In the following illustration, **MAC** represents media access control. This refers to the Ethernet controller address.
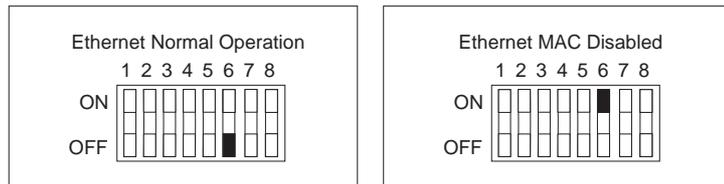
3. Move the switch to the **ON** position.

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 113), use the Configuration/Setup Utility program to reconfigure the server. For more information, see "Using the Configuration/Setup Utility Program" on page 28.

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 54 and "Handling Static-Sensitive Devices" on page 55.
> - 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 56).

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 203.

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.

Administrator Password Locked
1 2 3 4 5 6 7 8
ON
OFF

Administrator Password Unlocked
1 2 3 4 5 6 7 8
ON
OFF
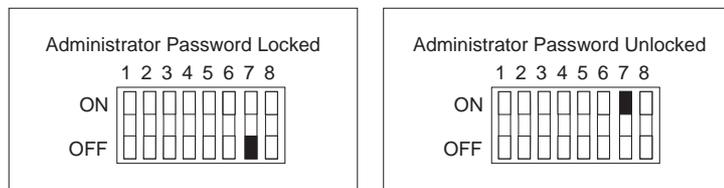
3. Move the switch to the **ON** position.

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

4. Set, change, or delete your password.

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 113), 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 28.

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 Ethernet controller supports the auto-detection mode only. When you install your device drivers and configure the Ethernet controller for use with your operating system, do not select the 10BASE-T mode. To ensure proper operation of your controller, always select the default parameters provided.

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.

To connect the server 10BASE-T or 100BASE-TX port to a 10BASE-T or 100BASE-TX port on a repeater, use a UTP cable with RJ-45 connectors at both ends. An EIA/TIA-568 Category 5 cable must be used for 10BASE-T and 100BASE-TX.

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.

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.

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 17 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.

Table 17. Cabling Specifications for 10BASE-T and 100BASE-TX Link Segments	
Characteristic	**Specification[1]**
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	- For 10BASE-T: 8 to 10 dB per 100 m at 10 MHz - For 100BASE-TX: 67 dB per 305 m at 100 MHz

[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.
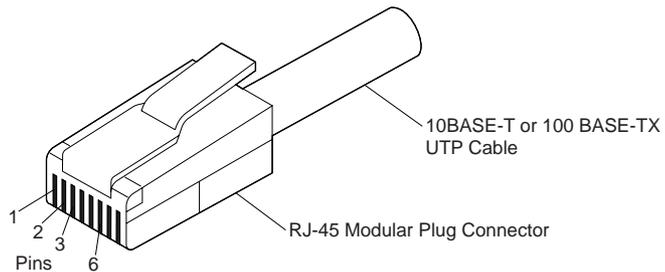
The following figure illustrates the wiring in straight-through cables.

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

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)
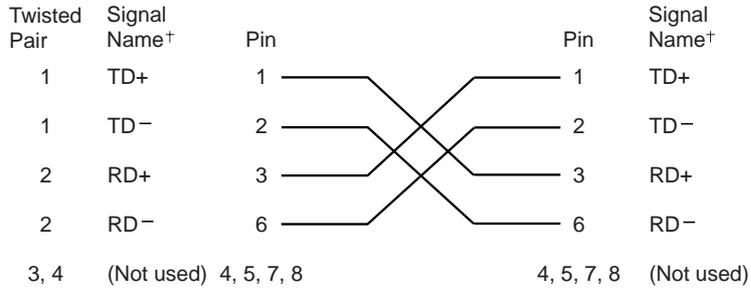
[†] Relative to the device connected to the adapter

Note: For additional information about Ethernet protocols, refer to your Ethernet documentation.

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

This appendix contains:

Warranty Statements

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

United States, Canada, and Puerto Rico

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

International Business Machines Corporation   Armonk, New York, 10504

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Product Warranties and Notices

> **Machine:** IBM Netfinity 3500
>
> **Warranty Period*:** Three Years
>
> **Contact your place of purchase for warranty service information.*

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

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

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You agree to:

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United Kingdom

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Tel + 44 1475 893638

Fax + 44 1475 893732

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

2. Customers are not required to register their machine for International Warranty Service if relocation is within the countries of Group A or Group B.

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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 meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

United Kingdom Telecommunications Safety Requirements

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

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Australia and New Zealand Class A Electronic Emission Statement

Australia and New Zealand Class A Statement

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

Power Cords

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

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

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

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

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

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

IBM Power Cord Part Number	Used in These Countries
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.

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.

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.

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

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.

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

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.

port. An access point for data entry or exit. (Contrast with connector.)

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.

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.

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