IBM

PC Server 315

User's Handbook

> **Note**
>
> Before using this information and the product it supports, be sure to read the general information under Appendix D, "Notices" on page 215. Also read the general information under "Product Warranties and Notices" in the *User's Reference*.

First Edition (April 1997)

Contents

⚠️ **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.	
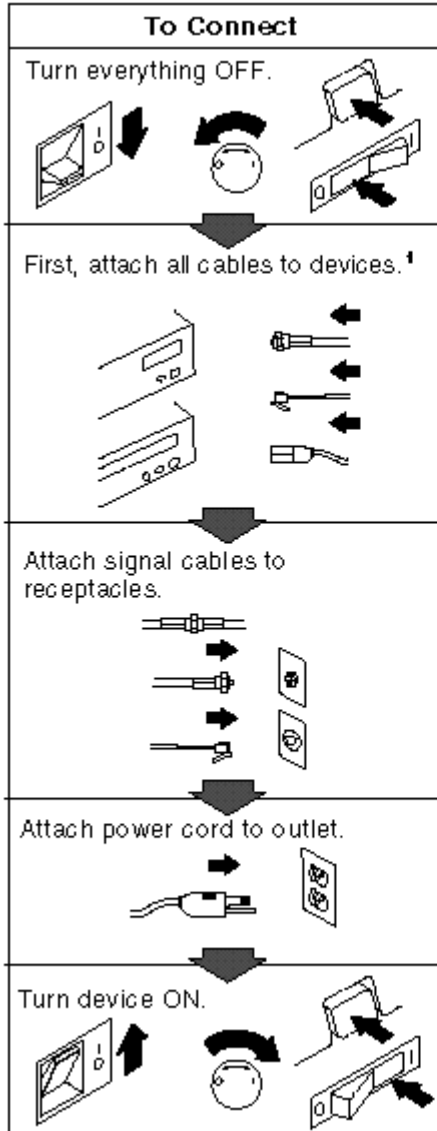
[1]In the U.K., by law, the power cord must be disconnected after the telephone line cable.
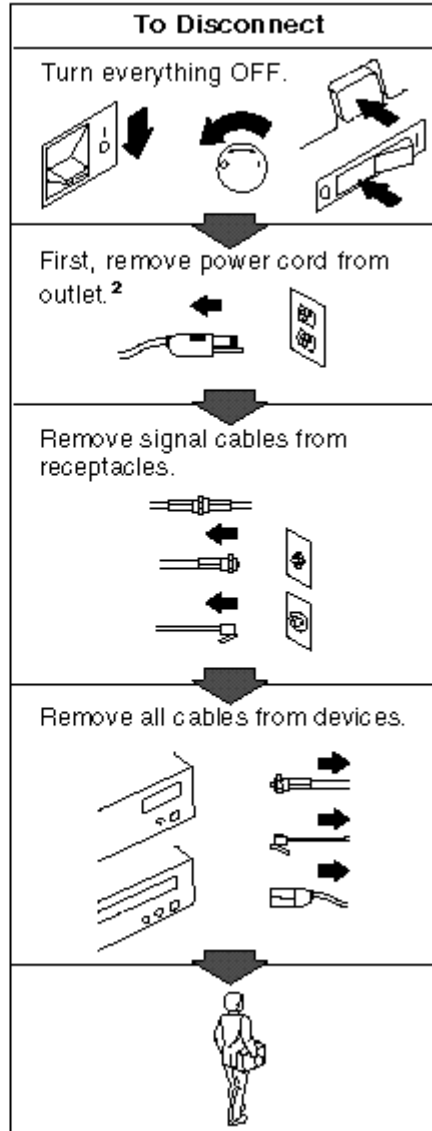
[2]In the U.K., by law, the telephone cable must be connected after the power cord.

⚠ 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 Statement

Some IBM Personal Computer 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 could result in exposure to 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.**

This book provides instructions to configure your PC Server 315 and how to install and remove options. This book also provides information to help you solve some of the simpler problems that might occur. If you have not yet set up your server, refer to the *Setup and Installation* sheet for detailed information about unpacking the server and attaching cables. Refer to the *User's Reference* for more detailed information about the server features.

How This Book is Organized

Chapter 1, "Getting Started with PC Server 315," provides a general introduction to server features and components.

Chapter 2, "Configuring Your Server," describes how to use the Configuration/Setup utility program to configure your server. This chapter also describes how to configure the Ethernet adapter. Also included are instructions for using the SCSISelect utility program.

Chapter 3, "Installing Options," contains instructions for installing and removing options, such as memory, adapters, and internal drives. Instructions for connecting external options and completing your option installation are also included in this chapter.

Chapter 4, "Solving Problems," includes an overview of the diagnostic tools, instructions for testing the server, lists of error messages, and troubleshooting charts. This chapter also contains information about checking the server for damage and resolving configuration conflicts.

Chapter 5, "Getting Help, Service, and Information," provides instructions about how to obtain service and technical assistance for your PC Server 315 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.

How This Book Is Organized

Appendix A, "Jumpers and Switches," describes jumper and configuration switch locations on the system board and contains instructions for changing jumpers and setting switches.

Appendix B, "Changing the Battery," describes how to replace the server battery.

Appendix C, "Server Records," provides a section to record and update important information about your server, including serial numbers, key number, and device records (which contain configuration information). Whenever you add options to your server, be sure to update the information in this appendix.

Appendix D, "Notices," contains product notices and trademarks.

An index follows the appendixes.

If you find a term that you are not familiar with, refer to the glossary located in the back of the *User's Reference*.

Notices Used in This Book

This book contains information 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 handbook, the following publications come with your PC Server 315:

- The *PC Server 315 Setup and Installation* sheet contains the instructions for setting up and cabling your server.

- The *PC Server 315 User's Reference* contains detailed information about the advanced features of your server.

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

The *IBM PC Servers Hardware Maintenance Manual* and the *IBM PC Servers Hardware Maintenance Manual Supplement* are available for purchase. These manuals contain error codes, advanced diagnostic procedures, and a parts catalog for most models. These manuals are intended for trained service technicians. (Diagnostic diskettes are not included.)

Related Publications

For a complete listing of publications available in the U.S. and
Puerto Rico, call 1-800-426-3395. In Canada, call Customer
Assistance at 1-800-465-3299. In all other countries, contact the IBM
support organization that services your area, your IBM marketing
representative, or your IBM reseller.

Welcome and Thank You

We appreciate your decision to purchase an IBM PC Server 315. Your server offers speed, power, expandability, and compatibility.

Your server comes with the IBM ServerGuide package, which contains a number of compact discs (CDs). These CDs contain operating systems, application programs, utility programs, online documentation, and more. Refer to the ServerGuide documentation for more information.

You can access the World Wide Web for updates to flash BIOS and the latest information about product compatibility and configuration. You can also link to other locations for additional information. IBM gives you direct access to trained specialists who can help you set up, install, and configure your server.

The PC Server 315 comes with a limited three-year on-site warranty. In addition, IBM's PC Server Startup Support program provides coverage to PC Server customers during the first 90 days after installation at no additional charge.*

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

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

---

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

Chapter 1. Getting Started with PC Server 315

Your PC Server 315 combines powerful microprocessor performance, large data-storage capacity, and improved system expandability. This server is designed by IBM to support the demands of today's network environment for smaller workgroups. Incorporating industry-standard architecture (ISA) and peripheral component interconnect (PCI) bus architectures, your server provides compatibility with a wide range of existing hardware and software. A built-in utility program allows you to configure the small computer system interface (SCSI) devices that you install in your server.

As an open-architecture, industry-standard system, the PC Server 315 has been tested for compatibility with numerous IBM and non-IBM adapters and devices. Rugged dependability is achieved by incorporating various quality standards and design points.

Refer to the *Setup and Installation* sheet for detailed information for setting up and cabling the server.

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

If you plan to install options, see Chapter 3, "Installing Options" on page 43, and install your options before using your server. Then, follow the instructions in Chapter 2, "Configuring Your Server" on page 15 for configuring your server. The troubleshooting information in Chapter 4, "Solving Problems" on page 121 will help you solve some of the simpler problems that might occur. Appendix C, "Server Records" on page 203 provides a section for you to record all the important information about your server.

Refer to the *User's Reference* for more detailed information about the server features. That book also includes a glossary, warranty information, and other important notices.

This chapter contains:

Features at a Glance

Microprocessor	Expansion Bays	Input/Output Connectors
• Intel Pentium Pro with: **Cache Memory** – Level-1 cache, 16 KB – Level-2 cache, 256 KB **Memory** • 32 MB minimum, expandable to 512 MB • 60 ns, EDO ECC • Four DIMM sockets **Diskette Drives** • Standard: 3.5-inch, 1.44 MB • Optional (internal): 3.5-inch, 1.44 MB **Hard Disk Drives** • Supports up to four internal hard disk drives • Number and capacities of drives vary by model **CD-ROM Drive** • Standard: SCSI **Keyboard and Mouse (Auxiliary-Device)** • IBM keyboard • Mouse	• One 3.5-inch diskette drive bay • One 5.25-inch CD-ROM drive bay • One 3.5-inch or 5.25-inch drive bay • Three 3.5-inch drive bays **Expansion Slots** • Four 32-bit PCI bus slots • Two 16-bit ISA bus slots • One shared PCI/ISA bus slot • The number of slots available for expansion varies by model **Video** • Super video graphics array (SVGA) PCI adapter • 1 MB VRAM, expandable to 2 MB • Compatibility: – Color graphics adapter (CGA) – Video graphics array (VGA) **Security Features** • Bolt-down capability • Door lock • Selectable drive-startup • Power-on and administrator passwords **Upgradable POST and BIOS** • Upgradable EEPROM on the system board • POST/BIOS upgrades (when available)	• One infrared port • One keyboard port • One mouse (auxiliary-device) port • Two serial ports • One universal serial bus (USB) port • One parallel port • One SVGA PCI adapter • One UltraSCSI adapter – One 8-bit internal port – One 16-bit internal port – One 16-bit external port • One Ethernet adapter 100BASE-TX (100/10 Mbps) installed on some models **Power Supply** • 250 Watts with switch (115–230 V ac) • Built-in overload and surge protection

What Your IBM PC Server 315 Offers

The PC Server 315 offers impressive performance using the Intel®
Pentium® Pro microprocessor. Your server also provides large
data-storage capabilities, enhanced system expandability, super
video graphics array (SVGA) capabilities. Ethernet networking is
installed on some models. This system's design provides a
powerful, cost-effective server.

The PC Server 315 takes advantage of advancements in
microprocessor speed, memory capacity, application programs,
communication devices, and operating environments.

Your server offers an innovative, multiple-bus architecture that
provide four dedicated PCI slots, two dedicated ISA slots and one
shared PCI/ISA slot.

Operating System Support

You can use the PC Server 315 in a variety of environments to do many different tasks. To meet the requirements of these environments, your server supports several operating systems. The IBM ServerGuide package provides an easy and efficient way to install an operating system. The IBM ServerGuide package contains several compact discs (CDs). These CDs contain menu-driven programs that make it easy for you to install your operating system and device drivers. These CDs also contain online publications. Refer to the documentation packaged with the ServerGuide CDs for more detailed information.

You can access the latest information about the operating systems that your PC Server 315 supports on the World Wide Web. See "Getting Help on the World Wide Web" on page 13 for more information.

If you do not have access to the World Wide Web, call IBM for the latest information:

- In the U.S., call 1-800-772-2227.

- In Canada, call 1-800-565-3344.

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

Controls and Status Indicators

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

Diskette Drive In-Use Light

Power-On Light

Power Switch

Hard Disk Drive In-Use Light

Diskette Eject Button

CD-ROM Eject Button

CD-ROM Tray

CD-ROM Drive In-Use Light

CD-ROM Volume Control
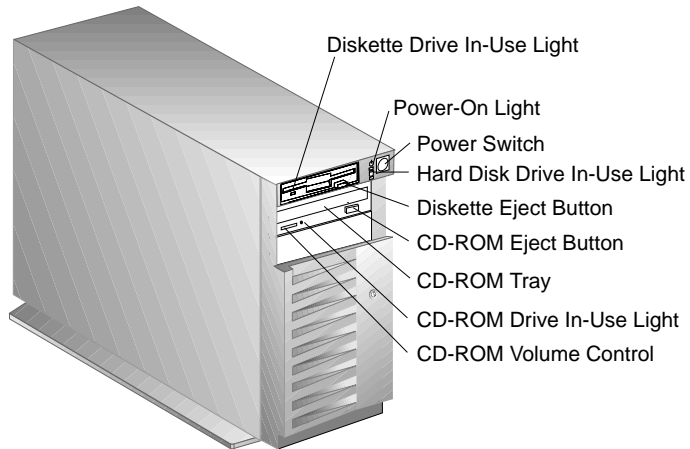
Diskette-**Drive In**-**Use Light:** This lights when the drive is accessing a diskette.

Power-**On Light:** This lights when you turn on your server.

Power Switch: Press this switch to turn on or turn off your server. Do not turn off your server if any of the drive in-use lights are on. This might damage the information stored on a hard disk or diskette.

Hard Drive In-**Use Light:** This lights when your server is accessing a SCSI device.

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

CD-**ROM Eject Button:** Push this button to release a CD_ROM from the drive.

CD-**ROM Drive In**-**Use Light:** This lights when the CD-ROM drive is accessed.

CD-**ROM Volume Control:** You can turn this knob to increase or decrease the volume when you have an audio CD in the CD-ROM drive, and you have headphones or speakers plugged into the jacks on the CD-ROM drive.

Input/Output Connectors

Infrared

Keyboard

Mouse

Serial A

USB

Parallel

Power Connector

Serial B

SVGA Connector

Slot 1

Slot Not Used

External
SCSI Connector

Slot 8

Ethernet Adapter
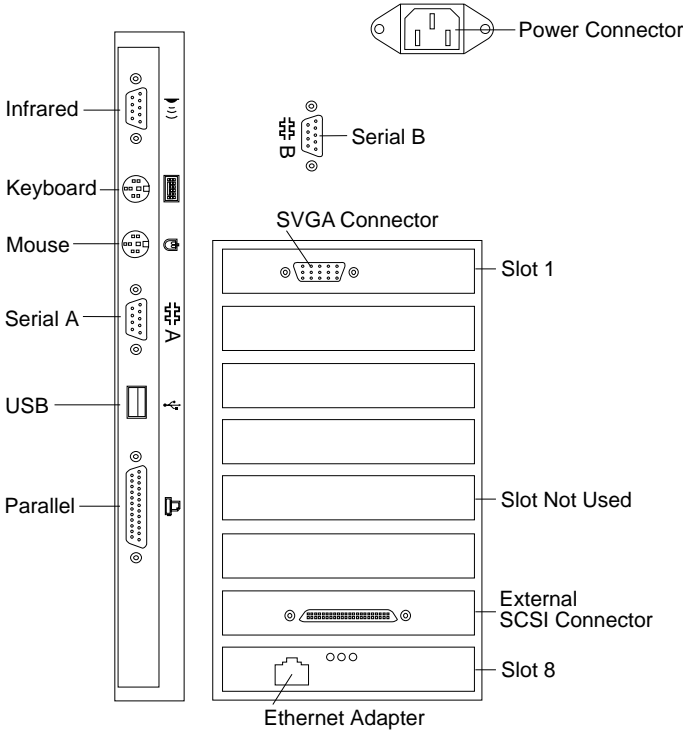
Note: For pin assignments and other details about these connectors, see the *User's Reference.*

Power Connector: The server power cable attaches here.

Serial Connectors: The server has two 9-pin, universal asynchronous receiver/transmitter (UART) serial connectors (A and B). Serial signal cables for modems or other serial devices attach here. To attach 25-pin signal cables, you must use a 9-pin-to-25-pin adapter cable. For information about displaying and changing port assignments, see "Devices and I/O Ports" on page 20.

SVGA Connector: The monitor signal cable attaches here. You can install other graphics adapters in your server. If your server has an adapter other than the one shown here, refer to the instructions that come with your adapter or monitor.

External SCSI Connector: External SCSI devices attach here.

Ethernet Connector: The cable for the Ethernet network attaches here.

Parallel Connector: The server has one 25-pin parallel port. A signal cable for a parallel device, such as a printer, attaches here. For information about displaying and changing port assignments, see "Devices and I/O Ports" on page 20.

Universal Serial Bus (USB) Connector: You can use a 4-pin USB cable to attach I/O devices to the USB connector.

Mouse (Auxiliary-Device) Connector: The mouse (auxiliary-device) cable attaches here.

Keyboard Connector: The keyboard cable attaches here.

Infrared Connector: An optional infrared (IR) transceiver module can attach here.

Expansion Bays
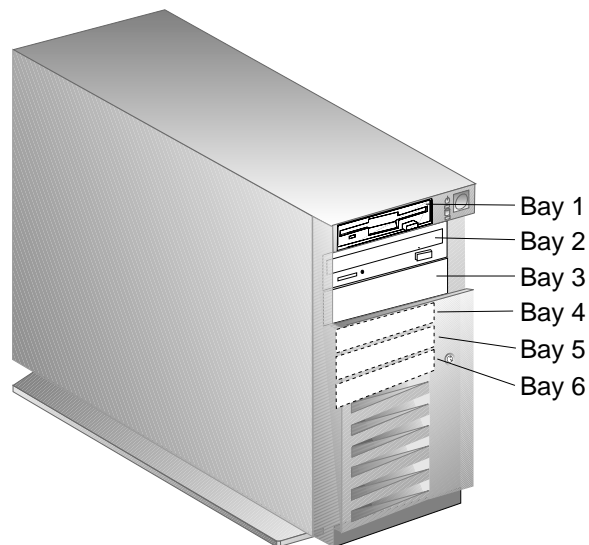
Diskette Drive: All models come with a 3.5-inch, 1.44 MB diskette drive in expansion bay 1 that uses 1 MB (unformatted) and 2 MB (unformatted) diskettes. For optimum use, format 1 MB diskettes to store 720 KB of data and 2 MB diskettes to store 1.44 MB of data.

CD-ROM Drive: All models comes with a SCSI CD-ROM drive in expansion bay 2.

Open Bays: These open bays provide the flexibility to use combinations of 3.5-inch or 5.25-inch diskette, hard disk, tape, and rewritable optical-disc drives in your server. For installation instructions and information about the types of drives that you can install in each bay, see "Installing Internal Drives" on page 81.

Hard Disk Drive: The number of preinstalled drives and their capacities vary by model.

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.

Viewing Distance

Lower
Back
Support

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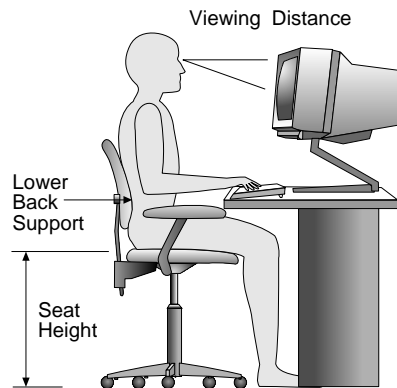
Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance,

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; usually, 127 mm (5 in.) of air space is sufficient. 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, refer to the *User's Reference.*

Getting Help on the World Wide Web

You can access the latest information about PC Server product compatibility and configuration on the World Wide Web at:

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

This information is updated as new PC Server products are announced. The following is a sample of the information available:

- Current updates to device drivers, flash BIOS, and other code

- A listing of products that have been tested for compatibility with IBM PC Servers

- Certification and compatibility information about network operating systems (NOS) and operating systems (OS)

For additional information, service, or assistance, see Chapter 5, "Getting Help, Service, and Information" on page 183.

IBM PC Server Startup Support

The IBM PC Server Startup Support program provides comprehensive telephone assistance 24 hours a day, 7 days a week, during the first 90 days after installation of your server at no

additional charge.* IBM gives you direct access to trained specialists who can help you set up, install, and configure your server.

Help is available for IBM and non-IBM network operating systems, network interface adapters, and other optional peripherals. To receive a list of the network products supported by the IBM PC Server Startup Support program, call the IBM PC Company Automated Fax System at 1-800-426-3395 in the U.S., or call 1-800-465-3299 in Canada. For more information about this program, or for help with the installation of your server:

- In the U.S., call IBM at 1-800-772-2227.

- In Canada, call IBM at 1-800-565-3344.

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

Note: For additional information, service, or assistance, see Chapter 5, "Getting Help, Service, and Information" on page 183.

---

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

Chapter 2. Configuring Your Server

This chapter provides information about the configuration and utility programs that come with your server, and instructions on when and how to use them.

The Configuration/Setup utility programs are stored in the *basic input/output system* (*BIOS*) that comes with your server. With these programs, you can set the system date and time, define input and output device parameters, and define system security.

A built-in utility program, SCSISelect, allows you to configure the SCSI devices that you install in your server. The PC Server 315 System Board Diagnostic diskette that comes with the server provides additional configuration and diagnostic support for the system board, hard disk drives, and other system components.

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 PCI adapters, ISA adapters, and SCSI devices. This flexibility lets you choose from many adapters and devices that comply with these standards.

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.

Two hardware configuration utility programs come with your server:

- Configuration/Setup
- SCSISelect

The built-in Configuration/Setup utility program configures system-board functions, such as serial and parallel port assignments, and the startup sequence for drives that you install. This utility program also allows you to set passwords for starting up and accessing the Configuration/Setup utility program.

The built-in SCSI utility program, SCSISelect, allows you to 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 SCSI hard disk drives.

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
scenario provides a preview of the actions that might be required to
configure your server.

1. Run the Configuration/Setup utility program and record the
   current configuration settings.

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

   See Appendix A, "Jumpers and Switches" 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 3, "Installing Options" on page 43.

   If the device is an ISA adapter that is not a Plug and Play
   device, use the ISA Legacy Resources Setup menu, which is part
   of the Configuration/Setup utility program, to set the ISA
   legacy resources. These include memory, I/O ports, direct
   memory access (DMA), and interrupt request levels (IRQs). See
   "ISA Legacy Resources" on page 29 for more information.

5. Install software programs.

   See the installation instructions shipped with the software.

6. Resolve configuration conflicts.

   See "Resolving Configuration Conflicts" on page 30.

Using the Configuration/Setup Utility Program

The built-in Configuration/Setup utility program provides a
convenient method to configure various system features. In most
cases, the server will operate using the default settings. You need to
change the settings only to resolve configuration conflicts or to
enable or change device function (for example, defining diskette
types).

Always run the Configuration/Setup utility program if you have
added or removed any hardware option, or if you receive an error
message instructing you to do so. Review this chapter and the
information that comes with the device before making changes.
Also, record the current settings (see Table 3 on page 205) before
making any changes.

The following menu appears when you start the
Configuration/Setup utility program.

```
┌─ Configuration/Setup Utility ─────────────────┐
│     Select Option:                            │
│                                               │
│   • System Summary                            │
│   • Product Data                              │
│   • Devices and I/O Ports                     │
│   • Date and Time                             │
│   • System Security                           │
│   • Start Options                             │
│   • Advanced Setup                            │
│   • ISA Legacy Resources                      │
│                                               │
│     Save Settings                             │
│     Restore Settings                          │
│     Load Default Settings                     │
│                                               │
│     Exit Setup                                │
│                                               │
└───────────────────────────────────────────────┘

   <F1>  Help                 <↑> <↓>  Move
   <Esc> Exit                 <Enter> Select
```
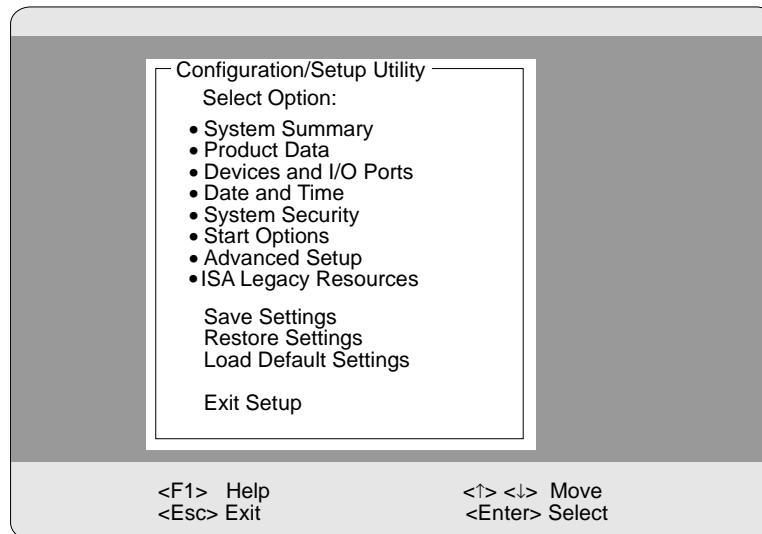
Note: Depending on the level of password protection, a limited
version of the menu might appear. See "Password
Overview" on page 23 for more information.

You can advance through the screens by pressing the Page Up (PgUp) or Page Down (PgDn) key. Use the Up Arrow (↑) or Down Arrow (↓) key to move through the items on the screen. To change a setting, highlight the item that you want to change; then, use the Left Arrow (←) or Right Arrow (→) key to view the choices.

Press **F1** for online Help information on each selection.

Starting the Configuration/Setup Utility Program

Note: If a configuration error occurs, a prompt appears before the operating system starts (see "Resolving Configuration Conflicts" on page 30).

To access the Configuration/Setup Utility program:

1. Turn on the server and watch the screen.

2. When the message `Press F1 for Setup` appears, press **F1**.

3. Follow the instructions on the screen to view or change the configuration.

4. Select the **Exit Setup** option on the menu or press **Esc** to exit the Configuration/Setup utility program.

You must *correctly* exit from the Configuration/Setup Utility Program to save the configuration information.

If you change configuration information, and the change causes an error during the power-on self-test (POST), a "▲" displays next to the menu selection that contains the change.

System Summary

Select this choice to view system information, including the type and speed of the microprocessor, amount of memory, and the number of diskette drives connected to the server.

Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields.

The System Summary choice appears on the full Configuration/Setup menu.

Product Data

Select this choice to display information about your PC Server 315, such as the machine type and model, the system serial number, the system board identifier, and the revision level or issue date of the flash electronically erasable programmable ROM (EEPROM) and BIOS.

Changes that you make on other menus are reflected on this summary screen. You cannot edit any fields.

The Product Data choice appears on the full Configuration/Setup menu.

Devices and I/O Ports

Select this choice to view or change the assignments for devices and ports. Some programs and devices require specific assignments. Review the documentation that comes with the device for more information.

To display or change the port assignments:

1. Turn on the system. When the **F1** prompt appears, press **F1**. The Configuration/Setup utility program Main Menu appears.

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

3. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change. Use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices.

> *Note:* If the assignment conflicts with another assignment, an asterisk appears next to the conflicting setting. You must change one of the conflicting settings to a value that does not conflict.

4. When you complete all changes to the menu, press **Esc** to return to the Configuration/Setup menu.

Changing the Serial and Infrared Port Assignments

Your system comes with two 9-pin, serial ports and one infrared port. For a description and illustration of these ports, see "Input/Output Connectors" on page 8.

Select **Serial Port Setup** to view or change serial and infrared port assignments.

Software recognizes ports by their port assignments. Each serial port must have a unique serial-port assignment. The Configuration/Setup utility program assigns serial ports, but you might have special hardware or software that requires you to change these assignments.

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.

You can connect an optional infrared transceiver module to the infrared connector. This enables you to transfer data to and from other infrared-capable computers or printers.

Note: The infrared port and serial port B share port addresses. If serial port B is enabled, the infrared port cannot be enabled. If the infrared port is enabled, serial port B cannot be enabled. Your server comes with serial port B enabled. To change the currently enabled port, you must change the position of Switch 7 on the system board. For instructions, see "Switch Settings" on page 195.

Configuring Parallel Ports

Select **Parallel Port Setup** to configure the parallel port.

Your system comes with one 25-pin, parallel port. For a description and illustration of this port, see "Input/Output Connectors" on page 8. This choice allows you to change values for resources used by the parallel port. These resources include:

- Parallel port address
- Parallel mode
- Extended mode
- Extended mode DMA
- Parallel port IRQ

Configuring Video

Your server supports a wide assortment of monitors. Because characteristics of monitor types vary, review the documentation that comes with the monitor to determine the type and refresh rate.

Select **Video Setup**; then, use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices.

Date and Time

Select **Date and Time** to change or set values for the system date and time. You use this option to set the real-time clock in the server.

The system time is in a 24-hour format: hour/minute/second.

The system date is in the standard format for your country. For example, in the United States, the format is MM/DD/YY (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 type it.

The **Date and Time** choice appears only on the full Configuration/Setup menu.

System Security

To control access to your server, you can implement the security features described in your *User's Reference*, including defining two levels of password protection and restricting diskette drive access.

The **System Security** choice appears only on the full Configuration/Setup menu.

Password Overview

Your server supports both a power-on password and an administrator password.

If passwords are set, the server displays the `Enter password` prompt when:

- The password prompt is set to **On** and a power-on password is set.

- The password prompt is set to **On** and a power-on password and an administrator password are set.

- An administrator password is the only password set.

- You enter the Configuration/Setup utility program.

- You start the server from a diskette.

The server does not display a password prompt when:

- No passwords are set.

- The password prompt is set to **Off**, only a power-on password is set, and the server is not being started from a diskette.

  In this case, the server starts, but the keyboard is locked. The keyboard can be unlocked by entering the power-on password.

The passwords do not appear on the screen as you type them. When you enter the correct password, `OK` appears on the screen. If you enter the wrong password, `Incorrect password` appears on the screen, and `Enter password` is again displayed. After three incorrect attempts, you must turn off the server and start again.

The following table summarizes the levels of security with the different levels of password protection.

Type of Password	Results
No password set	• No password required to start system. • User can access all choices on the Configuration/Setup utility program menu.
Power-on password only	• User must enter password to complete the system startup. • Power-on password provides access to all choices on the Configuration/Setup utility program menu.
Administrator password	• User must enter password to access the Configuration/Setup utility program menu. • Administrator password provides access to all choices on the Configuration/Setup utility program menu.
Administrator *and* power-on password	• User can enter either password to complete the system startup. • Administrator password provides access to all choices on the Configuration/Setup utility program menu. Administrator password menu can enable the power-on password user to change the power-on password. • Power-on password provides access to a limited set of choices on the Configuration/Setup utility program menu.

Setting an Administrator Password

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

Attention: If an administrator password is set and then forgotten, you must move the password jumper to clear the password and regain access to the Configuration/Setup utility program. This procedure erases your current server configuration (see "Removing a Password" on page 108 for more information). You must then reconfigure your server.

To set an administrator password:

1. Select **Administrator Password** on the System Security menu; then, press **Enter**.

2. Type the password in the **Enter Administrator Password** data field.

   A password can contain any combination of up to seven alphanumeric characters (A–Z, a–z, and 0–9). Keep a record of your password in a secure place.

3. Move the cursor to the **Enter Administrator Password Again** data field and type the password again.

4. Select **Set or Change Administrator Password** to save the new password; then, press **Enter**. The password becomes effective immediately.

   Note: A message appears if the two passwords do not match. If this happens, press **Esc** to cancel the request and return to the System Security menu.

To delete an administrator password:

1. Select **Administrator Password** on the System Security menu; then, press **Enter**.

2. Select **Delete Administrator Password**; then, press **Enter**.

3. A confirmation window appears. Press **Enter** to delete the administrator password. Press **Esc** to return to the System Security menu.

Setting a Power-on Password

When a power-on password is set, you must enter a password each time you start the system.

Attention: If you forget the power-on password, and an administrator password has been set, use the administrator password at the power-on prompt. Then, start the Configuration/Setup utility program and change the power-on password.

If a power-on password is set and then forgotten, and no administrator password is set, then, you must move the password jumper to clear the password and regain access to the Configuration/Setup utility program. This procedure erases your current server configuration (see "Removing a Password" on page 108 for more information). You must then reconfigure your server.

To set a power-on password:

1. Select **Power-on Password** on the System Security menu; then, press **Enter**.

   The **Power-on Password** menu appears.

2. Type the password in the **Enter Power-on Password** data field.

   You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place.

3. Move the cursor to the **Enter Power-on Password Again** data field and type the password again.

4. Select **Set or Change Power-on Password** to save the new password; then, press **Enter**.

   Note: A message appears if the two passwords do not match. If this happens, press **Esc** to cancel the request and return to the System Security menu.

To delete a power-on password:

1. Select **Power-on Password** on the System Security menu; then, press **Enter**.

   The **Power-on Password** menu appears.

2. Select **Delete Power-on Password**; then, press **Enter**.

3. A confirmation window appears. Press **Enter** to delete the power-on password. Press **Esc** to cancel the request and return to the System Security menu.

Restricting Access to Diskette Drives

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

To change this setting so that access to the diskette drives is disabled, select the System Security menu option; then, select **Secure Diskette Drives**. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change. Press the Left Arrow (←) or Right Arrow (→) key to toggle the entry to the appropriate value. If an administrator password is set, only the administrator can change this setting.

Updating POST/BIOS

POST/BIOS Update options allows you to run the POST/BIOS Update utility from a remote system without requiring an administrator password.

Select **POST/BIOS Update** on the System Security menu. Use the Up Arrow (↑) or Down Arrow (↓) key to select the **Enable** or **Disabled** option.

Start Options

Start options take effect when you start your server.

Select **Start Options**; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change. Use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices.

You can select keyboard operating characteristics, such as the keyboard speed. You can also specify whether the keyboard number lock (NumLock) starts on or off.

The server uses a startup sequence to determine the diskette drive, hard disk drive, or network adapter from which the operating system loads. You can specify up to four devices in the **Startup Device** data fields. For example, you can define a startup sequence that checks for a startable diskette in the primary diskette drive, then checks the bays for a hard disk drive.

Select **Startup Device** on the Start Options menu. Then follow the menu to set your startup sequence.

You can enable your server to run without checking for the presence or state of a monitor, keyboard, or diskette drive. The devices are disabled after the POST completes and the operating system has loaded. This allows you to enter a password and update the Configuration/Setup utility program in keyboardless operation.

You can select a test that your server runs at startup. For example, you can select to run a virus detection test. You can also choose whether to run the POST in enhanced or quick mode.

Advanced Setup

Select **Advanced Setup** to change values for advanced hardware feature such as ROM shadowing. A warning message appears when you select this choice, to alert you that the system might malfunction if this option is configured incorrectly. Follow the instructions on the screen carefully.

The **Advanced Setup** choice appears only on the full Configuration/Setup menu.

Select **Advanced Setup**; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change. Use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices.

Select **Cache Control** to disable the cache. Then, select **Cache State** and press the Left Arrow (←) or Right Arrow (→) key to change the cache state.

Select **PCI Control** to disable the PCI burst mode of data transfer. Some PCI adapters require burst mode to be disabled. Change this value to **Disabled**, if required for a PCI adapter.

Select **Plug and Play Control** to control the device mode. When you change this value to **Disabled**, the system is unable to update the configuration during POST.

Select **Processor Control** to control the microprocessor BIOS updates during system startup. When you change this value to **Disabled**, the system is unable to update the microprocessor during startup.

ISA Legacy Resources

Select **ISA Legacy Resources** to identify resources used by ISA adapters. These resources include:

- 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.

From the Configuration/Setup utility program screens, you can select available resources for the adapter that you are installing. Resources not currently being used by adapters that are already installed in your server are listed as **[Available].** The system

resources that are in use by other devices are listed as a **[System Resource].**

Select **ISA Legacy Resources**; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change. Use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices.

The **ISA Legacy Resources** choice appears only on the full Configuration/Setup menu.

Resolving Configuration Conflicts

The resources used by your server consist of interrupt levels (IRQs), DMA, I/O ports (for example, serial and parallel), and memory. This information is useful when a resource configuration conflict occurs.

Conflicts in the configuration occur if:

- A device is installed that 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 *COM 1* to two different serial ports).
- A software program is installed that requires the same resource as a hardware device (for example, an expanded memory specification (EMS) device driver that uses the address required by the SVGA video adapter).

The steps required to resolve a configuration error are determined by the number and variety of hardware devices and software programs 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. The program does not consider the requirements of the operating system or the application programs. See "Resolving Software Configuration Conflicts" on page 32 for additional information.

Resolving Hardware Configuration Conflicts

Use the following information to help resolve hardware configuration conflicts:

1. Run the Configuration/Setup utility program to view the settings. Record the current settings before making any changes. (See "Starting the Configuration/Setup Utility Program" on page 19 for instructions.)

2. Determine which adapter or device is causing the error.

3. Change configuration resource allocations. Use the Configuration/Setup utility program to view or change system board resource allocations.

4. Change adapter jumpers or switches. Jumpers and switches define the system resources a device uses. 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.

5. Remove the device or adapter. Some configurations are not supported (for example, you cannot operate the server with two PCI SVGA adapters installed). If you must remove an adapter, see "Removing Adapters" on page 61.

Resolving Software Configuration Conflicts

The memory-address space and IRQs used by some hardware options might conflict with addresses defined for use through application programs or the EMS. (EMS is used only with DOS.)

If a conflict occurs, 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 a conflict exists.

To resolve conflicts, you can change the software or hardware configuration.

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

Changing the Software Configuration

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

If a device driver is causing a memory-address conflict, refer to your operating-system documentation or the documentation supplied with the device drivers.

Using the SCSISelect Utility Program

The SCSI adapter 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:

- Change the default values
- Verify and change configuration conflicts
- Format a new SCSI hard disk

Note: For detailed information about the SCSISelect Utility program, refer to the publications provided in the UltraSCSI package that comes with your server.

Starting the SCSISelect Utility Program

You can access this program when you start the server. The SCSISelect prompt appears after the IBM logo screen. Press **Ctrl+A** immediately after the SCSISelect prompt appears. 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, follow the directions on the screen.

SCSISelect Utility Program Options

The following options 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. This menu has the following selections:

- Host Adapter SCSI ID

  Select this choice to change the SCSI ID of the SCSI controller
  from its default value of 7.

- SCSI Parity Checking

  Select this choice to enable or disable SCSI adapter parity
  checking. The default value is **Enabled**. This setting should not
  be changed.

- Host Adapter SCSI Termination

  Select this choice to configure SCSI controller termination.

- 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.

- 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 multiple drives with
  DOS Version 5.0 and higher.

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 making a selection.

Using the Low-Level Format Program

You can format hard disk drives using the *Low-Level Format* feature
of the SCSISelect Utility program.

Depending on the hard disk capacity, the Low-Level Format program could take up to two hours.

When To Use the Low-Level Format Program
Use the Low-Level Format 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 your files, see your operating-system documentation.

Starting the Low-Level Format Program
Attention: The Low-Level Format program erases *all* data and programs.

1. If the hard disk is working, make a backup copy of all the files and programs on the hard disk.

2. Select **Format disk** from the SCSISelect Disk Utilities menu; 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.

Configuring the 100/10 Ethernet Adapter

Some PC Server 315 models come with an Ethernet adapter preinstalled as a standard feature. The adapter contains three LEDs lights visible from the back of the server that indicate the status of the connection, monitor read and write activity, and indicate a 100 Mbps connection. Refer to "Troubleshooting the 100/10 PCI Ethernet Adapter" on page 168 for more information about the LEDs.

During POST, your server automatically configures your Ethernet adapter.

The Ethernet Configuration and Drivers program automatically installs necessary Novell NetWare 4.0 drivers, tests the adapter, and displays a help file with installation instructions for unsupported network operating-system drivers.

Note: You must use Category 5 cabling when operating the Ethernet adapter at 100 Mbps.

The Ethernet Configuration and Drivers program supports Microsoft Windows NT Server 4.0.

Installing Multiple Adapters
Use the Ethernet Configuration and Drivers program each time you install an adapter. You can also use the program to isolate problems during troubleshooting.

Repeat the configuration procedures for each adapter that you want to install. Even though the Ethernet Configuration and Drivers program can detect all the PCI adapters in your server, you must perform the installation process before you can use the adapter.

Configuring for Windows NT Server 4.0

To configure the Ethernet adapter for the Windows NT Server 4.0 operating system:

1. Double-click on the Network icon on the Control Panel.

2. Click on the **Adapters** button; click on the **Add** button; then, click on the **Have Disk** button.

3. Insert the Ethernet Configuration and Drivers diskette 1 of 2 in drive A. Then, click on **OK**.

4. When the Select OEM Option screen appears, highlight the IBM 100⁄10 PCI Ethernet Adapter. Then, click on **OK**.

   The Ethernet Configuration and Drivers program automatically scans server resources and determines which resources were assigned to the adapter. This may take a few seconds.

If a message appears stating *The system has not enabled busmastering on the device you are installing*, the device driver will attempt to enable mastering when it loads. Run the adapter diagnostics to see if busmastering is allowed in the slot selected.

5. Click on **Test**.

   Notes:

   - When testing a newly configured adapter, the network device driver will not be active. The diagnostic will test only the adapter and its connection to the network.

   - When testing a previously configured adapter, the network device driver will be active. The diagnostic will test the adapter, its connection to the network, and the device driver. The test will also track the actual network activity of the device driver.

6. When testing completes, click on **OK** to accept the configuration. Then, click on **OK** again.

7. Under Network Adapter, select the IBM 100/10 PCI Ethernet Adapter. Then, click on **Close**.

   Note:

   If you have other LAN protocols installed, such as TCP/IP, additional screens will appear requesting configuration information. If this occurs, follow the instructions on the screen.

8. Remove the Ethernet Configuration and Driver diskette from drive A.

9. Click on **Yes** in the Network Settings dialog box to restart Windows NT Server Version 4.0.

Troubleshooting

- Make sure that you are using the device drivers that come with this adapter.

- Make sure that the device driver is loaded and the protocols are bound. See the Network Bindings dialog box in Windows NT Server 4.0 to verify this.

- Make sure that you are using Category 5 cabling when operating the Ethernet adapter at 100 Mbps.

- Test the adapter using the instructions in "Configuring for Windows NT Server 4.0" on page 36.

- Check with your LAN administrator.

Configuring for Other Operating Systems

Refer to the help files on the Ethernet Configuration and Drivers program for instructions on configuring for other operating systems.

To view the help files:

1. Insert the Ethernet Configuration and Drivers diskette in drive A, and switch to that drive.

2. At the operating-system prompt, type `SETUP \README`.

3. Press **Enter**.

4. Select **Installing 100/10 PCI Ethernet adapter drivers**; then, follow the instructions on the screen.

Duplexing

Duplexing is a performance option that lets you choose how the adapter sends and receives packets over the network.

There are three duplex modes:

Full duplex   The adapter sends and receives packets at the same time, increasing adapter performance. This mode requires a full-duplex hub.

Half duplex   The adapter performs one operation at a time: it either sends or receives packets.

Auto-negotiate The adapter negotiates with the hub how to send and receive packets, either full or half duplex.

Configuring for Full-Duplex

If you have a hub that does not support auto-negotiation, manually configure the adapter for full-duplex support. Configuration is specific to the device driver that you are loading for your network operating system. Refer to Table 1.

Note: You must set the adapter speed when configuring for full-duplex support. Do not leave the speed set to auto-negotiate.

Driver	How To Set Duplex Mode
Windows NT Server 4.0	Define the Setup program: 1. Double-click on the Network icon on the Control Panel. 2. Click on the **Adapters** button. 3. Click on the **Properties** button. 4. Click on the **Change** button. 5. Under Network Speed, select 100 Mbps or 10 Mbps. 6. Under Duplex Mode, select Half Duplex or Full Duplex. 7. Click on **Ok**. Then, click on **Ok** again. 8. Click on **Close**. 9. Click on **Ok** to restart Windows NT Server Version 4.0.
Other Network Operating Systems	See the README file. To view the README files, insert the Ethernet Configuration and Drivers diskette, and type `SETUP \README` at the DOS prompt. Then, press **Enter**.

Table 1. Setting Duplex Mode

Fast Ethernet Cabling

The 100BASE-TX specifications support 100 Mbps transmission over two or four pairs of twisted-pair Ethernet cabling. In two-pair cabling, one pair of cables is used for transmission, and the second is used for reception and collision detection.

Because a 125 MHz frequency is used on the wire, 100BASE-TX requires Category 5 cabling.

Segment lengths are limited to 100 meters (328 feet) with 100BASE-TX for signal timing reasons.

Fast Ethernet Hubs

New hubs are available to support a variety of Fast Ethernet LAN configurations. These hubs can be divided into two basic types: shared and switched. 100/10 PCI Ethernet adapters can be used with either type of hub for 10 Mbps or 100 Mbps operations.

Shared Hubs

In a shared network environment, servers are connected to hubs. A repeater is built into each port of the hub. All ports of the repeater hub share a fixed amount of bandwidth, or data capacity. A 100 Mbps shared hub means that all nodes on the hub must share the 100 Mbps or bandwidth. As stations are added to the hub, the effective bandwidth available to any individual station becomes smaller.

All nodes must operate at the same speed, either 10 Mbps or 100 Mbps. Fast Ethernet repeaters provide 100 Mbps of available bandwidth, ten times more than what is available with a 10 BASE-T repeater.

Repeaters use a well established, uncomplicated design, making them highly cost-effective for connecting workstations in a workgroup.

Switched Hubs

In a switched network environment, each port uses a fixed, dedicated amount of bandwidth. Network bandwidth is not shared among all stations. Each new station added to the hub receives access to the full bandwidth of the network. Data is sent only to the port that leads to the correct workstation.

If a new workstation is added to a 100 Mbps switching hub, the new workstation receives its own dedicated, 100 Mbps link that does not affect the 100 Mbps bandwidth of other workstations. Switching hubs can effectively increase the overall bandwidth available on the network, significantly improving performance.

Chapter 3. Installing Options

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

This chapter contains:

Before You Begin

- Become familiar with the safety and handling guidelines specified under "Safety Information" on page ix, "Electrical Safety" on page 45, and "Handling Static-Sensitive Devices" on page 46. 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 that you intend to install.

- Place your server in a location that is dry. Rain or spilled liquids might damage your server.

- Leave about 51 mm (2 in.) of space around the front and rear of the server to allow the server cooling system to work properly.

- Have a supply of 1 MB and 2 MB, 3.5-inch diskettes available.

- Back up all important data before you make changes to disk drives.

- Before installing a new microprocessor, read thoroughly the information provided with your microprocessor. You might need to update the basic input/output code (BIOS) for your system. See "Getting Customer Support and Service" on page 184 for information on obtaining the latest flash BIOS.

- Have a small, flat-blade screwdriver available.

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 covers 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 can seriously damage server components and
optional devices.

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

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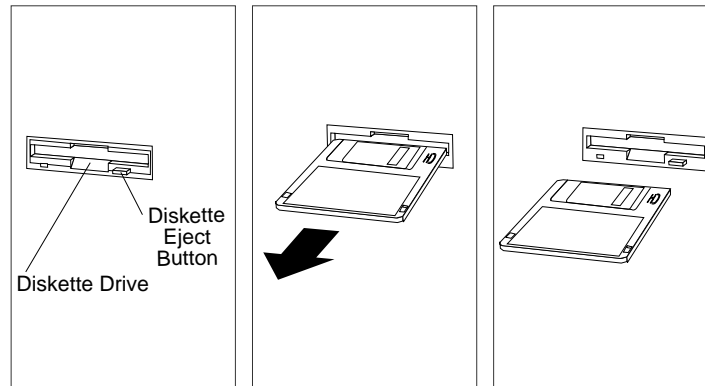precautions to avoid damage from static electricity:

- Limit your movement. Movement can cause static electricity to
  build up around you.

- Always handle components carefully. Handle adapters, the
  riser card, and memory-module kits 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 your current server configuration is working properly.
- Locate the key to the cover lock.
- Obtain a small, flat-blade screwdriver.
- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.

└───┘

1. Unlock the server door, if locked.

2. Open the front door completely and lift it up. Set the door aside.

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

4. If you have a modem or fax machine attached to the server, disconnect the telephone line from the server.

   Note: If you are in the United Kingdom, you must perform this step *before* disconnecting the power cord.
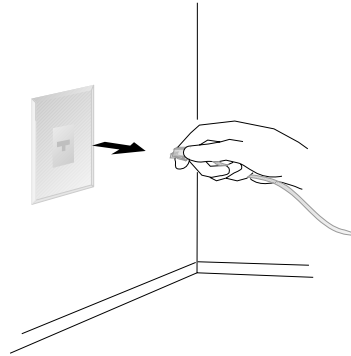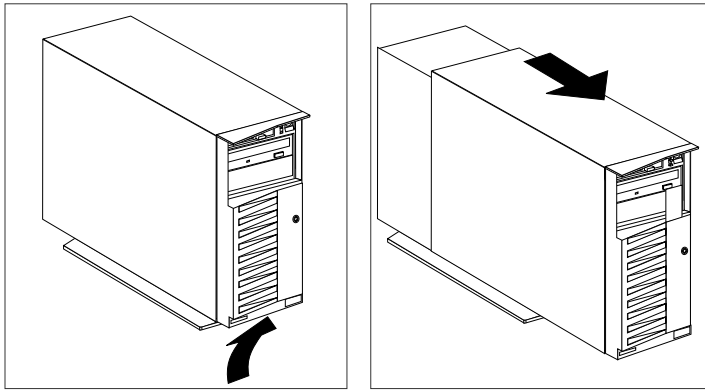
5. Unplug all power cords (cables) from electrical outlets; then, disconnect all other cables from the back of the server. This includes standard and optional features.
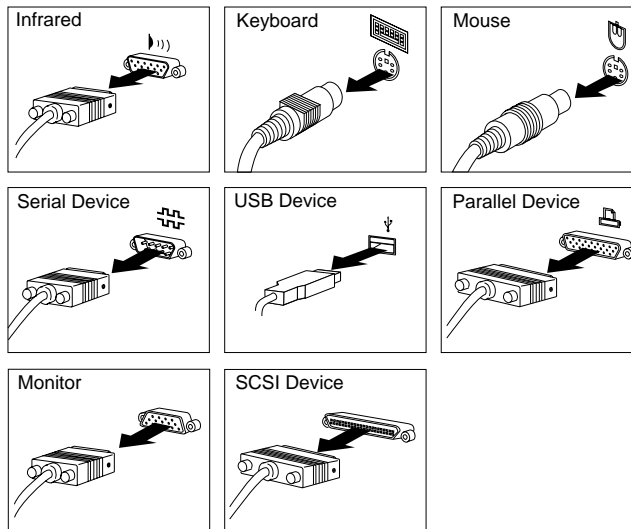
Removing the Cover

1. Locate the cover release latch on the bottom edge in the front of the server.

2. Press the release latch upward and slide the cover forward.

3. Set the cover aside.

Removing the Floor Stand

1. Position the server on a table.

2. Turn the server on its side, as shown in the following illustration.

3. Extend the bottom of the server (the side with the floor stand) over the end of the table, approximately 40 mm (1.5 in.).

4. Locate the two release tabs on the bottom of the floor stand.

5. Pull out both release tabs and lift the floor stand upward.
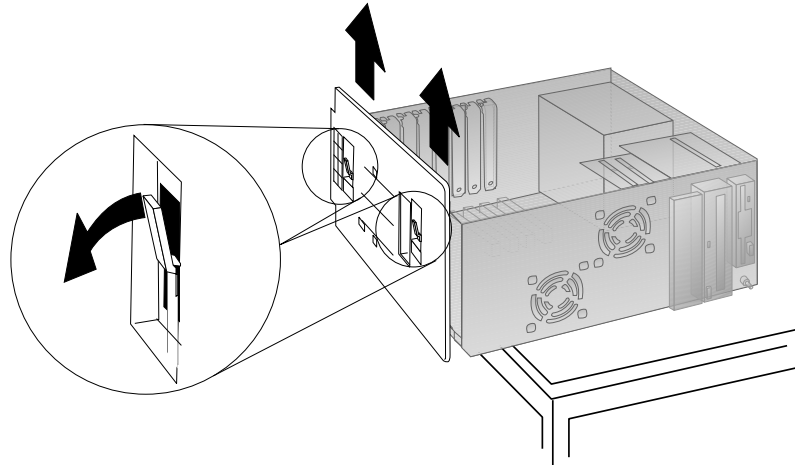
6. Set the floor stand aside.

Locating System-Board Components

The system board is the main circuit board in your server. It provides basic computer functions and supports a variety of devices that are IBM-installed or that you can install later.

If you plan to install, remove, or replace hardware in your server, you will need to know the layout of the system board. The following simplified layout of the system board identifies server components. The numbered pointers identify the components of the system board.
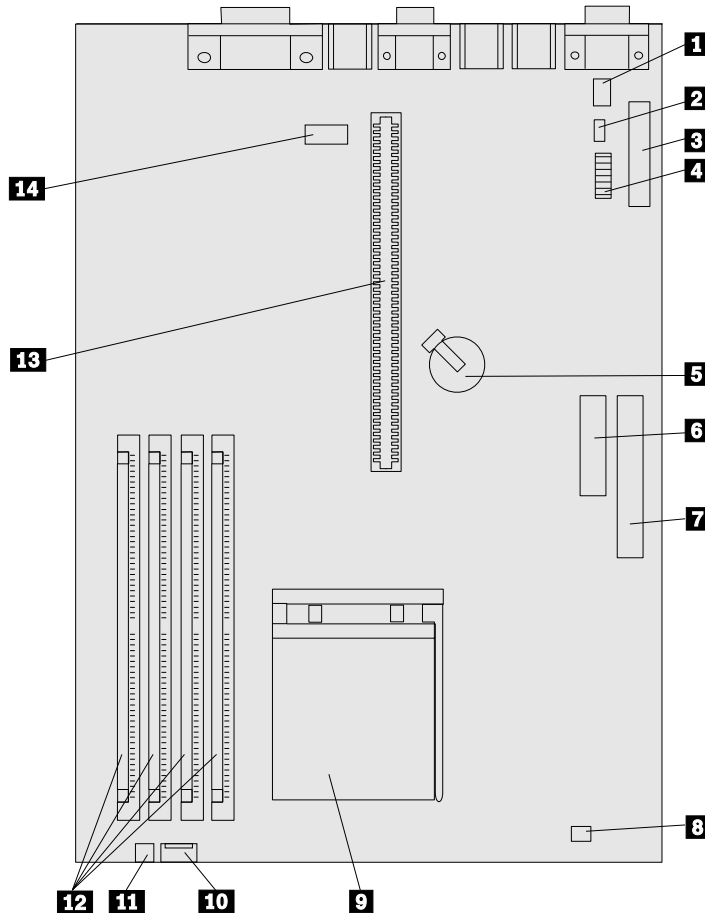
Locating System-Board Components

1	Auxiliary power connector
2	CMOS clear (password) jumper
3	Diskette drive connector
4	Switches for microprocessor speeds and diskette write protection
5	Battery
6	3.3 V ac power connector
7	Main power connector
8	Secondary fan connector
9	Microprocessor
10	Power LED connector
11	First fan connector
12	System memory connectors
13	Riser card connector
14	Serial B port

Accessing the System Board

Note: For information on removing the server cover, see "Removing the Cover" on page 49.

To access the section of the system board you need to work with, you might need to remove adapters or the riser card. Also, you might need to remove cables that are attached to the system board. When disconnecting cables, it is important to note where they attach, so that you can reattach them later.

The following examples describe when you might need to remove components:

- When working with *dual-inline memory modules (DIMMs)*, you might need to remove adapters from the riser card. For instructions on removing adapters, see "Removing Adapters" on page 61. Instructions for installing and removing memory modules are in "Installing or Removing DIMM Kits" on page 69.

- When replacing or upgrading the microprocessor you might need to remove some adapters. For instructions, see "Removing Adapters" on page 61. Also, to access the switches for updating the settings for the microprocessor speed, you might need to remove the riser card, an adapter, and any cables attached to the system board. Instructions for installing the microprocessor upgrade are in "Installing Microprocessor Upgrades" on page 95.

- When replacing the system battery, you need to remove the riser card, adapters, and cables connected to the system board if they impede your access. For instructions, see "Removing and Replacing the Riser Card" on page 64 and "Removing Adapters" on page 61. Instructions for replacing the battery are in Appendix B, "Changing the Battery" on page 199.

- When changing jumper and switch settings, you might need to remove the riser card and any cables connected to the system board that impede your access. For instructions, see "Removing and Replacing the Riser Card" on page 64. Instructions for the

jumper and switches are in "Setting the Diskette Write-Protect Switch" on page 111, "Removing a Password" on page 108.

> **To install or remove**
>
> - An adapter, go to "Working with Adapters" on page 55
> - The riser card, go to "Removing and Replacing the Riser Card" on page 64
> - A memory-module kit, go to "Working with Memory-Module Kits" on page 68
> - A video memory-module kit, go to "Installing Video Memory-Module Kits" on page 73
> - An internal drive, go to "Working with Internal Drives" on page 77
> - A microprocessor upgrade, go to "Installing Microprocessor Upgrades" on page 95

Working with Adapters

You can add adapters to provide communication, specialized graphics, and sound. This extends the capabilities and power of your server. Many adapters provide bus-master capabilities, which enable the adapters to perform operations without interrupting the server's microprocessor.

Your server has adapter connectors called *expansion slots*, which are located on a *riser card.*

Riser Configuration

The following information describes the expansion slots that are available on the PCI/ISA riser card.

The server riser card has four dedicated PCI slots, two dedicated ISA expansion slots and one shared PCI/ISA expansion slot. You can install only one adapter in the shared slot.
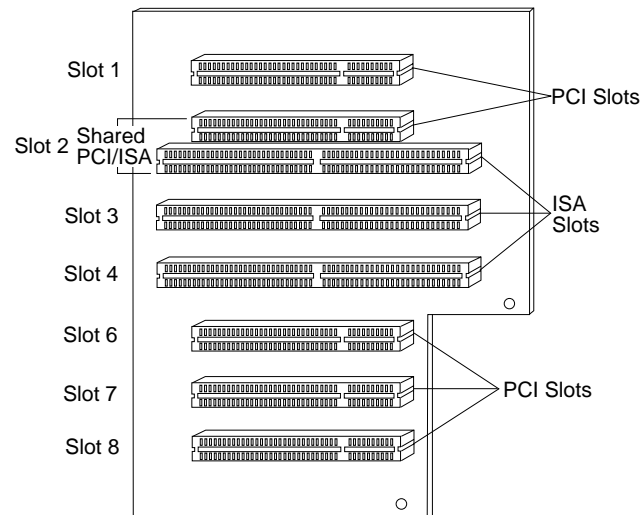
Note: Slot 5 is not available.

One of the PCI expansion slots contains an UltraSCSI adapter In some models, one of the PCI expansion slots contains an Ethernet adapter. One of the PCI expansion slots contains the SVGA video adapter. The remaining slots are available for future expansion and growth.

Plug and Play

Plug and Play is a technology designed to make expanding your server easier. Plug and Play adapter support is built into the system board in your server.

Plug and Play Adapters

Plug and Play adapters are easier to install and set up because they are auto-configuring. This means that there are no jumpers or switches to set.

A Plug and Play adapter comes with built-in identification and configuration specifications set in memory on the adapter that provides installation information to the server during startup. This information is sensed by the input/output (I/O) bus and interpreted by the server *Basic Input/Output System (BIOS)*. The BIOS routines then automatically configure the adapter around the resources already in use by other devices.

Most adapters designed for PCI slots are Plug and Play devices. However, many ISA adapters are not Plug and Play devices. These adapters are discussed in "ISA Legacy Resources" on page 29.

Notes:

1. If a resource conflict arises after you install a Plug and Play adapter, you might need to change the default resource settings on the adapter. For more information, refer to the documentation that comes with the adapter.

2. For a description of resource conflicts, see "Resolving Configuration Conflicts" on page 30. For information about handling resource conflicts, see "Troubleshooting" on page 161 and "Resolving Configuration Conflicts" on page 180.

Installing Adapters

Before you begin:

- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
- Read the instructions that came with the adapter.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

1. Review the instructions that come with the adapter:

   a. Determine if the adapter must be installed in a certain slot. If there are no restrictions other than those previously discussed in this chapter, you may use any empty, bus-compatible slot.

   b. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
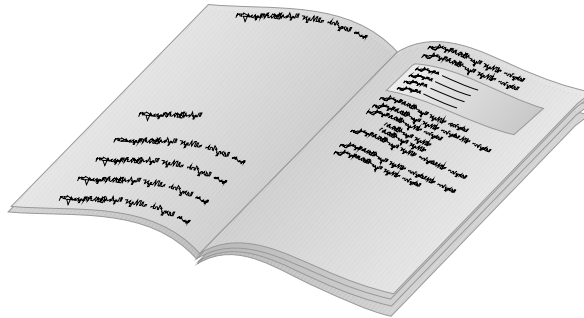
2. Determine which expansion slot you will use for the adapter.

3. Remove the expansion-slot cover from the slot where you want to install the adapter:

   a. Loosen and remove the screw on the top of the expansion-slot cover.

   b. Slide the expansion-slot cover out of the server.

   c. Store it in a safe place for future use.

Expansion-slot Cover

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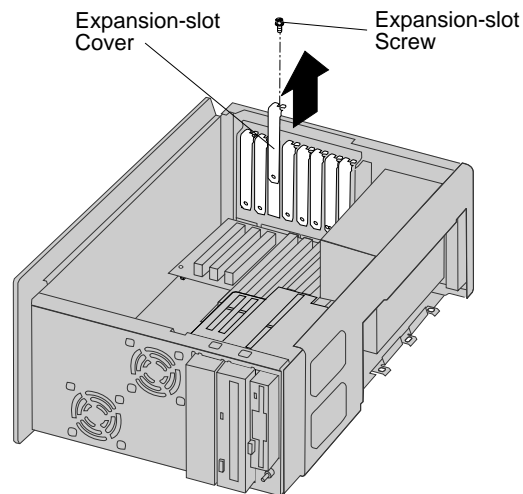
4. Touch the static-protective package to any *unpainted* metal surface on the server; then, remove the adapter from the package.
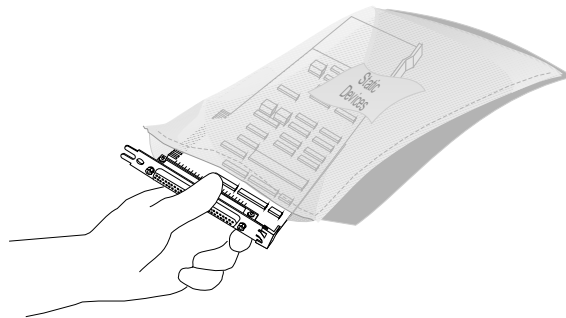
Static Devices

5. Install the adapter:

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

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

   b. Slide the adapter into the expansion slot; then, press the
      adapter *firmly* in the connector.

   c. Tighten the expansion-slot screw on the top of the adapter
      bracket.
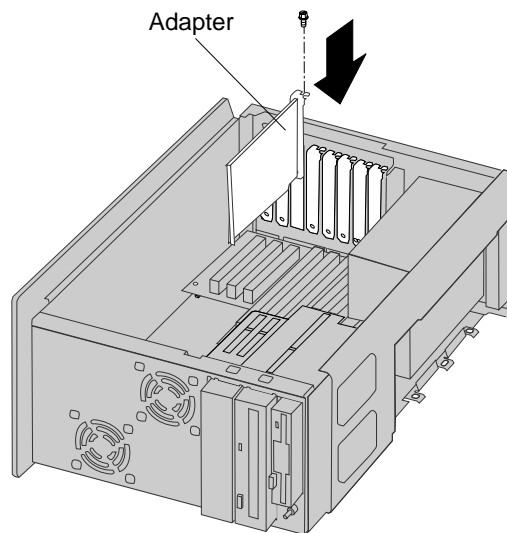
6. Go to Table 5 on page 210 and write the adapter name next to the slot into which it is installed; then, return here.
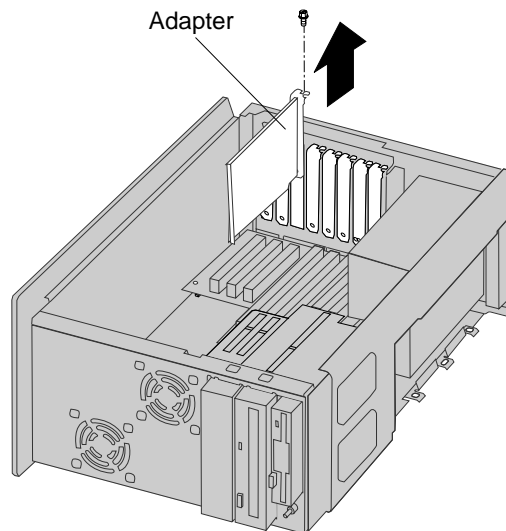

What to do next?

- To install or remove:
  - The riser card, go to "Removing and Replacing the Riser Card" on page 64
  - A memory-module kit, go to "Working with Memory-Module Kits" on page 68
  - A video memory-module kit, go to "Installing Video Memory-Module Kits" on page 73
  - An internal drive, go to "Working with Internal Drives" on page 77
  - A microprocessor upgrade, go to "Installing Microprocessor Upgrades" on page 95
  - A security option, go to "Security Options" on page 105
- To complete the installation, go to "Completing the Installation" on page 113.

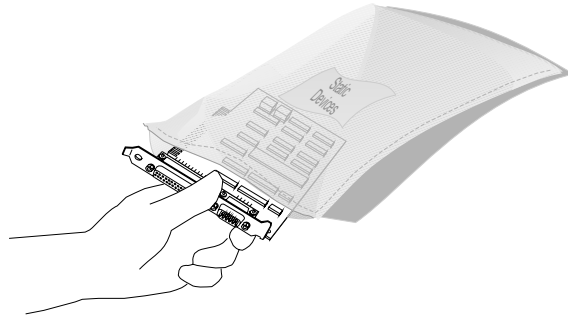
Removing Adapters

Before you begin:

- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

1. Remove the adapter:

   a. Note the expansion-slot position of the adapter that you are removing.

   b. Loosen and remove the screw on top of the adapter bracket.

   c. If there are any internal cables attached to the adapter, disconnect them.

   d. Carefully pull the adapter out of the slot.

Adapter

2. Store the adapter that you removed in a static-protective package.

3. If you are installing another adapter in this expansion slot, see "Installing Adapters" on page 57 for instructions.

   If you are not installing another adapter in this expansion slot, replace the expansion-slot cover:

   a. Slide the cover over the open expansion slot.

   b. Replace and tighten the expansion-slot screw on the top of the expansion-slot cover.
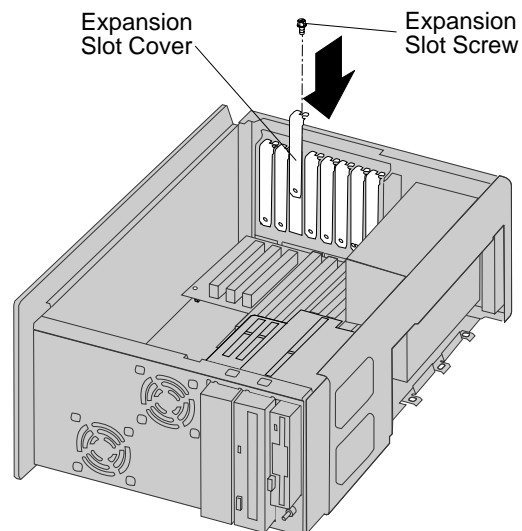
4. Go to Table 5 on page 210, and delete the name of the adapter
   that you removed; then, return here.
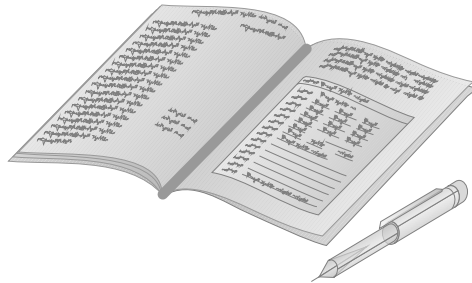
What to do next?

- To install or remove:

  – The riser card, go to "Removing and Replacing the Riser
    Card" on page 64

  – A memory-module kit, go to "Working with
    Memory-Module Kits" on page 68

  – A video memory-module kit, go to "Installing Video
    Memory-Module Kits" on page 73

  – An internal drive, go to "Working with Internal Drives"
    on page 77

  – A microprocessor upgrade, go to "Installing
    Microprocessor Upgrades" on page 95

  – A security option, go to "Security Options" on page 105

- To complete the installation, go to "Completing the
  Installation" on page 113.
---

Removing and Replacing the Riser Card

Before you begin:

- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).
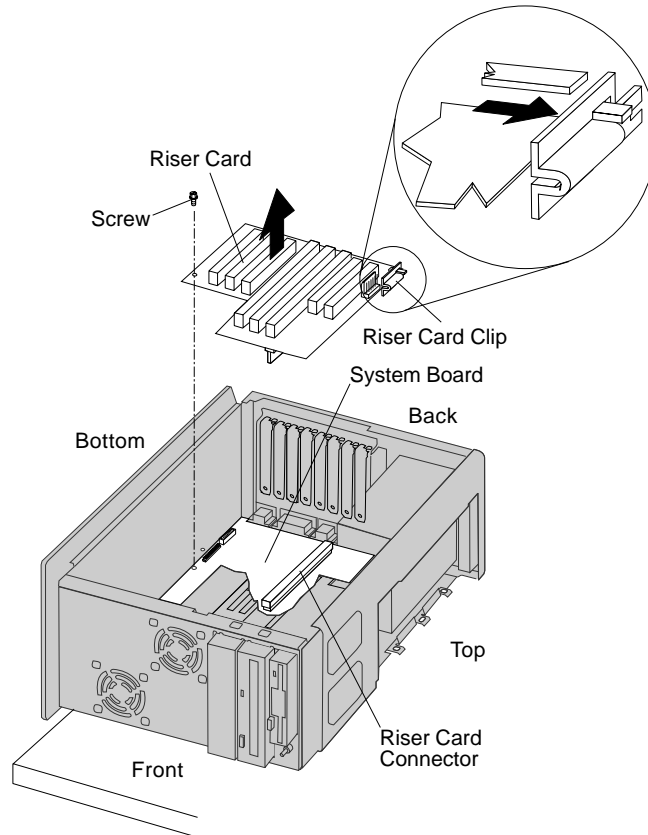

Removing the Riser Card

1. If any adapters have cable connections to the system board or to a drive, disconnect the cables. Note the cable connector locations so that you can reconnect them.

2. If any adapters are connected to the riser card, note their positions; then remove them. For instructions, see "Removing Adapters" on page 61.

3. Disconnect the power cable that is attached to the riser card. Note where this cable connects so that you can reattach it later.

Power Cable
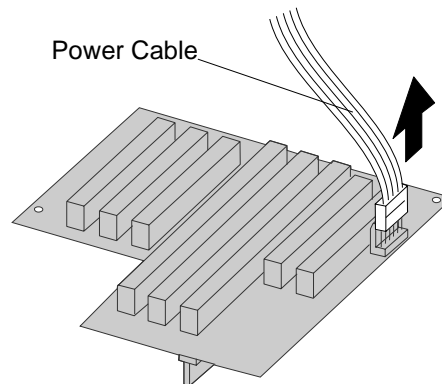
4. Remove the riser card clip.

5. Remove the riser card screw.

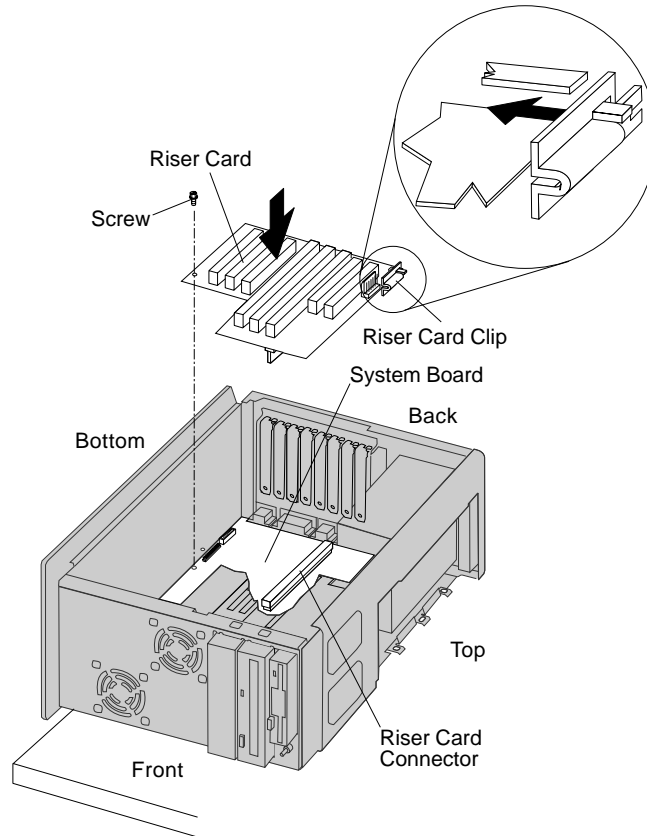6. Lift the riser card straight up from the connector on the system board.

Replacing the Riser Card

1. Align the riser card directly above the connector on the system board; then, press the riser card into the connector.

2. Attach the riser card screw.

3. Replace the riser card clip.

4. Attach the power cable that you removed in step 3 on page 64.

   Note: Cable connectors are keyed and connect only one way.

5. If you removed any adapters in step 1 on page 64, attach them to the riser card. For instructions, see "Installing Adapters" on page 57.

6. If you removed any cables from adapters to the system board or to drives, connect the cables.

Working with Memory-Module Kits

Adding system memory to your server is an easy way to make programs run faster. The main memory in your server uses memory modules called *dual-inline memory modules (DIMMs)* for temporary storage of data and instructions.

Your server comes with a minimum of one 32 MB, 60 nanosecond (ns) EDO ECC DIMM. You can install from one to three extra DIMMs into the connectors on the system board.

Your server supports four, industry-standard, 168-pin, gold DIMMs. The optimal speed is 60 ns. You can install 32 MB, 64 MB, and 128 MB DIMMs. The maximum amount of system memory your server supports is 512 MB.

Notes:

1. Memory modules can have a maximum height of 30 mm (1.2 in.). If you use DIMMs that are greater than 25 mm (1.0 in.) in height, you cannot install a full-length adapter in the bottom expansion slot on the riser card.

2. During startup, the power-on self-test (POST) sets the system memory to 60 ns.

What to do next?

- Before you install memory modules, review the information in "Standard and Optional Memory-Module Configurations" on page 69.
- To install or remove a DIMMs, go to "Installing or Removing DIMM Kits" on page 69.

Standard and Optional Memory-Module Configurations

Table 2 shows the supported DIMM configurations.

Table 2. DIMM Memory-Module Configurations			
Configuration	**Speed**	**Type**	**Size (MB)**
Standard	60 ns	EDO ECC	32
Optional	60 ns	EDO ECC	32, 64, 128
Note: Standard memory-module configurations are subject to change.			

Installing or Removing DIMM Kits

┌─ **Before you begin:** ─────────────────────────────

- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

1. Locate the four system-memory connectors at the right-front corner of your server system board. (See the system-board illustration in "Locating System-Board Components" on page 51.)
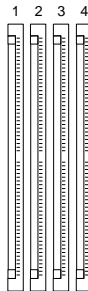
2. Note the slot position of any installed adapters; then, remove any adapters that block access to the DIMM connectors. (In most cases, it is not necessary to remove half-length adapters. For information about removing an adapter, see "Removing Adapters" on page 61.)

What to do next?

- To install a DIMM kit, go to step 3.
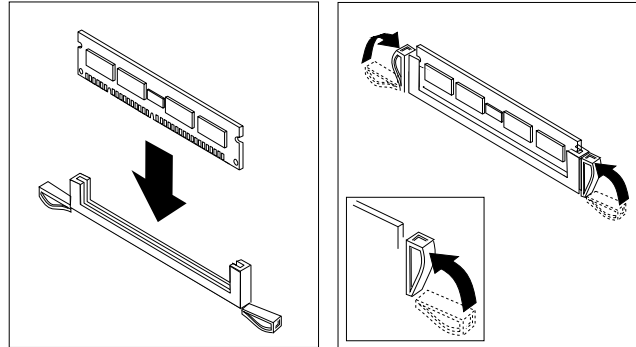- To remove a DIMM kit, go to step 5 on page 71.

---

3. Use the following procedure to install a DIMM kit:

   a. Touch the static-protective package containing the DIMM kit to any *unpainted* metal surface on the server; then, remove the memory-module kit from the package.
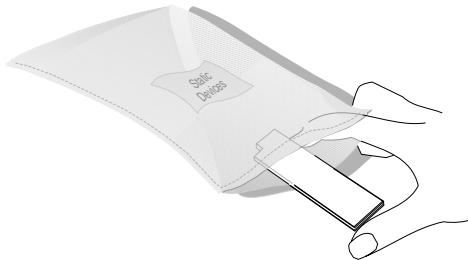

   b. Position the DIMM kit so that the two notches (key slots) on the bottom edge align with the two notches in the connector on the system board.

c. After aligning the DIMM kit, push the DIMM kit firmly, straight down into the connector. (The retaining clips on both sides of the connector will pop up.)

4. Go to step 6 on page 72.

5. Use the following procedure to remove a DIMM kit:

a. Firmly push downward on the retaining clips at both ends of the DIMM kit connector. This will release the DIMM kit from the connector.

b. Lift the DIMM kit out of the connector.
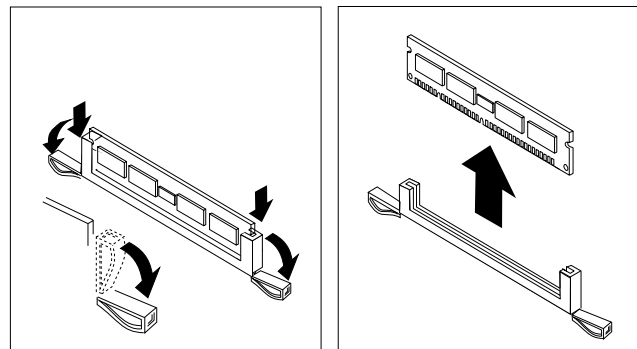
c. Store the DIMM that you removed in a static-protective package.

6. Reinstall any previously removed adapters into the same slots from which they were removed. (For information about installing an adapter, see "Installing Adapters" on page 57.)

7. Go to Table 4 on page 209 and update the current configuration of the memory-module kits.

What to do next?

- To install or remove:

    – A video memory-module kit, go to "Installing Video Memory-Module Kits" on page 73

    – An internal drive, go to "Working with Internal Drives" on page 77

    – A microprocessor upgrade, go to "Installing Microprocessor Upgrades" on page 95

    – A security option, go to "Security Options" on page 105

- To complete the installation, go to "Completing the Installation" on page 113.

Installing Video Memory-Module Kits

You can add video memory to your server to improve the
performance of many graphics-intensive application programs and
take advantage of the higher resolution provided by some monitors.

Your server comes with 1 MB of preinstalled video memory on the
system board. If you expand the video memory to 2 MB, your
video adapter will support high-resolution graphics and text modes
with 132 columns. You can increase the video memory to a
maximum of 2 MB by installing optional video-memory modules.
POST automatically configures the video memory during startup.

Note: See the *User's Reference* for more details about the video
subsystem.

Before you begin:

- Read "Electrical Safety" on page 45 and "Handling
  Static-Sensitive Devices" on page 46.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove
  the server cover (see "Removing the Cover" on page 49).
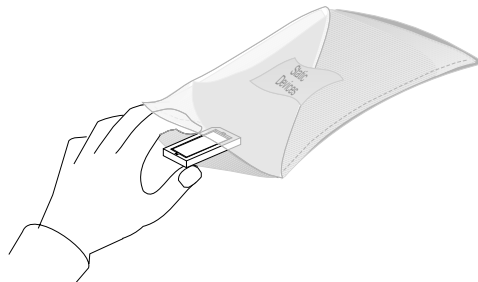

Installing Video Memory-Module Kits

To install the video-memory modules on the video adapter:

1. Locate the video-memory module connectors (sockets) on the video adapter.

   Note: You might need to remove the video adapter to gain access to the connectors. For information about removing adapters, see "Removing Adapters" on page 61.
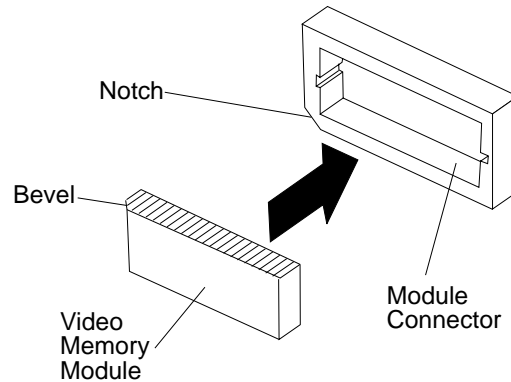
Two Video Memory
Upgrade Sockets
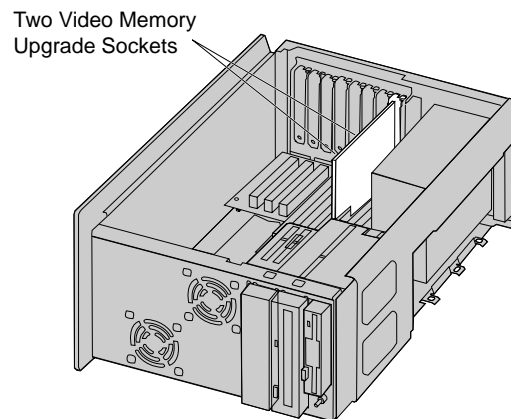
2. Install the video-memory modules:

   a. Touch the static-protective package containing the video memory-module kit to any *unpainted* metal surface on the server; then, remove the video memory-module kit from the package.

b. Locate the beveled corner on the video-memory module.

c. Carefully align the beveled corner on the video-memory module with the notch of the memory connector on the video adapter.

d. Press the video-memory module down firmly into the connector. Make sure that the memory module is fully seated.

   Note: You must install two 512 KB video-memory modules to upgrade the video memory.

Installing Video Memory-Module Kits

3. Go to Table 4 on page 209, and update the current
   configuration of the video memory.
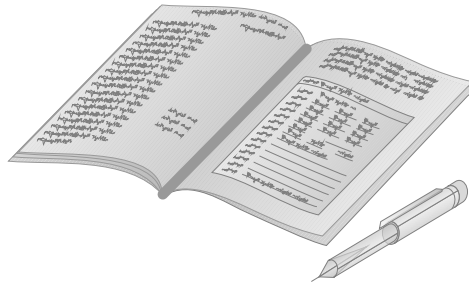
Note: Adding or removing video-memory modules changes the
configuration information in the server. When you restart the
server, the system displays a configuration error. Start the
Configuration/Setup utility program and select **Save
Settings.**

Working with 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 other types of media.

Internal drives are installed in *bays*. The bays are referred to as bay 1, bay 2, and so on.

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

Bay 1
Bay 2
Bay 3
Bay 4
Bay 5
Bay 6
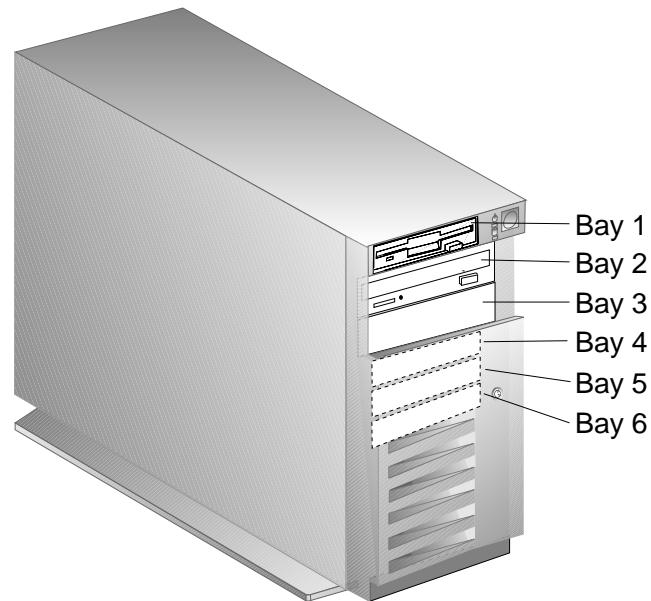
Your server comes with a diskette drive installed in bay 1, and a CD-ROM drive installed in bay 2. Some models come with a preinstalled hard disk drive.

Working with Internal Drives

Bay	Drive Width	Drive Type	Drive Height
1	3.5-inch	Diskette drive	25.4 mm (1.0 in.)
2	5.25-inch	CD-ROM	41.3 mm (1.6 in.)
3	3.5-inch 5.25-inch	Removable media drive, hard disk drive[1]	25.4 mm (1.0 in.) 41.3 mm (1.6 in.)
4 through 6	3.5-inch	Hard disk[2]	25.4 mm (1.0 in.)

Notes:

1. Removable media include CD-ROMs, optical discs, and tapes.

2. If a hard disk drive is preinstalled, it is the startup (or boot) drive.

Your server supports drives that conform to the *small computer system interface* (SCSI). This design allows you to attach multiple drives to a single SCSI adapter.

Notes:

1. Depending on your particular server configuration, you might need to install an additional SCSI adapter if you attach external SCSI devices.

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

Drives connect to your server with cables. Each cable connector is designed to fit a corresponding drive connector. If the cable connector fits the drive connector, you can connect the cable to that drive.

Three types of internal cables connect to the drive in your server:

- A four-wire, power cable connects to most drives. Two types of power cables and connectors are provided, allowing you to connect drives with different types of connectors. One of the drive power cables connects to the installed diskette drive and one connects to the CD-ROM drive. If a hard disk drive is installed, one of the drive power cables is attached to the drive.

- A flat-ribbon signal cable connects internal diskette drives and certain tape drives.

  This cable has two connectors. The primary diskette drive installed in your server (usually known as drive A) must be attached to the diskette drive connector that is at one end of the ribbon cable. The unique connector at the opposite end of this ribbon cable plugs into the system board.

  Note: If you want to install more than one diskette drive, you must purchase a four-wire, Y-cable that provides two power connectors.

- Another cable connects internal SCSI devices. This SCSI cable has five connectors that connect to SCSI devices. A sixth connector attaches to the UltraSCSI adapter.

  The internal SCSI cable is attached the CD-ROM drive, the UltraSCSI adapter and a hard disk drive if preinstalled. This cable also has additional connectors for installing other SCSI devices.

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 place of purchase, or your IBM reseller.

- Within Canada, call 1-800-565-3344 or 1-800-465-7999.

- Outside the United States and Canada, contact your IBM HelpWare number, place of purchase, or IBM reseller.

SCSI IDs

If you install additional SCSI devices, you must set a unique identification (ID) for each SCSI device that you connect to your server. This enables the UltraSCSI adapter to identify the devices and ensure that different devices do not attempt to transfer data at the same time.

The UltraSCSI adapter in your server supports SCSI IDs 0 to 15. ID 7 is reserved for the adapter. The scanning sequence for (preinstalled) SCSI devices proceeds from the lowest SCSI ID to the highest SCSI ID, starting with 0. If your server comes with a

preinstalled hard disk drive, this is your startup drive, and it already has a SCSI ID of 0. The CD-ROM drive has a SCSI ID of 6.

Narrow SCSI devices can use IDs 0 through 6. Wide SCSI devices can use IDs 0 through 15. The cabling in your server supports narrow SCSI devices. Refer to the instructions that come with the SCSI devices for information about setting a SCSI ID.

Termination Requirements

All PC Server 315 models come with an UltraSCSI adapter preinstalled as a standard feature. This adapter provides termination for one end of the SCSI bus (cable) in your server. However, both ends of the SCSI bus must be terminated. The steps required to set the termination for the other end of the SCSI bus are as follows:

- PC Server 315 models that come with a hard disk drive preinstalled in bay 6.

  The termination for the hard disk drive is set to Enabled. When you install additional SCSI devices in bays 3, 4, and 5, you must disable the termination for the devices before you install them.

- PC Server 315 models that do not come with a preinstalled hard disk drive.

  These models come with a device, known as a terminator, attached to the last connector on the SCSI cable. When you install SCSI devices in bays 3, 4, or 5, you must disable the termination for the devices before you install them. However, when you install a SCSI device in bay 6, you must Enable the termination on the device before you install it; then, you must remove the terminator from the last connector on the cable and attach the cable to the device.

 *Note:* You can not enable termination on the CD-ROM drive in bay 2.

Refer to the instructions that come with the SCSI device for more information about termination. Refer to the *User's Reference* for additional information about your server's SCSI subsystem.

Installing Internal Drives

> **Before you begin:**
>
> - Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
> - Read "SCSI IDs" on page 79 and "Termination Requirements" on page 80.
> - Read the instructions that came with the internal drive.
> - Turn off the server.
> - Disconnect all external cables and power cords; then, remove the server cover. (See "Removing the Cover" on page 49.)

1. Determine the location for the drive that you want to install.

Bay 1
Bay 2
Bay 3
Bay 4
Bay 5
Bay 6
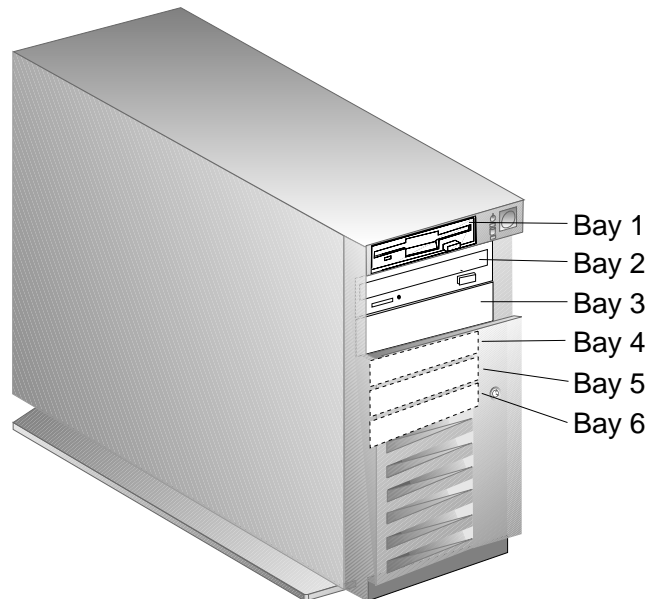
Working with Internal Drives

2. Touch the static-protective package to any *unpainted* metal surface on the server; then, remove the drive from the package.
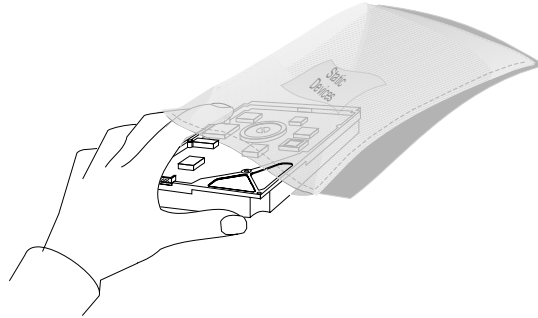

3. Using the instructions that came with the drive, together with these instructions, check that any switches or jumpers on the drive are set correctly. Change the settings if necessary. For information about termination requirements, see "Termination Requirements" on page 80.

4. 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.

5. To install a drive in bay 3, continue with the next step. To install a drive in bays 4 through bay 6, go to step 1 on page 87.

Installing a Drive in Bay 3

1. Remove the cover plate from bay 3:

   a. Insert a small flat-blade screwdriver under the side of the
      bay panel.

   b. Lift the cover plate and remove it from the server front
      panel. (Save the cover plate for future use.)
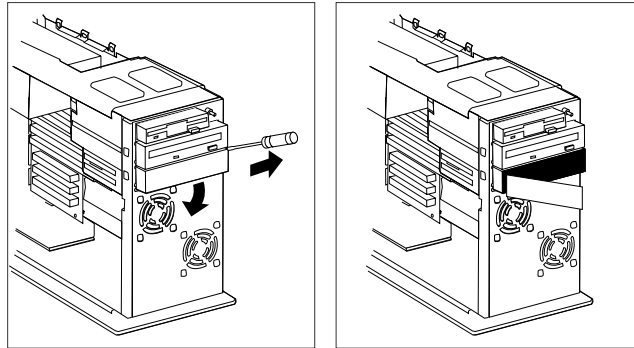
2. Remove the screws that secure the drive tray in bay 3. Then,
   slide the tray out of the bay.
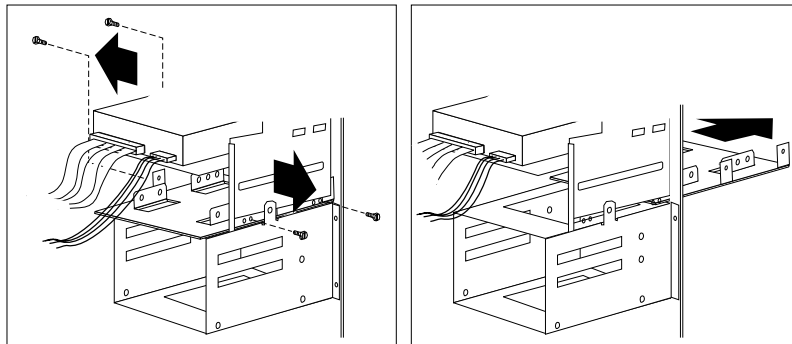
3. If you are installing a 3.5-inch drive, continue with the next step.
   If you are installing a 5.25-inch drive, go to step 9 on page 85.

4. Place the drive on the tray, with the connectors facing the rear of the tray.

5. Attach the drive to the drive tray, using the screws that came with the drive kit; then, slide the drive tray in bay 3.

   Attention: To ensure that the drive functions properly, do not overtighten the screws.
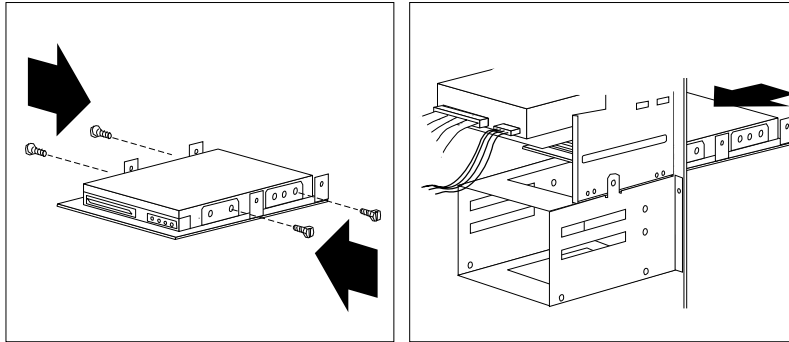
6. Reinstall and tighten the four screws that you removed in step 2 on page 83.
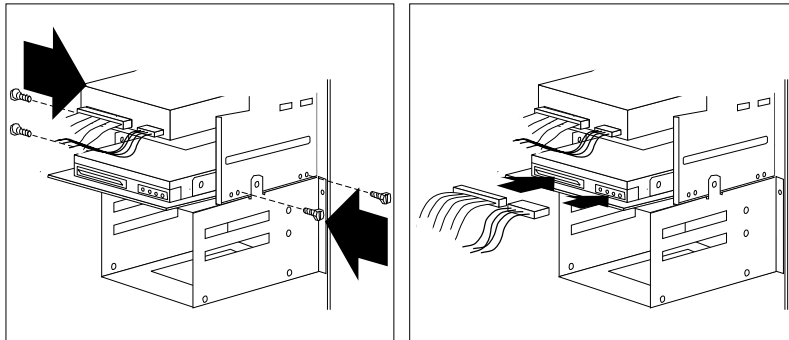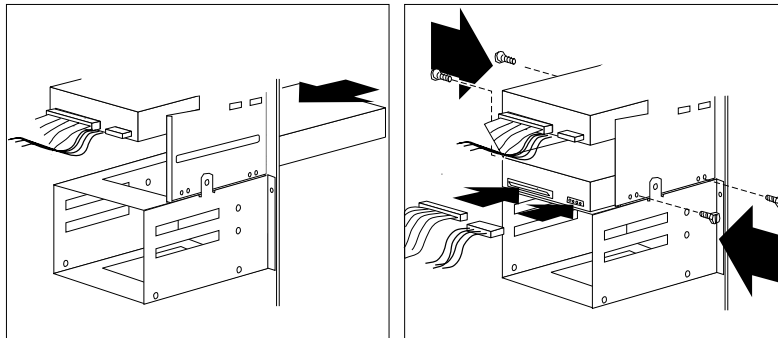
7. Connect the SCSI signal cable and power cable to the installed drive.

    Notes:

    a. Cables connectors are keyed and connect only one way.

    b. When connecting cables to the drive in bay 3, connect the SCSI signal cable first; then, connect the power cable.

8. Go to step 14 on page 86.

9. Position the drive in bay 3 with the connectors facing the rear of the server.

10. Slide the drive to the rear until it stops.

11. Reinstall the four screws that you removed from the tray in step 2 on page 83.

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

12. Connect the SCSI signal cable and power cable to the installed drive.

    Notes:

    a. Cables connectors are keyed and connect only one way.

    b. When connecting cables to the drive in bay 3, connect the SCSI signal cable first; then, connect the power cable.

13. Store the drive tray in a safe place.

14. Go to the device-record form in Appendix C, "Server Records" on page 203, and update the drive information.

What to do next?

- To install or remove:

    – A microprocessor upgrade, go to "Installing Microprocessor Upgrades" on page 95

    – A security option, go to "Security Options" on page 105

- To complete the installation, go to "Completing the Installation" on page 113.

## *Installing a Drive in Bays 4, 5, and 6*

1. Remove the four screws from the drive assembly that contains bays 4 through 6.
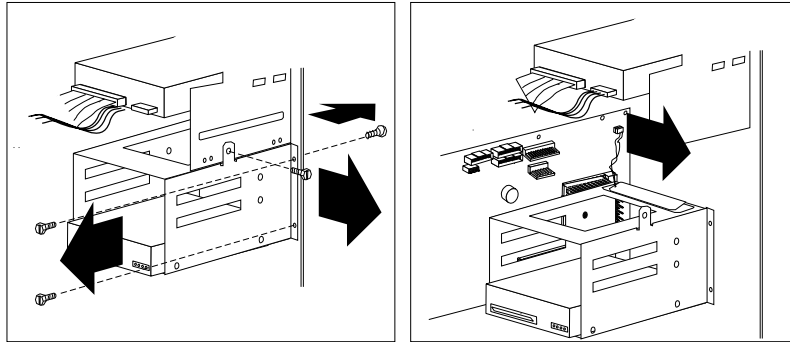
2. Lower the drive assembly from the server. If necessary, disconnect the fan's power connector. For information about the location of the fan's power connector, see "Locating System-Board Components" on page 51.

3. Position the drive in bay with the connectors facing the rear of the server. Then, slide the drive in the drive assembly until it stops.
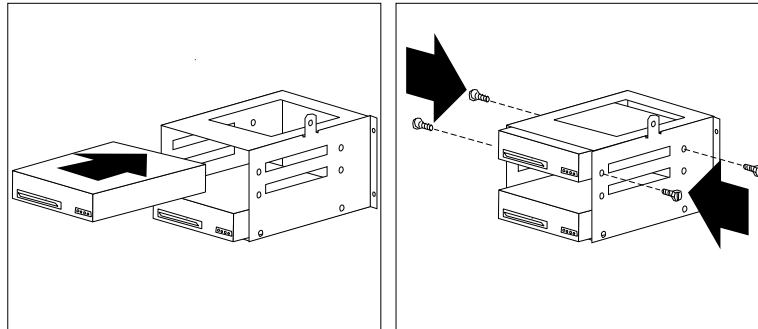
4. Attach the drive to the drive assembly, using the screws that came with the drive kit.

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

5. If you have additional drives to install in bay 4 through bay 6, go to step 3. If you have no more drives to install, continue with the next step.

6. Connect the SCSI signal cable and power cable to the installed drive.
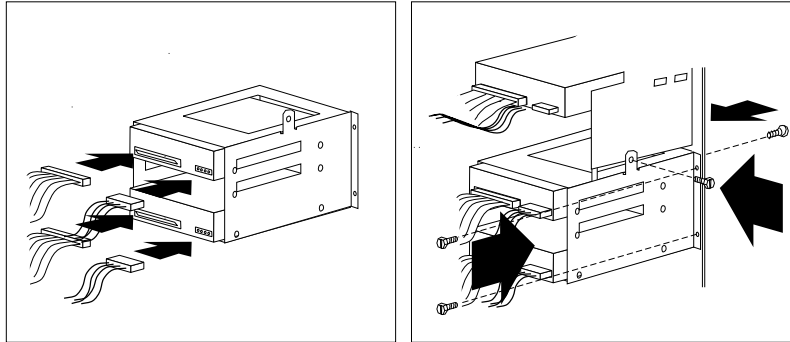
7. Reinstall the drive assembly, using the screws that you removed in step 1 on page 87. Be sure to reconnect the fan's power connector if removed in step 2 on page 87.

8. Go to the device-record form in Appendix C, "Server Records" on page 203, and update the drive information.

**What to do next?**

- To install or remove:

    - A microprocessor upgrade, go to "Installing Microprocessor Upgrades" on page 95

    - A security option, go to "Security Options" on page 105

- To complete the installation, go to "Completing the Installation" on page 113.

Removing Internal Drives

Before you begin:

- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
- Read "SCSI IDs" on page 79 and "Termination Requirements" on page 80.
- Read "SCSI IDs" on page 79 and "Termination Requirements" on page 80.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

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

Bay 1
Bay 2
Bay 3
Bay 4
Bay 5
Bay 6
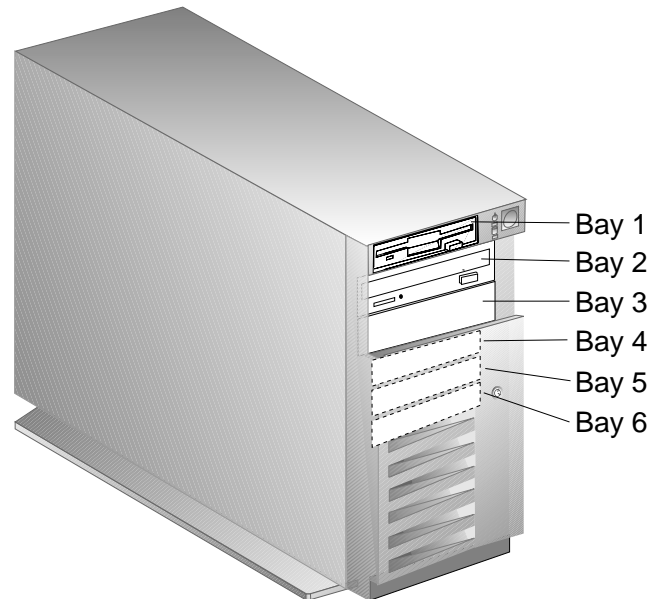
2. Disconnect all cables from any drives in bay 4, 5, and 6.

   Note: As an example, the following illustration shows how to remove the cables from a drive.

3. To remove a drive from bay 3, continue with the next step. To remove a drive from bay 4 through bay 6, go to step 8 on page 92.

4. Disconnect the SCSI signal cable and power cable from the drive.
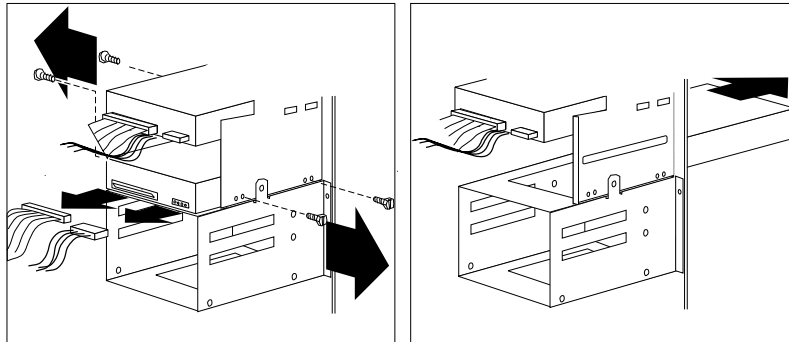
5. Remove the screws that secure the drive in bay 3. Then, slide the drive out of the bay.

6. Store the drive in a safe place. If the drive is attached to a drive tray, remove the drive before storing it.

7. Reinstall the cover plate that was shipped with your server.

What to do next

- To remove a drive from bay 4 through bay 6, continue with the next step.
- If you have completed removing drives, go to step 13 on page 94.
- To install an internal drive, go to "Installing Internal Drives" on page 81.

---

8. Remove the four screws from the drive assembly that contains bays 4 through 6.
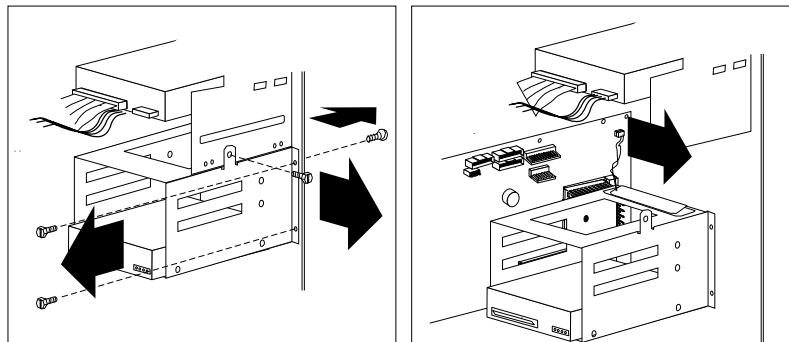
9. Lower the drive assembly from the server. If necessary, you may disconnect the fan's power connector. For information about the location of the fan's power connector, see "Locating System-Board Components" on page 51.

10. Remove the selected drive from the drive assembly.

    Note: Be sure the termination is set correctly on the appropriate
    drive or by installing a cable terminator. For more
    information about termination requirements, see
    "Termination Requirements" on page 80.

    ┌─ **What to do next** ──────────────────────────┐
    │   │
    │ • If you have completed removing drives from the drive │
    │   assembly, continue with the next step.   │
    │ • To install an internal drive, go to "Installing Internal │
    │   Drives" on page 81.   │
    │   │
    └──┘

11. Reconnect the signal and power cables to each remaining drive.

    Note: If you have difficulty connecting a cable, turn the cable
    connector over and try again; cable connectors are keyed
    and connect only one way.
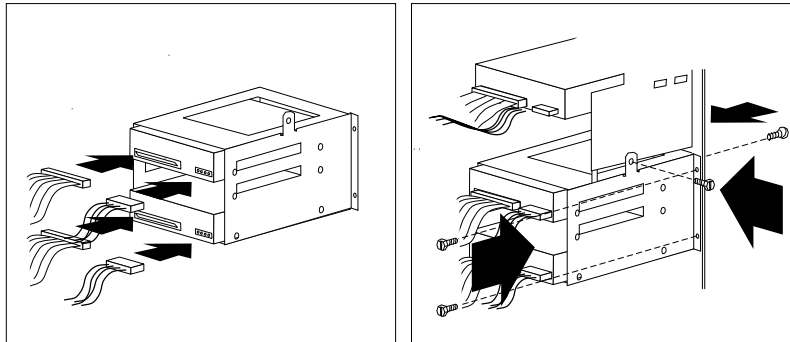
12. Reinstall the drive assembly, using the screws that you removed in step 8 on page 92. Be sure to reconnect the fan's power connector if removed in step 9 on page 92.

What to do next

- To install an internal drive, go to "Installing Internal Drives" on page 81.
- If you do not want to install or remove any other internal drives, go to step 13.

---

13. Go to Appendix C, "Server Records" on page 203 and update the drive information.
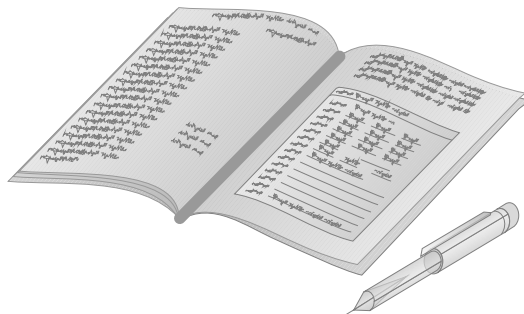
What to do next

- To install or remove:

  - A memory-module kit, go to "Working with Memory-Module Kits" on page 68

  - A microprocessor upgrade, go to "Installing Microprocessor Upgrades" on page 95

  - A security option, go to "Security Options" on page 105

- To complete the installation, go to "Completing the Installation" on page 113.

Installing Microprocessor Upgrades

You can enhance the operation of your server by upgrading its microprocessor to a more powerful microprocessor. To do this, replace the existing microprocessor in the microprocessor socket with a new microprocessor.

Before you begin:

- Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
- Read the documentation that came with the microprocessor upgrade.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

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

1. Locate the microprocessor socket on the server system board. (See the system-board illustration in "Locating System-Board Components" on page 51.)

Installing Microprocessor Upgrades

2. Note the slot position of any installed adapters; then, remove any adapters that block access to the microprocessor socket. (For information about removing an adapter, see "Removing Adapters" on page 61.)

Adapter
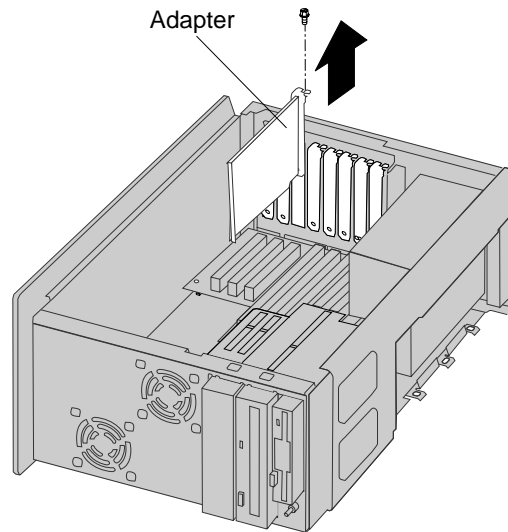
3. Locate the configuration switch and the microprocessor socket on the system-board illustration in "Locating System-Board Components" on page 51.

4. When installing a microprocessor upgrade, you must change the microprocessor/bus speed switch to the correct settings.

   Note: The wrong setting will result in unreliable server operation. In addition, an incorrect value will appear in the Configuration/Setup utility program.

   Use the following illustration to set switches (1 to 6) on the configuration switch.
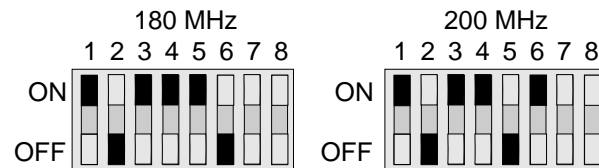
5. Press on the heat-sink-clip tab to release the heat-sink clip from the socket flange.

   Note: Your heat sink and heat-sink clip might differ from those shown here. Refer to the documentation that comes with your upgrade kit for further details.
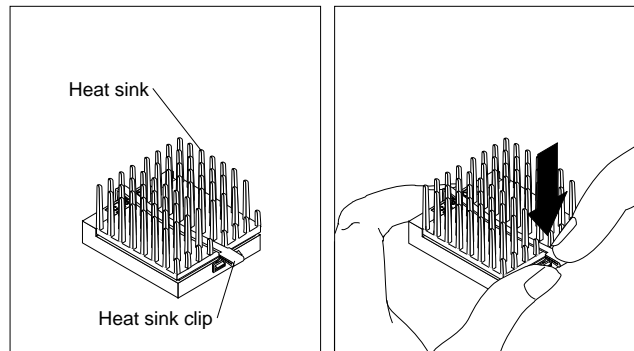
6. Remove the heat-sink clip and heat sink.

   Attention: A thermal grease is on the top of the microprocessor and the base of the heat sink. Avoid getting this material on your skin or clothing. Use a soft, lint-free cloth to remove the thermal grease before storing the old microprocessor, heat sink, and heat-sink clip.
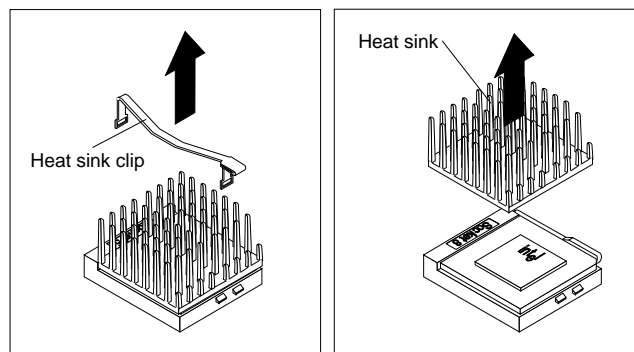
7. Press the latch away from the socket; then, lift the latch up.

8. Carefully lift the microprocessor from the socket.

   Attention: The pins on the base of the microprocessor bend easily. Once bent, the pins will not easily fit into another socket.
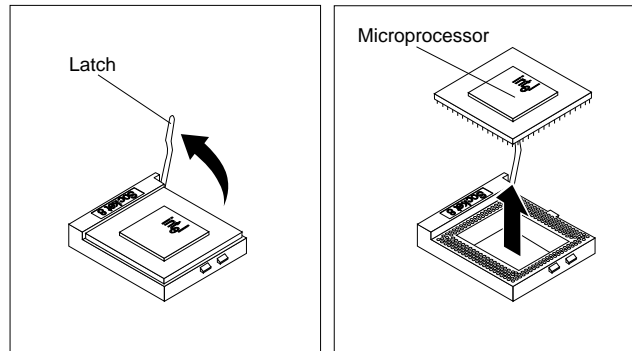
9. Store the old microprocessor in a static-protective package. Make a note of the microprocessor type for future reference. Store the old heat sink and heat-sink clip in a safe place.

10. Install the new microprocessor:

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

   Note: To install the new microprocessor, follow the instructions given here, plus the documentation that came with the new microprocessor.

b. Center the microprocessor over the socket.

c. Carefully insert the microprocessor into the socket. Ensure that the pins on the microprocessor align with the holes in the socket.

   Attention: Do not force the pins into the socket. If you feel any resistance, remove the microprocessor and check the orientation and alignment.

d. Move the latch downward until the microprocessor is completely locked into the socket. Make sure that the latch is in the fully closed position.
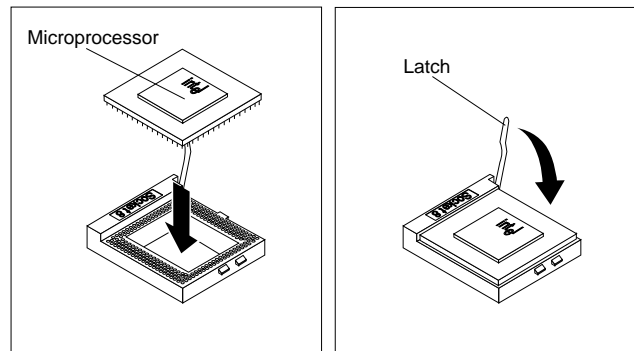
11. Open the thermal grease packet. Place the contents of the packet on top of the microprocessor.

12. Spread the grease evenly over the surface of the microprocessor. Ensure that the grease does not extend beyond the microprocessor edges.

13. Discard the empty thermal grease packet.

14. Reinstall the heat sink and heat-sink clip:

    a. Position the heat-sink clip over the flange, as shown.
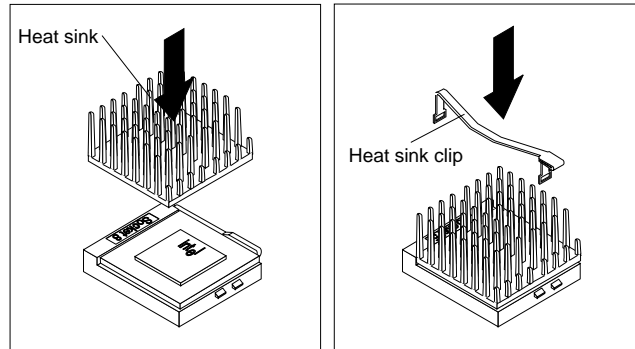
    b. Clip one end of the heat-sink clip over the flange. Then, place the clip over the top of the heat sink and press down until it is secure on both sides of the socket.

15. Reinstall any previously removed adapters into the same slots from which they were removed. (For information about installing an adapter, see "Installing Adapters" on page 57.)
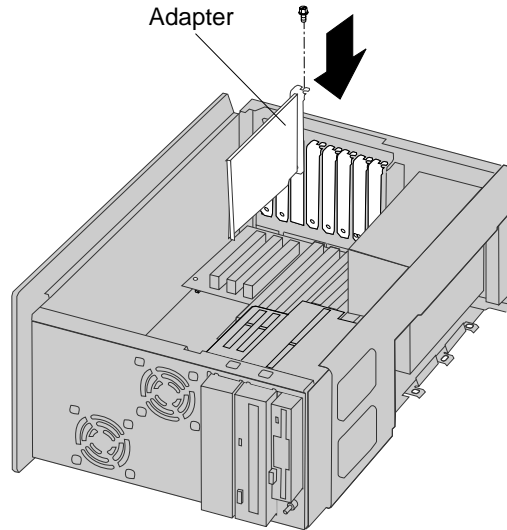
16. Go to Table 3 on page 205, and update the microprocessor information.
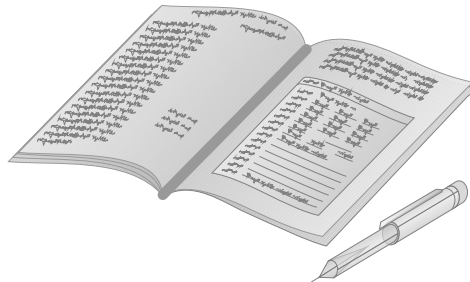
Installing Microprocessor Upgrades

```
┌──── What to do next? ────────────────────────────────┐
│                                                       │
│  • To install or remove:                              │
│                                                       │
│      –  A memory-module kit, go to "Working with      │
│         Memory-Module Kits" on page  68               │
│                                                       │
│      –  A video memory-module kit, go to "Installing Video │
│         Memory-Module Kits" on page  73               │
│                                                       │
│      –  An internal drive, go to "Working with Internal Drives" │
│         on page  77                                   │
│                                                       │
│      –  A security option, go to "Security Options" on page  105 │
│                                                       │
│  • To complete the installation, go to "Completing the │
│     Installation" on page  113.                       │
│                                                       │
└───────────────────────────────────────────────────────┘
```

Security Options

You can add options to your server to protect it from theft and tampering, and to protect the data and programs stored in the server from unauthorized access and use. Some of the security measures that you can take are:

- Installing a U-bolt and security cable
- Setting, removing, and changing a password
- Setting the diskette write-protect switch

These options are discussed in the following sections. Chapter 2, "Configuring Your Server" on page 15 contains more details about setting passwords and controlling access to the diskette drives. Additional security information is provided in the *User's Reference.*

Installing a U-Bolt and Security Cable

You can deter unauthorized removal of your server hardware by installing a U-bolt and security cable on the rear of your server.

Your server comes with knockout covers over the U-bolt holes. If you choose to connect a U-bolt to the server, you must first remove the knockout covers.

Before you begin:

- Obtain a 19 mm (3/4 in.) U-bolt or wire rope (similar to National Manufacturing No. 3230, Stock No. 176-735).
- Obtain a security cable.
- Obtain a lock, such as a combination lock or padlock.
- Obtain a flat-blade screwdriver.
- Obtain an adjustable wrench.
- Obtain threaded nuts that fit the U-bolt.
- Read "Electrical Safety" on page 45.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

Security Options

1. Locate the two holes for the U-bolt in the rear panel of the server.

2. Remove the knockout covers:

   a. Carefully tap the middle of the knockout cover (marked with a hole) with a screwdriver. The cover will bend toward the interior of the server.

   b. Bend the knockout cover back and forth several times, until you can pull it off.

3. Install the U-bolt through the holes and secure it in place with the threaded nuts.
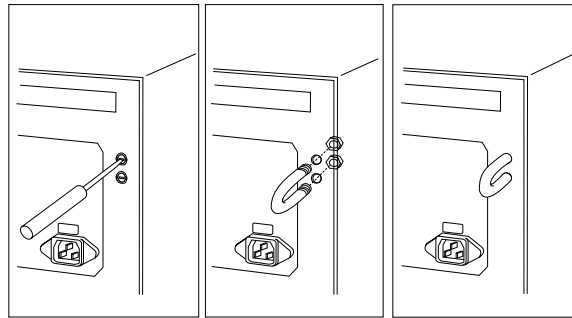
4. Thread the cable through the U-bolt and around an object that is not a part of or permanently secured to the building structure or foundation, and from which it cannot be removed; then, fasten the cable ends together with a lock.
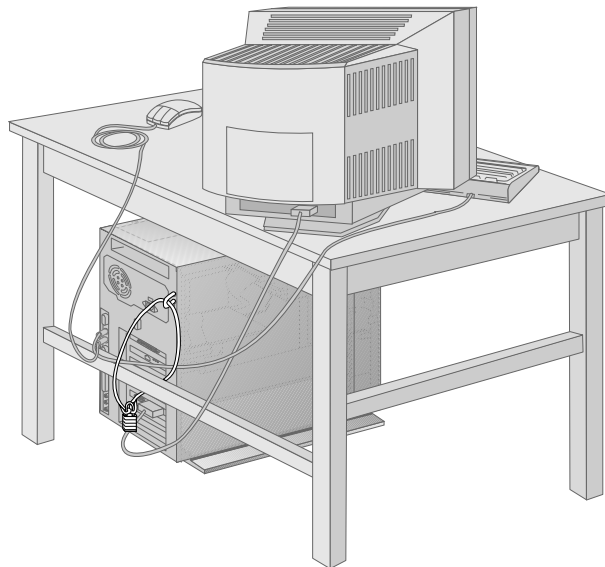
What to do next?

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.

Removing a Password

The administrator password and power-on password share the same jumper, know as the password jumper.

The following procedure outlines how to remove an unknown (or forgotten) power-on password and how to remove an adminstrator password.

Attention: This procedure erases your current server configuration. Be sure to record the server configuration before performing this procedure. You must reconfigure your server after you move the password jumper.

> **Before you begin:**
>
> - Read "Electrical Safety" on page 45 and "Handling Static-Sensitive Devices" on page 46.
> - Turn off the server.
> - Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

1. Locate the password jumper (PWD) in the system-board illustration in "Locating System-Board Components" on page 51. The jumper settings are shown in the following illustration.

Normal

3   2   1

Erase

3   2   1
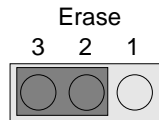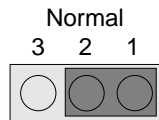
You might have to remove server components (such as adapters or the riser card) to gain access to the jumper.

2. Change the jumper's position:

   a. Lift the jumper straight off the pin block.

   b. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.

   c. Slide the jumper over these pins.

   This procedure removes the password.
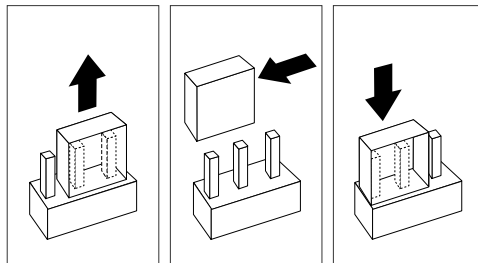
3. Wait one minute; then, move the jumper back to its original position. You can now set a new password.
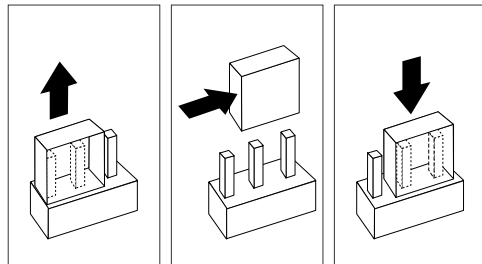
To set a new power-on password, follow the instructions in "Setting a Power-on Password" on page 26.

4. Reinstall any adapters or other components that you might have removed earlier.

What to do next?

- Replace the server cover and reconnect all external cables and power cords. See "Completing the Installation" on page 113 if you need additional information.

- Turn on the monitor and server.

- Use the Configuration/Setup utility program to set a new power-on password and to reconfigure your server. See Chapter 2, "Configuring Your Server" on page 15 for more information.

Setting the Diskette Write-Protect Switch

The diskette write-protect switch controls whether you can write information to a diskette using a diskette drive. This 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 45 and "Handling Static-Sensitive Devices" on page 46.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see "Removing the Cover" on page 49).

---

1. Locate the configuration switch in the system-board illustration in "Locating System-Board Components" on page 51.

2. For normal diskette operation or for read-only diskette operation, set switch 8 as illustrated.

<div align="center">

Normal Diskette   Read-Only Diskette
    Operation   Operation
1 2 3 4 5 6 7 8   1 2 3 4 5 6 7 8

</div>

Security Options

```
┌──── What to do next? ──────────────────────────────┐
│                                                     │
│  • Replace the server cover and reconnect all external cables │
│    and power cords.  See "Completing the Installation" on │
│    page 113 if you need additional information.     │
│                                                     │
│  • Use the Configuration/Setup utility program to set values │
│    that control diskette drive access and to reconfigure your │
│    server.  See Chapter 2, "Configuring Your Server" on │
│    page 15 for more information.                    │
│                                                     │
└─────────────────────────────────────────────────────┘
```
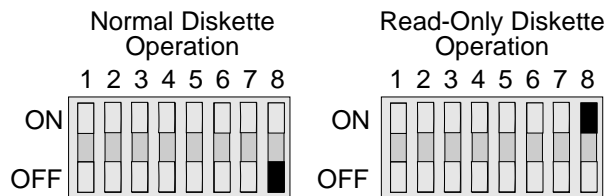
Completing the Installation

1. If you removed the floor stand to install options, attach the floor stand to the bottom of your server.
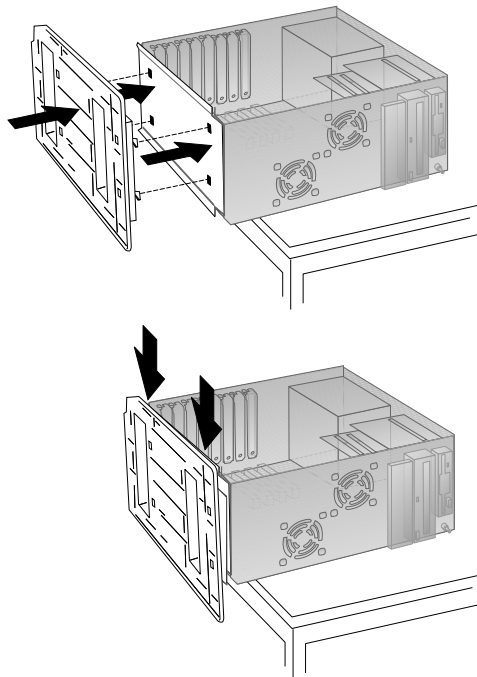
Completing the Installation

2. Install the cover on the server.
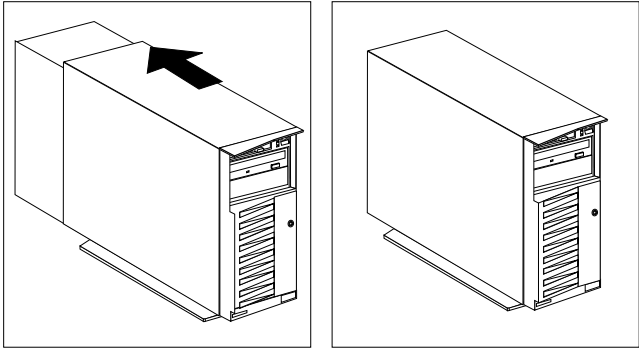
3. Replace the server's front door.
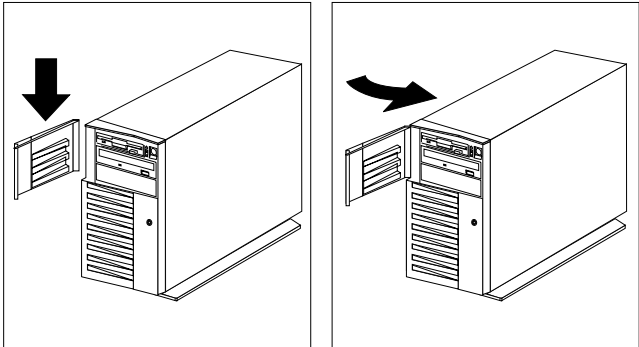
4. Reconnect the cables to the back of the server; then, plug the power cords into properly grounded electrical outlets. This includes standard and optional features.
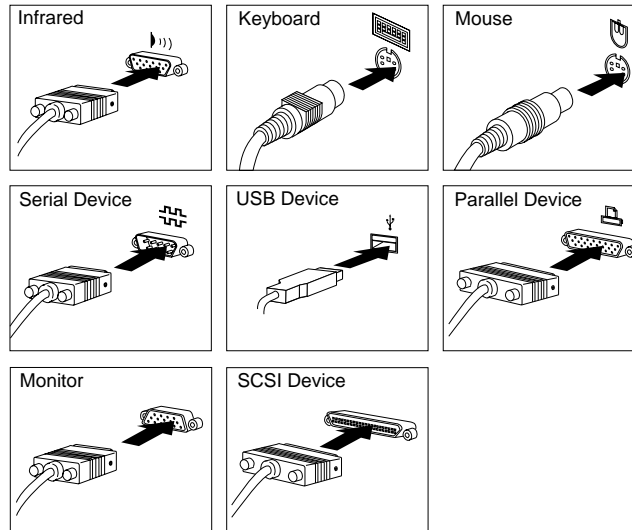
5. If you have a modem or fax machine attached to the server, reconnect the telephone line to the wall outlet and the server.

   Note: If you are in the United Kingdom and reassembling your server, you must reconnect the telephone line *after* you plug in the power cords.
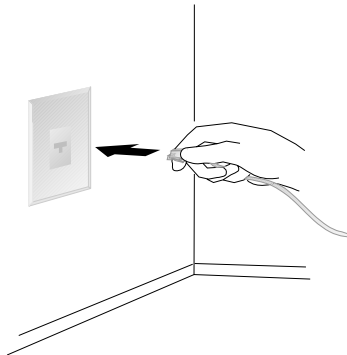
Completing the Installation

What to do next? ─────────────────

When you have completed installing the cover and cables:

- If you do not have any external devices to install, go to "Updating the Server Configuration" on page 119.

- If you have external devices to install, go to "Connecting External Options" on page 117.

Connecting External Options

To connect external options (SCSI drives, printers, modems, and other serial and parallel devices), see 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 External SCSI Devices

The SCSI adapter that comes with your server can support a maximum of 15 devices. If your server has five internal SCSI devices, the controller can support up to ten external devices.

If you plan to install both internal and external SCSI devices, you must follow the instructions given in "Working with Internal Drives" on page 77 in addition to the instructions in this section. Read "Working with Internal Drives" on page 77, and then return here.

You must set a unique SCSI ID for each external SCSI device so that the controller can identify it. The controller can then ensure that different devices do not attempt to transfer data at the same time. Therefore, do not set the SCSI IDs for external devices to the same values you used for internal devices.

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 PC Server 315, 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.

Adding External Options

To add an external option:

1. Turn off the server and all attached devices.

2. Follow the instructions that come with the option to connect it to the server.
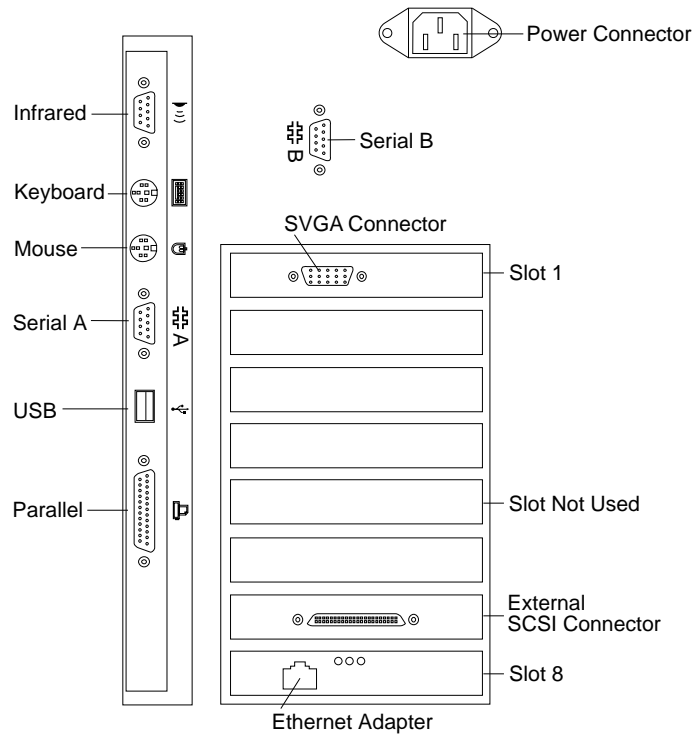
What to do next

- Device drivers to install? See the instructions that come with the option to determine if device drivers are required, and, if so, how to install them.

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

Updating the Server Configuration

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. You might need to install device drivers (required only if the option has a device driver). Refer to the documentation that comes with your option for information about installing any required device drivers.

Notes:

1. If you remove a SCSI device, the server might not recognize any SCSI devices that are still connected. See Chapter 4, "Solving Problems" on page 121 for information about correcting this situation.

2. When a hard disk drive is added and you want to include it in your startup sequence, use the **Start Options** selection of the Configuration/Setup utility program.

Record the new configuration information on the device-record forms in Appendix C, "Server Records" on page 203.

Chapter 4. Solving Problems

This chapter contains information to help you solve some of the simpler problems that you might have with your IBM PC Server 315. For more complex technical problems, see Chapter 5, "Getting Help, Service, and Information" on page 183.

System problems can be caused by the hardware, the software, or a user error. (An example of a user error is pressing the wrong key.)

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

This chapter contains:

Getting Started

If you are not familiar with the diagnostic tools, continue reading the following sections. If you are familiar with these topics, select the appropriate instructions from the list below:

- To interpret an error message (for example, you have a **162** on the screen), go to "Error Messages" on page 140.

- For more information about a hardware failure (for example, keys on the keyboard not working) or a screen prompt, go to "Troubleshooting" on page 161.

Diagnostic Tools Overview

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

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

Power-On Self-Test (POST)

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

POST does the following:

- Checks some basic system-board operations
- Checks the memory operation
- Compares the current system configuration with the stored system configuration information
- Starts the video operation
- Verifies that the diskette drive is working
- Verifies that the hard disk drive is working

While the memory is being tested, the amount of available memory and the KB OK message appear on the screen. These numbers

advance as the system progresses through POST. If POST finishes without detecting any problems, a single beep sounds and the first screen of your operating system or application program appears.

If POST detects a problem, you hear beeps and an error message appears on your screen. A single problem might 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 you turn on the system.

Test Programs

The PC Server 315 System Board Diagnostic diskette is the primary method of testing the system board, memory, disk drives, and many other options that you can install in the PC Server 315.

You can use the programs to test the system and some external devices. The amount of time required to test all components depends on the number of components. The more optional adapters and devices that you have attached to your system, the longer the testing takes.

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 correctly.

The programs on the PC Server 315 System Board Diagnostic diskette include:

- Diagnostic Tests

  These tests identify most problems associated with the major components of your system: the system board; RAM; hard disk, diskette, and CD-ROM drives; serial and parallel ports; the video adapter; and the keyboard and mouse.

  You can run groups of tests, specify test parameters (for example, video modes, port addresses, and so on), specify the number of passes you want to run (one through continuous), log test results to a file, and save test settings for future use.

  You can also use the test programs to view the server's configuration information. For example, you can view the interrupt request (IRQ) and direct memory access (DMA) assignments, memory usage, device drivers, and so on.

- Utility Programs

  The utility programs include a text editor and a diskette formatter.

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 appear on the screen can be text, numeric, or both.

Messages generated by your software generally are text messages, but they also can be alphanumeric. Basically, there are four types of error messages. These include POST error messages, POST beep codes, diagnostic error messages, and software-generated messages.

POST Error Messages

POST error messages appear when, during startup, POST finds problems with the hardware or detects a change in the hardware configuration. A list of these error messages is given in the "POST Error Message Table" on page 141.

POST Beep Codes

POST generates beeping sounds 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 on beep codes, see "Beep Codes" on page 171.

Diagnostic Error Messages

Diagnostic error messages appear when a test program finds a problem with a hardware option. Normally, these messages are text, but they can be alphanumeric. The test programs will generate one of the following return codes:

Return Code	Description
0	The device passed its test.
1	The device failed its test.
2 or higher	The test stopped.

Software-Generated Error Messages

These messages appear if a problem or conflict is found by an application program, the operating system, or both. For an explanation of these messages, refer to the information that comes with your software package.

Troubleshooting Charts

See "Troubleshooting" on page 161 for a list of symptoms of problems (for example, a symptom might be "the mouse is not working"), along with steps to correct the problems.

Option Diskettes

An optional device or adapter might come with a diskette. Option Diskettes usually contain diagnostic files or configuration files that the system needs to recognize and activate the option.

If your optional device or adapter comes with an Option Diskette, you might need to install some configuration files or diagnostic files. See Chapter 2, "Configuring Your Server" on page 15 for instructions on installing the configuration files, or see "Installing Additional Test Programs" on page 176 for installing diagnostic files.

Testing the System

Note: You might need to install a wrap connector on your active parallel port to obtain accurate parallel-port test results. If you do not have a wrap connector, contact your IBM reseller or IBM marketing representative.

This section includes procedures for starting and stopping the diagnostic programs. This section also describes how to navigate through the test programs. These programs are designed specifically to test the IBM PC Server 315.

Using the PC Server 315 System Board Diagnostic Diskette

All systems programs are located on a Diagnostic Diskette that come with your server. Be sure to make a backup copy of the Diagnostic Diskette onto another diskette.

Store the original Diagnostic Diskette in a safe place, and use the backup copy of the system diskettes when configuring and troubleshooting your server.

To start the diagnostic programs:

1. Insert the backup copy of the PC Server 315 System Board Diagnostic diskette into the diskette drive.

2. Turn on the server. Or, if the server is turned on already, press **Ctrl**+**Alt**+**Del**.

   The server begins POST. If a power-on or administrator password is set, the server prompts you for it.

   Note: If an administrator password is set, you *must* enter it to use the PC Server 315 System Board Diagnostic diskette.

3. After a few moments, the Main Menu appears. Follow the instructions on the screen.

If the server stops during testing and you cannot continue, have the system serviced.

If the diagnostic programs do not find a problem, see "Troubleshooting" on page 161 and look for the problem symptom.

Using the Main Menu

The Main Menu, the starting point for the diagnostic tests, contains the following choices:

- **Diagnostics**: When you select this choice from the Main Menu, the Diagnostics Menu appears. The Diagnostics Menu contains the following selections:

  – **Quick Check** automatically checks the hardware configuration and builds a group of tests based on the

configuration check. The diagnostic program then runs the tests for each of the devices or modules found during the configuration check. Upon completion of the Quick Check, you are prompted to: `Press any key to continue.` Pressing any key then returns you to the Diagnostics Menu.

– **Module Tests** allow you to more rigorously test an individual module (or device such as a diskette drive) or specify a group of tests for several modules. In addition, you can specify how many times to run an individual test and how the test program should note and log any errors that it finds. See "Using the Module Tests" on page 135 for more information about running the module tests.

– **Options** allow you to set or change defaults that affect the reporting, error logging, and presentation of the error information. For more information about the options available, see "Test Options" on page 137.

• **System Info**: When you select this choice from the Main Menu, the System Info Menu appears. The System Info Menu allows you to view the server's hardware and software configuration information. For example, you can view the IRQ and DMA assignments, memory usage, address and attribute information for device drivers, and so on.

• **Reports**: When you select this choice from the Main Menu, the Reports Menu appears. The Reports Menu allows you to print the system information.

• **Utilities**: When you select this choice from the Main Menu, the Utilities Menu appears. The Utilities Menu provides access to additional programs on the PC Server 315 System Board Diagnostic diskette. These utility programs include: RAM Chip Locator, File Editor, Format Diskette, and Hard Disk Utilities. For more information about the File Editor, see "Using the File Editor" on page 178.

• **Exit**: Select this choice to exit from the PC Server 315 System Board Diagnostic diskette.

Program Navigation

You can maneuver within the test programs by typing the first letter of a menu choice, using the function keys, or using command-line options.

Using the Function Keys

You can use the following keys to maneuver within the test programs:

Enter	Selects an item, runs the test module, or runs the test.
Down Arrow (↓)	Moves the cursor down.
Up Arrow (↑)	Moves the cursor up.
F1	Displays the appropriate Help information. Use the Up Arrow (↑) or Down Arrow (↓) key to scroll through the information. Press F1 from within a Help screen to provide a help index from which you can select categories. Press Esc to exit from Help and return to your previous location within the test programs.
Esc	Returns to the previous menu.
Tab	Moves the highlight bar (or cursor) to the test group (or moves to parameters).
Spacebar	Toggles modules on or off (or toggles tests on or off).
F2	Displays current test results log.

F10	Displays the Local Menu when the Module Tests Menu is displayed or from individual Test Group test screens. Local Menu includes the following selections:

- Test Options serves as a shortcut to accessing and changing the test options without having to back up through menus.

- Single Test moves from the Module Test Menu to the relevant Test Group window for test selection.

- Next and Previous LUN changes from one Logical Unit Number (LUN) or device to another (for example, HD1 to HD2, or Base Memory to Extended Memory).

+	Displays next logical unit number (only used in the Test Module menu and Test Group screens).
−	Displays previous logical unit number (only used in the Test Module menu and Test Group screens).

Using the Runtime Options

The following Runtime Options allow you to define specific conditions for running the diagnostic programs at startup time.

To include the Runtime Options, you must edit the AUTOEXEC.BAT file on the PC Server 315 System Board Diagnostic diskette and add the desired option after the entry **QAPRO.EXE /XXX** (where **/XXX** represents one of the following from the list below).

/B&W	The /B&W option forces the program to load in black and white (monochrome) mode.
/LOG=*file*	The /LOG=*file* option directs the test programs to start using a specified Error Log file.

Testing the System

/INT10	The **/INT10** option forces the test programs to use the Basic Input/Output System (BIOS) for screen writes.
/OXXX	The **/O**XXX option, where XXX=test group (for example, MBD/MEM/VID/FDU /KBD/COM/LPT, and so on), omits the designated test group from testing. (See **/I**XXX for a list of valid test groups.)
/OALL	The **/OALL** option omits all test groups from testing. (See **/I**XXX for more information.)
/IXXX	The **/I**XXX option, where XXX=test group, includes the designated test group. When used in conjunction with the /**OALL** option, you can specify the tests that you want to include. These options are helpful if you have insufficient memory available to load all of the test programs simultaneously, or if you want to test specific test groups.

The valid test groups are:

LPT   Parallel port
COM   Serial ports
FDU   Diskette drive
VID   Video
MBD   System board
KBD   Keyboard
PDV   Pointing device or mouse
MEM   Memory
SCU   SCSI
CDR   CD-ROM
SYS   System information/Utilities

You can include this option multiple times. For example, to run the keyboard, SCSI, and CD-ROM test groups, type:
`QAPRO.EXE /OALL /IKBD /ISCU /ICDR`

/USRCONFIG=_file_ The **/USERCONFIG=**_file_ option tells the test programs to look for a user diagnostic configuration file other than the default USERDIAG.CFG.

/SCRIPT=_file_**[,R]** The **/SCRIPT=**_file_**[,R]** option with the **[,R]** runs the selected script.

Note: You can use a "–" instead of a "/" as the command line switch.

Intruder Alert

When you run the diagnostic programs, Intruder Alert checks for damage to the PC Server 315 System Board Diagnostic diskette. If a virus or program alteration is detected, the diagnostic programs do not load.

To suspend Intruder Alert and continue loading the diagnostic programs, press **Esc**.
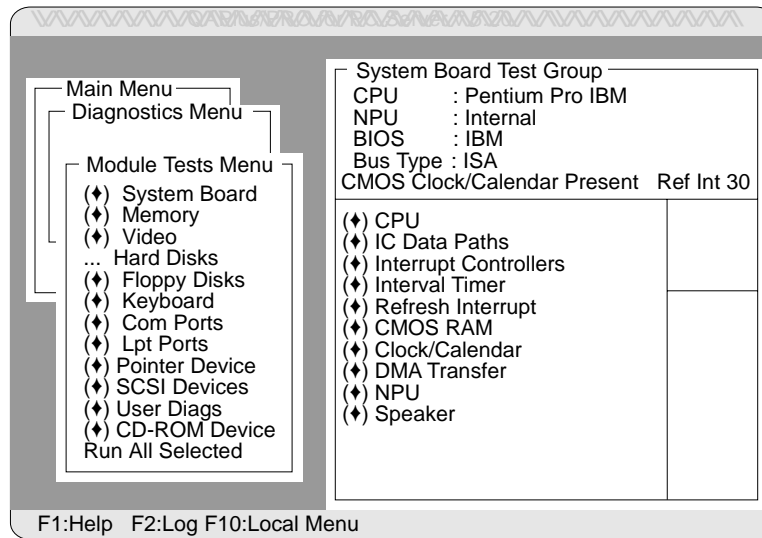
The Test Group Window

When you select Quick Tests or Module Tests from the Diagnostic Menu, a Test Group window appears. (For Module Tests, if you press Tab, the window expands to a full screen.) The Test Group window shows the attributes, parameters, and selected tests of the corresponding Test Group. The diamond "♦" mark indicates a module or device selected for testing.

Test Group Specifications

In the upper portion of the Test Group window are the specifications for the related test group.

The following illustration is an example of the Test Group Window when the System Board is selected from the Module Tests Menu.

```
┌─────────────────────────────────────────────────────────────┐
│ \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/    │
│ ┌──────────────────────┐ ┌─ System Board Test Group ──────┐ │
│ │ ┌─── Main Menu ────┐  │ │  CPU      : Pentium Pro IBM    │ │
│ │ ┌── Diagnostics Menu ─┐│ │  NPU      : Internal          │ │
│ │ │                     ││ │  BIOS     : IBM               │ │
│ │ │ ┌── Module Tests Menu ──┐ Bus Type : ISA              │ │
│ │ │ │ (♦) System Board     │ CMOS Clock/Calendar Present  Ref Int 30 │
│ │ │ │ (♦) Memory           │ ┌────────────────────┬──────┐│
│ │ │ │ (♦) Video            │ │(♦) CPU             │      ││
│ │ │ │ ... Hard Disks       │ │(♦) IC Data Paths   │      ││
│ │ │ │ (♦) Floppy Disks     │ │(♦) Interrupt Controllers  ││
│ │ │ │ (♦) Keyboard         │ │(♦) Interval Timer  │      ││
│ │ │ │ (♦) Com Ports        │ │(♦) Refresh Interrupt      ││
│ │ │ │ (♦) Lpt Ports        │ │(♦) CMOS RAM        │      ││
│ │ │ │ (♦) Pointer Device   │ │(♦) Clock/Calendar  │      ││
│ │ │ │ (♦) SCSI Devices     │ │(♦) DMA Transfer    │      ││
│ │ │ │ (♦) User Diags       │ │(♦) NPU             │      ││
│ │ │ │ (♦) CD-ROM Device    │ │(♦) Speaker         │      ││
│ │ │ │ Run All Selected     │ │                    │      ││
│ │ │ └──────────────────────┘ └────────────────────┴──────┘│
│ └──────────────────────┘ └────────────────────────────────┘ │
│ ┌──────────────────────────────────────────────────────────┐│
│ │ F1:Help   F2:Log F10:Local Menu                          ││
│ └──────────────────────────────────────────────────────────┘│
└─────────────────────────────────────────────────────────────┘
```

Using the Module Tests

To start the Module Tests:

1. Start the diagnostic programs. If you do not know how to do this, see "Using the PC Server 315 System Board Diagnostic Diskette" on page 128.

2. Select **Diagnostic** from the Main Menu, then press **Enter**.

3. Select **Module Tests**, then press **Enter**. Use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar from one selection to the next within the Module Tests menu.

4. To select or deselect a test, use the Spacebar (the Spacebar toggles your selection on or off). When you have selected a test, a diamond (♦) appears next to the selection.

   Attention: An asterisk (*) directly adjacent to an item indicates that running that test might damage your data. Make sure to back up all of your data *before* running the tests.

5. If you want to run all of the selected tests, you can do so by moving the highlight bar to the last choice, **Run All Selected Modules**, then pressing **Enter**. If you want to run each test, one at a time, press **Enter** at the highlight bar of the desired selection.

6. When you are done, press **Esc** to return to the Test Group window.

Note: As you move the highlight bar up or down the selection menu, the Test Group window to the right changes to correspond to the highlighted module.

Changing Selected Tests in Test Groups

To add or remove a test from a Test Group:

1. In the Module Tests Menu, use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar to your selection.

2. Press **Tab** to move into the expanded Test Group window.

3. Move the highlight bar to the test you want to select or deselect.

4. Press the Spacebar at the highlighted test to toggle between select (indicated by a diamond ("♦") and deselect.

   Attention: An asterisk (*) directly adjacent to an item indicates that running that test might damage your data. Make sure to back up all of your data *before* running the tests.

5. Press **Enter**.

Creating Test Scripts

Scripting allows you to select specific groups of tests, testing parameters, and options. You can then save your selections for later use as a test *script*.

To create a test script:

1. Select **Diagnostics** from the Main Menu; then press **Enter**.

2. Select **Module Tests**; then press **Enter**.

3. Select the test groups and specific tests.

4. Select **Save Script** (the last item on the Options Menu).

5. Type in a file name. The test program automatically adds the extension "QA."

6. To load and run the test program with this test setting, type QAPRO /SCRIPT-*Filename*,R and then, press **Enter**.

   Note: Adding the ",R" runs the tests listed in the named test script. If this is omitted, the diagnostic program loads only the program with the test settings as previously saved in the chosen script file.

Test Options

Each option that appears on the Options Menu is briefly described below.

- **Halt on Error**: The default is **No**. If you select **Yes**, you can resume testing after a halt by pressing any key. If you select **No**, any error detected is logged (only if you enabled the Test Log) and the program continues testing without halting.

- **Beep on Error**: The default is **No**. If you select **Yes**, a beep sounds whenever the test program detects an error.

- **Lap Count**: This option allows you to set the number of times to run each group of tests. The default setting is 1. You can enter a number from 0 to 9999. The looping is controlled on a block basis, not on an individual test basis. Therefore, if you select tests A, B, and C and the Lap Count is set to 3, the test sequence is ABC/ABC/ABC.

- **Pause Control**: You can choose to have the test programs pause between test modules and wait for you to press any key to continue. Also, you can choose to have the test program wait for a user response to indicate if the video tests pass. The default setting is **Pause Between**. The available choices are **Pause Between** and **No Pause**. If you choose **No Pause**, the test programs continue testing without a pause from one video test to the next, and from one test module to the next.

- **Test Log**: Allows you to select whether or not to do logging. You can select one of the following five choices:

  - No Logging
  - COM1
  - LPT1
  - ASCII
  - .DBF

  No Logging is the only selection that turns off Test Log. The other four selections enable Test Logging.

When Test Log starts, the test programs create a log with the following information:

- – The date and time the log was opened
- – The start and end times of each module tested and for each test selected for that module
- – The results of testing
- – The date and time the log was closed

Disabling the Test Log writes the date and time to the Test Log along with a message that the log was closed. Any Test Log is automatically closed when the program finishes.

If you enable Test Log, the hardware configuration is automatically entered at the beginning of the log.

If you select **ASCII File**, the test programs prompt you to type in the name of the Test Log file. The test programs automatically assign the extension **.LOG** to the file if you do not specify a file-name extension. The file is stored in ASCII text format. You can then examine the file with most word processors and text editors at a later time.

If you select **.DBF File**, the test programs prompt you to fill in the information on an Open DBF File screen. This creates a new file or opens an existing data base compatible file to insert new information on the current test machine. The Machine Type, Serial Number, and Work Center lines identify the system that is being tested.

- – **Test Log Mode**: This choice determines the amount of data to be logged after you select COM1, LPT1, ASCII, or .DBF. The available options are LogAll or LogFail. LogAll logs all test information. LogFail logs only failures.

- – **Log Message Queue**: Pressing F2 allows you to examine the test results to date through a Log Message Queue. This information is generated whether or not you select a Test Log. It does not, however, allow you to examine previous Test Logs.

- **Save Script**:
   See "Creating Test Scripts" on page 136 for a more detailed description of scripting.

Option Diskettes

Some optional devices, such as adapters, come with an Option Diskette. Option Diskettes usually contain device drives and test programs for the device. If the optional devices come with an Option Diskette, be sure to read the documentation and follow any instructions provided. Different instructions apply depending on whether the option diskette is startable or not startable.

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 these error messages should be performed by a trained service technician.

Types of Messages

System problems can result in two types of error messages:

- POST error messages appear when, during startup, POST finds problems with the hardware or detects a change in the hardware configuration.

- Diagnostic error messages appear when the diagnostic program finds a problem with hardware.

Messages generated by your software generally are text messages, but they also can be numeric. Information about these messages is not included in this handbook. For information about these error messages, refer to the documentation that comes with your software.

Multiple Messages

Sometimes the first error to occur causes additional errors. In this case, the system displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

POST Error Message Table

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

Notes:

1. The actions for some of the messages require you to start the Configuration/Setup utility program. (For instructions, see Chapter 2, "Configuring Your Server" on page 15.)

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

POST Message	Description
101 102 103 104 105 106 107 108 109	A failure occurred during testing of the system board and microprocessor. *Action:* Have the system serviced.
110	A memory error occurred during testing of the system board. *Action:* Run the diagnostic tests to verify that a problem exists in the memory-module kits. See the system memory table in "Standard and Optional Memory-Module Configurations" on page 69 to see if you can reconfigure (swap) your system memory. This might aid in identifying the defective memory module. If you cannot identify the defective memory module in this way, have the system serviced.
111 112 113	An input/output (I/O) channel check occurred during testing of the system board and memory. This failure is generally caused by an adapter. *Action:* Have the system serviced.
114	An adapter read-only memory (ROM) error occurred. *Action:* Remove the options. If you can start the system without the option installed, reinstall each option and retest. When an option fails, replace it. If a problem still exists, have the system serviced.

Error Messages

POST Message	Description
115	A DMA error occurred.
	Action: Have the system serviced.
116	A system-board port read/write error occurred.
	Action: Have the system serviced.
120	A microprocessor error occurred.
	Action: Have the system serviced.
121	A hardware error occurred.
	Action: Have the system serviced.
129	An internal cache error occurred.
	Action: Have the system serviced.
151	A failure occurred during the testing of the real-time clock.
	Action: Run the diagnostic programs to get more information.
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.**
	Action: Until you replace the battery, the server can be used. However, you must run the Configuration/Setup utility program and set the time and date each time that you turn on the server. (See Appendix B, "Changing the Battery" on page 199 for additional instructions.)

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.
	• An invalid checksum is detected in the battery-backed memory.
	Action: Verify that all external devices are turned on. External devices must be turned on before the server is turned on.
	If you did not add, remove, or change the location of a device, a device is probably failing. Running the diagnostic programs might isolate the failing device, but you must have the system serviced.
163	The clock is not working correctly.
	Action: Set the correct date and time. If the date and time are set correctly and saved and the 163 error message reappears, replace the battery.
	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.

POST Message	Description
164	A change in the memory configuration occurred. This error can be caused by adding memory, removing memory, or incorrectly installing memory.
	Note: The server can be used with decreased memory capacity.
	Action:
	1. If you have newly installed memory, see "Standard and Optional Memory-Module Configurations" on page 69 to verify that the new memory is correct for your server and that the memory module configuration matches one of the configurations shown in the system memory table.
	2. Running the diagnostic tests might isolate the location of the problem memory-module kit and provide additional information.
	3. If the system diagnostic tests fail, have the system serviced.
175	A hardware error occurred.
	Action: Have the system serviced.
176	The server cover has been removed.
177 178	A hardware error occurred.
	Action: Have the system serviced.
183	An administrator password is set and must be entered.
	Action: Enter the administrator password.
	Attention: You have only three tries to enter the password correctly. After three attempts, turn off your server. Wait at least five seconds; then turn it on. You have three more tries to enter the password. If you cannot enter the correct password, follow the instructions in "Removing a Password" on page 108; then, set a new administrator password as described in "Setting an Administrator Password" on page 24.
184	The power-on password information stored in your server was removed.
	Action: To restore this information, use the Configuration/Setup utility program. Select **System Security**; then, follow the instructions on the screen. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15. If this information cannot be restored, have the system serviced.

POST Message	Description
185	A power failure damaged the stored information about the drive-startup sequence.
	Action: From the Configuration/Setup utility program Main Menu, select **Start Options**. Then, follow the instructions on the screen. For more information about using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.
186	A system board or security hardware error occurred.
	Action: Have the system serviced.
189	An attempt has been made to access the server with invalid passwords.
20X	A failure occurred during testing of the memory. This error can be caused by incorrectly installed memory, a failing memory-module kit, or a system-board failure.
	Action:
	1. If you just installed memory, see "Working with Memory-Module Kits" on page 68 to verify that the new memory is correct for your system, that it is installed correctly, and that the memory module configuration matches one of the configurations shown in the system memory table.
	2. Run the diagnostic tests to verify the problem.
	If the system diagnostic tests fail, have the system serviced.

Error Messages

POST Message	Description

301
302
303
304
305
	A failure occurred during testing of the keyboard and keyboard controller. 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 connected correctly to the keyboard and to the correct connector on the server.
	
	Note: If you have just connected a new mouse or other pointing device, turn the server off and disconnect that device. Wait at least 5 seconds, and then turn on the server. If the error message goes away, replace the device.
	
	Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced. If the error message remains, have the keyboard and cable or the 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. *Action:* The server can be used, but one or more diskette drives might not work. Running the diagnostic tests can isolate the diskette drive that failed, but you must have your system serviced.
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 in working condition.

604	A failure occurred during the testing of a diskette drive.
	
	Action:
	
	  1. Verify that the configuration information in the Configuration/Setup utility program correctly reflects the type of diskette drive that you have installed.
	  2. Run the diagnostic programs.
	  3. If the diagnostic programs fail, replace the diskette drive.

POST Message	Description
662	A diskette drive configuration error occurred. *Action:* If you removed a diskette drive, make sure that the diskette drive setting is correct in the Configuration/Setup utility program. If the setting is not correct, change the setting. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.
962	A parallel-port configuration error occurred. *Action:* If you changed a hardware option, make sure the parallel port setting is correct in the Configuration/Setup utility program. If the setting is not correct, change the setting. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.
11XX	A failure occurred during testing of the system-board serial port. *Action:* If you have a modem, serial printer, or other serial device attached to your server, verify that the serial cable is connected correctly. If it is, use the following procedure: 1. Turn off the server. 2. Disconnect the serial cable from the serial port. 3. Turn on the server. If the POST error message does not reappear, either the serial cable or the device is probably failing. (See the documentation that comes with the serial device for additional testing information.) If the POST error message reappears, have the system serviced.
1162	A serial port configuration error occurred. *Action:* If you changed a hardware option, make sure the serial port setting is correct in the Configuration/Setup utility program. If the setting is not correct, change the setting. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.

Error Messages

POST Message	Description

1762	A hard disk drive configuration error occurred.
	
	Action:
	
	  1. Make sure that the cables are securely attached to all drives.
	
	  2. Make sure that the settings for the drive options are correct in the Configuration/Setup utility program. If the settings are not correct, change them. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.

178X	A failure occurred during testing of the hard disk drive. *Action:* Run the system diagnostic tests.

1800	A PCI adapter has requested a hardware interrupt that is not available.
	
	Action:
	
	  1. Make sure that the settings for the PCI Adapter and any ISA legacy adapters are correct in the Configuration/Setup utility program. If the interrupt resources settings are not correct, change the settings. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.
	
	  2. If all interrupts are being used by ISA legacy adapters, you might need to remove one to make an interrupt available to the PCI adapter. For instructions on removing adapters, see "Removing Adapters" on page 61.

POST Message	Description
1801	A PCI adapter has requested memory resources that are not available.
	Action:
	1. Make sure that the setting for any PCI adapter and any ISA legacy adapters are correct in the Configuration/Setup utility program. If the memory resources settings are not correct, change the settings. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.
	2. If all memory resources are being used by ISA legacy adapters, you might need to remove one to make memory available to the PCI adapter. For instructions on removing adapters, see "Removing Adapters" on page 61.
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 the setting for any PCI adapter and any ISA legacy adapters are correct in the Configuration/Setup utility program.
	2. If the I/O port resources settings are correct, the PCI adapter might be defective. Have the system serviced.
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 the settings for any ISA legacy adapters are correct in the Configuration/Setup utility program. If the memory resources settings are not correct, change the settings. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15.
	2. If the memory resources settings are correct, the PCI adapter might be defective. Have the system serviced.

Error Messages

POST Message	Description
1804	A PCI adapter has requested a memory address that is not available. *Action:* 1. Make sure that the setting for any ISA legacy adapters are correct in the Configuration/Setup utility program. If the memory resources settings are not correct, change the settings. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15. 2. If all memory addresses are being used by ISA legacy adapters, you might need to remove one to make memory addresses available to the PCI adapter. For instructions on removing adapters, see "Removing Adapters" on page 61.
1805	A PCI adapter ROM error occurred. *Action:* Remove the PCI adapter. If you can start the system without the adapter, reinstall each adapter and retest. When an adapter fails, replace it. If a problem still exists, 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 the settings for all ISA legacy adapters are correct in the configuration programs program. If the hardware interrupt settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to **Not available** enables the Plug and Play function to configure around the legacy adapters.

   For background information on PCI, ISA, Plug and Play, and legacy (non-Plug and Play) adapters, refer to the *User's Reference*. For information about required interrupt resource settings for ISA legacy adapters, refer to the documentation that comes with these adapters. For instructions on using the configuration programs, see "Starting the Configuration/Setup Utility Program" on page 19.

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 Plug and Play adapter you want to install. For instructions on removing adapters, see "Removing Adapters" on page 61.

   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 you want to install.

If a problem still exists, have the system serviced.

Error Messages

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

Action:

1. Make sure that the setting for all ISA legacy adapters are correct in the configuration programs program. If the memory resource settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to **Not available** enables the Plug and Play function to configure around the legacy adapters.

   For background information on PCI, ISA, Plug and Play, and legacy (non-Plug and Play) adapters, refer to the *User's Reference.* For information about required memory resource settings for ISA legacy adapters, refer to the documentation that comes with these adapters. For instructions on using the configuration programs program, see "Starting the Configuration/Setup Utility Program" on page 19.

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 memory resources are being used by ISA legacy adapters, you might need to remove an ISA legacy adapter to make memory available to the Plug and Play adapter you want to install. For instructions on removing adapters, see "Removing Adapters" on page 61.

   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 you want to install.

If a problem still exists, 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 the settings for all ISA legacy adapters are correct in the configuration programs program. If the I/O address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to **Not available** enables the Plug and Play function to configure around the legacy adapters.

   For background information on PCI, ISA, Plug and Play, and legacy (non-Plug and Play) adapters, refer to the *User's Reference*. For information about required I/O resource settings for ISA legacy adapters, refer to the documentation that comes with these adapters. For instructions on using the configuration programs program, see "Starting the Configuration/Setup Utility Program" on page 19.

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 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 you want to install. For instructions on removing adapters, see "Removing Adapters" on page 61.

   If you remove an ISA legacy adapter, set the I/O 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 an I/O address available to the Plug and Play adapter you want to install.

If a problem still exists, have the system serviced.

Error Messages

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 the settings for all ISA legacy adapters are correct in the configuration programs program. If the memory address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to **Not available** enables the Plug and Play function to configure around the legacy adapters.

   For background information on PCI, ISA, Plug and Play, and legacy (non-Plug and Play) adapters, refer to the *User's Reference*. For information about required memory resource settings for ISA legacy adapters, refer to the documentation that comes with these adapters. For instructions on using the configuration programs program, see "Starting the Configuration/Setup Utility Program" on page 19.

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 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 you want to install. For instructions on removing adapters, see "Removing Adapters" on page 61.

   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 a memory address available to the Plug and Play adapter you want to install.

If a problem still exists, have the server serviced.

POST Message	Description
1854	A Plug and Play adapter has requested a memory address that is not available.

Action:

1. Make sure that the settings for all ISA legacy adapters are correct in the configuration programs program. If the memory address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to **Not available** enables the Plug and Play function to configure around the legacy adapters.

   For background information on PCI, ISA, Plug and Play, and legacy (non-Plug and Play) adapters, refer to the *User's Reference*. For information about required memory resource settings for ISA legacy adapters, refer to the documentation that comes with these adapters. For instructions on using the configuration programs program, see "Starting the Configuration/Setup Utility Program" on page 19.

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 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 you want to install. For instructions on removing adapters, see "Removing Adapters" on page 61.

   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 a memory address available to the Plug and Play adapter you want to install.

If a problem still exists, have the server serviced.

Error Messages

POST Message	Description
1855	A Plug and Play adapter read-only memory (ROM) error occurred.
	Action: Remove all of the Plug and Play adapters that are not required for system startup and reinstall them one at a time, retesting after each is reinstalled. When an adapter fails, replace it.
	If a problem still exists, 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 the settings for all ISA legacy adapters are correct in the configuration programs program. If the DMA address settings are not correct, change and save the settings. Setting the resources used by ISA legacy adapters to **Not available** enables the Plug and Play function to configure around the legacy adapters.

   For background information on PCI, ISA, Plug and Play, and legacy (non-Plug and Play) adapters, refer to the *User's Reference*. For information about required DMA resource settings for ISA legacy adapters, refer to the documentation that comes with these adapters. For instructions on using the configuration programs program, see "Starting the Configuration/Setup Utility Program" on page 19.

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 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 instructions on removing adapters, see "Removing Adapters" on page 61.

   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 a DMA address available to the Plug and Play adapter that you want to install.

If a problem still exists, have the system serviced.

Error Messages

POST Message	Description
1962	A startup sequence error occurred. *Action:* 1. Make sure that the adapter card option is set correctly in the Configuration/Setup utility program. If the setting is not correct, change the setting. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15. 2. Make sure that all adapters are installed correctly. For instructions on installing adapters, see "Installing Adapters" on page 57.
2401	A failure occurred during testing of the video controller. This error can be caused by a failing monitor, a failing system board, or a failing video adapter. *Action:* Verify that the monitor is connected correctly to the video port. If so, have the system serviced.
2462	A video configuration error occurred. *Action:* 1. Make sure that the monitor cables are correctly and securely connected to the system. 2. If you just added or removed video memory, use the Configuration/Setup utility program to make sure that the settings in **Video Setup** are correct. If the settings are not correct, change the settings. For instructions on using the Configuration/Setup utility program, see Chapter 2, "Configuring Your Server" on page 15. 3. If the error recurs, you might need to replace the video memory module. 4. If the error persists, have the system serviced.

POST Message	Description
8601 8602 8603	A failure occurred during testing of the pointing device (mouse) and pointing-device controller. *Note:* An 8603 error can be caused by the addition or removal of a mouse. This error can be caused by the pointing device or by a failing system board. This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the server for at least 5 seconds, and then turn it back on. *Action:* Ensure that the keyboard and pointing device are attached to the correct connectors. If they are connected correctly, use the following procedure: 1. Turn off the server. 2. Disconnect the pointing device from the server. 3. Turn on the server. If the POST error message does not reappear, the pointing device is probably failing. (See the documentation that comes with the pointing device for additional testing information.) If the problem remains, have the pointing device serviced. If the POST error message reappears, run the diagnostic tests to isolate the failure. If the diagnostic tests do not find a problem and the POST error message remains, have the system serviced.
I9990301	A hard disk failure occurred. *Action:* Have the system serviced.
I9990305	An operating system could not be found. *Action:* Run diagnostic tests to verify that the hard disk is functioning correctly. If there is a problem with the hard disk drive (such as a bad sector), you might have to reinstall the operating system. If you cannot reinstall the operating system, have the system serviced.
Other Numbers	The server POST found an error. *Action:* Follow the instructions on the screen.

SCSI Messages

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

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

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
	• Duplicate SCSI IDs in the same SCSI chain
	• An 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 the system.
	    • The cables for all external SCSI devices are connected correctly.
	    • The last device in each SCSI chain is terminated correctly. (See "Working with Internal Drives" on page 77 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.

Troubleshooting

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

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column.

- Remove the software or device that you just added.

- Run the diagnostic test programs to determine if your server is running correctly.

- Reinstall the new software or new device.

CD-ROM Drive Problems	Action
The CD is not working properly.	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 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.
CD-ROM drive tray not working.	Be sure the server is turned on. If the system is on and the tray does not eject, insert the end of a paper clip into the manual tray release opening. If the drive still does not work correctly, have the system serviced.
CD-ROM drive not recognized.	Use the SCSISelect program to verify the SCSI ID of the CD-ROM drive (see "SCSISelect Utility Program Options" on page 33 for information on the SCSISelect utility program).

Diskette Drive Problems	Action
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.
	2. The diskette is good and not damaged. (Try another diskette if you have one.)
	3. The diskette is inserted correctly in the drive.
	4. The diskette contains the necessary files to start the system.
	5. 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 server serviced.

Monitor Self-Tests	Action
	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, refer to the information supplied with the monitor for adjusting and testing instructions.
	If you still cannot find the problem, have the monitor and server serviced.

Monitor Problems	Action
Wavy, unreadable, rolling, distorted screen, or screen jitter.	If the monitor self-tests show the monitor is OK, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.
	Notes:
	1. To avoid diskette drive read and write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).
	2. Non-IBM monitor cables might cause unpredictable problems.
	3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. See your IBM reseller or IBM marketing representative for information about the enhanced monitor cable.
	If the problem recurs, have the monitor and system serviced.
Screen flickers.	Set the monitor for the highest, noninterlaced refresh rate available.
	To reset the refresh rate, use a utility program, such as the Configuration/Setup utility program, AnyView Professional, or WinMode. For OS/2, use **Set Up Monitor** in **Easy Tools for OS/2**.
The monitor works when you turn on the system, but goes blank when you start some application programs.	Verify that the primary monitor cable is connected to the video port.
	To find the video port, see "Input/Output Connectors" on page 8.
	Be sure that you installed the necessary device drivers for the applications.

Troubleshooting

Monitor Problems	Action
Blank screen	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 monitor signal cable is connected to the correct connector on the system. If the items above are correct and the screen remains blank, have the system serviced.
Only the cursor appears.	Have the system serviced.
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.

Intermittent Problems	Action
A problem occurs only occasionally and is difficult to detect.	Verify that: 1. All cables and cords are securely connected to the rear of the system and attached options. 2. When the system is turned on, air is flowing from the rear of the system at the fan grill. If there is no air flow, the fan is not working. This causes the system to overheat and shut down. 3. The last external device in each SCSI chain is terminated correctly. (See your SCSI documentation.) If the items above are correct, have the system serviced.

Keyboard, Mouse, or Pointing-Device Problems	Action
All or some keys on the keyboard do not work.	1. Make sure the keyboard cable is properly connected to the system. 2. Make sure the system and the monitor are turned on. If the items above are correct, have the system serviced.

Keyboard, Mouse, or Pointing-Device Problems	Action
The mouse or pointing device does not work.	Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly.
	If the problem recurs, have the server and the device serviced.

Memory Problems	Action
The amount of memory displayed is less than the amount of memory installed.	Verify that:
	1. The correct type of memory module is installed.
	2. The memory modules are seated properly.
	3. If you changed the memory, you updated the memory configuration in the Configuration/Setup utility program.
	If the above items are correct, run the memory test program from the QAPlus/PRO diagnostic test program. The system might have detected a bad memory module and automatically reallocated memory to enable you to continue to operate. If the memory tests fail, have the system 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.
	3. The option is installed correctly.
	4. You have not loosened any other installed options or cables.
	5. You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.

Troubleshooting

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 items above are correct and the test programs found no problem, have the server and option serviced.
	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. All external SCSI options are turned on. External SCSI options must be turned on before the system is turned on.
	For more information, see your SCSI documentation.
	If the problem recurs, have the system serviced.

Parallel Port Problems	Action
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.
	2. The parallel-port adapter, if you installed one, is seated properly.
	If the items above are correct, have the system serviced.

Serial Port Problems	Action
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.
	2. The serial-port adapter, if you installed one, is seated properly.
	If the items above are correct, have the server 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 serial or parallel port on the system. (For the location of the serial or parallel port, see "Input/Output Connectors" on page 8.) *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. 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 server 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 you are using works on another system. If you received any error messages when using the software program, refer to the information supplied with the software for a description of the messages and solutions to the problems. If the items above are correct and the problem remains, contact your place of purchase or service technician for help.

Note: If you cannot find the problem in the troubleshooting charts, go to "Testing the System" on page 127 to test the system. If you already have run the test program, or if running the test program does not reveal the problem, have the system serviced.

Troubleshooting the 100/10 PCI Ethernet Adapter

This section provides troubleshooting information for problems that might occur when the 100/10 PCI Ethernet Adapter is installed in the server.

Network Connection Problems

If the adapter cannot connect to the network, check the following:

- Make sure 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 set the Ethernet adapter to operate at 100 Mbps, you must use Category 5 cabling.

  If you directly connect two workstations (no hub), use a crossover cable. Refer to the "Hardware Specifications and Cabling Information" section in the help file for a list of recommended cables and information on how to install cabling.

- Check the LEDs on the rear of the Ethernet adapter.

  The Ethernet adapter has three diagnostic LEDs beside the cable connector. These lights help indicate whether a problem exists with the connector, cable, or hub.

  - The LNK LED illuminates when the adapter receives a LNK pulse from the hub. If the LED is OFF, there might be a bad connector or cable, or a problem with the hub. The LNK LED is also OFF when you run the diagnostic tests in the Setup program.

- – The ACT LED illuminates when the adapter detects read or write activity on the network, even when there is no activity on the adapter. If the ACT LED is not on, make sure that the hub and network are operating and that the correct device drivers are loaded.

- – The 100 LED illuminates when a 100 Mbps connection is established.

- Make sure that you are using the correct device drivers.

- Check for operating system-specific causes for the problem.

- Test the adapter.

  Select **Test adapter** from the Main Menu on the Ethernet adapter Configuration and Drivers diskette. How you test the adapter depends on which operating system you are using (see "Configuring the 100/10 Ethernet Adapter" on page 35).

100⁄10 PCI Ethernet Adapter Troubleshooting Chart

You can use the following troubleshooting chart to find solutions to problems that have definite symptoms.

Adapter Problem	Action
The Setup program reports the adapter's interrupt as 0 or 255.	The PCI BIOS is not configuring the adapter correctly.
The Setup program reports *No PCI Bus.*	The PCI BIOS is not configuring the adapter correctly.
Server stops running when loading device drivers	Change the PCI BIOS interrupt settings.
LNK LED does not light	Check the following: • Make sure you have loaded the network device drivers. • Check all connections at the adapter and the hub. • Use another port on the hub. • If you forced the duplex mode, make sure that you also force the speed to either 10 or 100. • Make sure that the hub port is configured for the correct speed (10 Mbps or 100 Mbps). • If you manually configured the duplex mode, make sure that you manually configure the speed also. See "Installing Multiple Adapters" on page 36 for more information.
The ACT LED does not light.	Check the following: • Make sure that you have loaded the network device drivers. • The network might be idle. Try sending data from this server. • Use another Ethernet adapter.
Data is corrupted or sporadic.	Make sure that you are using Category 5 cabling when operating at 100 Mbps.
The Ethernet adapter stopped working when another adapter was added to the server.	Check the following: • Make sure that the cable is connected to the Ethernet adapter. • Make sure that your PCI system BIOS is current. • Reseat the adapter.

Adapter Problem	Action
The adapter stopped working without apparent cause.	Check the following: • Reseat the Ethernet adapter or try a different connector. • Reinstall the device drivers. • Use a different Ethernet adapter.

Beep Codes

One beep and the appearance of text on the monitor indicates successful completion of POST. More than one beep indicates that POST detects 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 a beep code if you do not understand exactly how they work. Keeping in mind that POST error codes vary in the length of the pause, and not the duration of the beep tones, will help you to distinguish the beeps.

The following list contains more detailed descriptions of the possible types of beeps that your server might emit.

Beep Descriptions

Beep Type   Meaning

No Beeps

> If no beeps occur after your server successfully completes POST, your server might contain a defective system board, a defective speaker, or a disconnected speaker.

One Short Beep

> If this occurs after your server successfully completes POST, then POST has no configuration or functional errors to report. One beep also occurs if you enter an incorrect power-on password.

Beep Codes

Two Short Beeps

This beep combination indicates that POST encountered an error.

Three Short Beeps

This beep combination indicates a system memory error. This combination occurs only if the video BIOS cannot display the error code.

Continuous Beep

This beep type indicates that your server system board or speaker subsystem might contain a failing component.

Repeating Short Beeps

This beep combination indicates that your server system board might contain a failing component, your keyboard might be defective, or a key on the keyboard might be stuck.

One Long and One Short Beep

This beep combination indicates that POST encountered an error on a video adapter.

One Long and Two Short Beeps

This beep combination indicates that a video I/O adapter ROM is not readable, or the video subsystem is defective. If you hear this beep combination twice, both the server system board and an optional video adapter have failed. This beep combination might also indicate that your server system board contains a failing component.

One Long and Three Short Beeps

This beep combination indicates that the system board video subsystem has not detected a monitor connection to the server. Ensure that the monitor is connected to the server. If the problem recurs, have the system serviced.

Two Long and Two Short Beeps

This beep combination indicates that POST does not support the system board video subsystem. This beep combination occurs when the video subsystem is

upgraded or replaced with another that is
incompatible with your server.

Beep Code Chart

Beep Code	Description
1-1-3	CMOS write/read test 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
2-1-1	Secondary DMA register test in-progress or failure
2-1-2	Primary DMA register test in-progress or failure
2-1-3	Primary interrupt mask register test failure
2-1-4	Secondary interrupt mask register test failure
2-2-2	Keyboard controller test failure
2-3-2	Screen memory test in-progress or failure
2-3-3	Screen retrace tests in-progress or failure
2-3-4	Search for video ROM failure
2-4-1	Screen believed inoperable
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
	Action: Have the system serviced.
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
3-2-4	CMOS memory size against actual compare failure
3-3-1	Memory size mismatch occurred
	Action: Reseat the memory module and cache module. If the problem recurs, have the system serviced.

Checking the System for Damage

This section provides instructions on what to do if your system becomes 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 45 and follow the instructions for opening your system; then, reseat all adapters and memory modules.

If the system still does not work correctly, use the diagnostic program and test the system. Refer to "Testing the System" on page 127 for instructions.

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 server serviced immediately.

Installing Additional Test Programs

You can add other test programs to the PC Server 315 System Board Diagnostic diskette. These other programs are usually provided on the diskette that comes with a device. After you add the programs to the PC Server 315 System Board Diagnostic diskette, you can include information from the programs in the Test Log.

Before the test programs can find these programs to run as the User Diags test group, information about them must be included in a file called USERDIAG.CFG. This is an ASCII text file. It must include the following three items for each test to run:

- Program Name (.COM and .EXE files only)
- Test Description of the test to be run
- Command-line parameters to be passed to the program identified in the first item of this list

To ensure that the user diagnostic tests are registered properly in the QAPlus/FE test log, the tests must generate the following return (error) codes upon completion of testing:

Error Code	Meaning
0	Pass
1	Fail
2 or greater	Abort
	Abort messages from the user diagnostic program also report the Abort error code.

Notes:

1. All the information for a given test must be on a single line, and a semicolon (;) must separate the items on the line.

2. Make sure you press **Enter** at the end of each line of text in the USERDIAG.CFG file.

   This creates a carriage return line feed (CR LF) which is necessary for the User Diagnostics to be found and executed.

3. If the program executable file is in a directory other than the QA directory (or other directory you have designated to contain the

QA files), that directory must be listed in the PATH= section of
the AUTOEXEC.BAT.

4. You can use a .CFG file other than USERDIAG.CFG if you use
   the command line USRCONFIG=*filename*, when running the
   diagnostic programs. For example, you might use:
   QAPLPRO /USRCONFIG=MYTESTS.CFG.

USERDIAG.CFG Example
An example USERDIAG.CFG file might look like the following:

Program Name	Test Description	Command-Line Parameter
BBSMODEM.EXE;	9600 Baud 5 Line Modem;	5
TEST1.EXE;	Generic 1;	
TEST2.EXE;	Generic 2;	
TESTALL.EXE;	CMD 1;	1
TESTALL.EXE;	CMD 2;	2
TESTALL.EXE;	CMD 3;	3

Note: You can have more than one command-line parameter for
any given test.

When you view these tests on the Test Group window for the User
Diag test group, they appear as follows:

- (♦) 9600 Baud 5 Line Modem
- (♦) Generic 1
- (♦) Generic 2
- (♦) CMD 1
- (♦) CMD 2
- (♦) CMD 3

The diagnostic program automatically assigns a test number to each
test. The test numbers start at 201 and continue upward as needed.
The numbers are:

202 9600 Baud 5 Line Modem
203 Generic 1
204 Generic 2
205 CMD 1

206 CMD 2
207 CMD 3

Using the Utility Programs

The PC Server 315 System Board Diagnostic diskette contains utility programs for formatting diskettes and editing.

Formatting Diskettes

To format a diskette within the diagnostic programs, insert a diskette into diskette drive A or B; then, select one of the following options:

Format A: high density — 1.44 MB

Format A: low density — 720 KB

Format B: high density — 1.44 MB

Format B: low density — 720 KB

After selecting one of the above options to format a diskette, follow the instructions that appear on the screen.

Using the File Editor

The file editor allows you to modify text files. By modifying files, such as your AUTOEXEC.BAT or CONFIG.SYS files, you can improve the test system's performance and eliminate unnecessary lines of information in those files.

Note: Always make a backup copy on a self-starting diskette of the AUTOEXEC.BAT and CONFIG.SYS files *before* making any changes.

The File Editor is an ASCII text editor that uses the following function keys:

Key   **Description**

Arrows   Use the arrow keys to move the cursor to the place in the text where you want to make changes.

Home   To move the cursor to the start of the current line, press **Home** once. To move to the beginning of the current screen, press **Home** twice. To move to the beginning of the file, press **Home** three times.

End   To move the cursor to the end of the current line, press **End** once. To move the cursor to the end of the current screen, press **End** twice. To move to the end of the file, press **End** three times.

F2   To be in search mode, press **F2**. You are prompted to enter the search word or words on a reverse highlighted line at the bottom of the File Edit Screen. After typing in the search word, press **Enter**.

F3   To find the next occurrence of a search word, press **F3**.

F4   To mark the start of a block of text (if you have not previously marked it), press **F4**. If you previously marked the block of text, pressing this key unmarks the text block.

F5   To complete the block marking (that you started with F4), press **F5**. If you did not previously press F4 to start marking a block of text, F5 is ignored.

F6   To move an active (marked) block of text, first press **F6** while the cursor is within the active block. Then, move the cursor to the new location where the active block is to be moved, and press **F6** again. If there is no active block of text, F6 is ignored.

F7   To copy an active (marked) block of text to a new location, move the cursor to the new location and press **F7**. If there is no active block of text, F7 is ignored.

F8   To delete an active (marked) block of text, move the cursor within the active block and press **F8**. If there is no active text block, F8 is ignored.

F10   To save all changes and exit from the file, press **F10**.

Insert   Insert is the default text-editing mode of the File Editor. To toggle between replace and insert modes, press **Insert**.

To access the File Editor:

1. Select **File Editor** from the Utilities Menu; then, press **Enter**.

2. Insert a diskette into drive A or drive B before selecting the file you want to edit; then select the file from the Files Selection box.

3. Press **Enter**.

4. Make your changes.

5. When you are done, press **F10** to update the file with the changes you made, or press **Esc** to quit the editing process without saving the changes.

Note: Pressing F1 when inside the File Editor displays all of the keyboard functions available to you while editing.

Resolving Configuration Conflicts

The Configuration/Setup utility program configures only the system hardware. This utility program does not consider the requirements of the operating system or the application programs. For these reasons, memory-address configuration conflicts might occur.

Resolving Memory-Address Conflicts

The Configuration/Setup utility program might change the memory-address space used by some hardware options. If this happens, the new address might conflict with addresses defined for use through expanded memory specification (EMS). (EMS is used only with DOS.)

If a memory 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.

You can resolve memory-address conflicts by changing either the software or hardware configuration setup.

Changing the Software Configuration Setup

The best way to resolve memory-address conflicts is to change the software configuration by changing the addresses that the EMS device driver defined. The SVGA video memory occupies 8 KB of space in the hex C0000 to C7FFF EMS memory area. EMS device drivers must use addresses different from those assigned to video read-only memory (ROM). You can use the Configuration/Setup utility program to view or change the current setting for video ROM.

If the SVGA or EMM386 device driver is causing the memory-address conflict, refer to your DOS documentation. For conflicts caused by device drivers supplied with application programs instead of those supplied with DOS, refer to the documentation supplied with the device drivers.

Changing the Hardware Configuration Setup

An alternative way to resolve memory-address conflicts is to change the address of the conflicting hardware option.

Chapter 5. 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.pc.ibm.com/desktop/`	IBM Commercial Desktop home page
`http://www.pc.ibm.com/servers/`	IBM PC Server home page
`http://www.pc.ibm.com/options/`	IBM Options home page

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.

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 PC Server 315, see Chapter 4, "Solving Problems" on page 121.)

If you suspect a hardware problem, run the diagnostic tests and make a note of any error messages you receive. Then look up the message in Chapter 4, "Solving Problems" on page 121, and take the appropriate action.

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

Solving Problems

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

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

If you suspect a hardware problem, run the diagnostic tests and make a note of any error messages you receive. Then look up the message in the documentation and take the appropriate action.

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**.

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.pc.ibm.com/desktop/
```

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

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

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 computer and IBM monitor
- Installing and setting up IBM options purchased from IBM or an IBM reseller

- 30-day, preinstalled-operating-system support
- Arranging for service (on-site or carry-in)
- Arranging for overnight shipment of customer-replaceable parts

In addition, if you purchased an IBM PC Server, you are eligible for Server Startup 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 computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

If possible, be at your computer when you call.

These services are available 24 hours a day, 7 days a week.[1]

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

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

Getting Help Around the World

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

---

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

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

This service includes technical support for:

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

You can purchase this service on a per-call basis, as a
multiple-incident package, or as an annual contract with a
10-incident limit. For more information about purchasing Enhanced
PC Support, see "Ordering Support Line Services" on page 189.

900-Number Operating System and Hardware Support Line

In the U.S., if you prefer to obtain technical support on a pay-as-you
go basis, you can use the 900-number support line. The 900-number

support line provides support for IBM PC products that are out of the warranty period.

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

Network and Server Support Line

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

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

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

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

Ordering Support Line Services

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

- In the U.S.:

  1. Call 1-800-426-3395.
  2. Select document number 11683 for Network and Server support.
  3. Select document number 11682 for Enhanced PC support.

- In Canada, contact IBM Direct at 1-800-465-7999, or:

  1. Call 1-800-465-3299.
  2. Select the HelpWare catalog.

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

For more information or to purchase these services:

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

Appendix A. Jumpers and Switches

The jumpers and switches on the system board help you to customize the way your server operates.

Changing Jumper Positions

Your system board contains three-pin jumper blocks. You can change a jumper's position as described in "Three-Pin Jumper Blocks."

Notes:

1. For jumpers that are positioned perpendicular to the front of the server, pin 1 is on the end of the pin block nearest the front of the server.

2. For jumpers that are positioned parallel to the front of the server, pin 1 is on the end of the pin block nearest the left side of the server.

Three-Pin Jumper Blocks

With the three-pin jumper blocks, each jumper covers two of the three pins on a pin block. The jumper can be positioned to fit over the center pin and either the pin to the front or to the rear of the center pin.

Attention: The following procedure erases your current server configuration. Be sure to record the server configuration before performing this procedure. You must reconfigure your server after you move the password jumper.

To change a jumper's position for a three-pin jumper block:

1. Turn off the server; then, disconnect the server power cord.

2. Remove the server cover.

3. Lift the jumper straight off the pin block.

Changing Jumper Positions

4. Align the holes in the bottom of the jumper with the center pin; place the jumper in its new position, covering the front or rear pin that was exposed prior to moving the jumper.
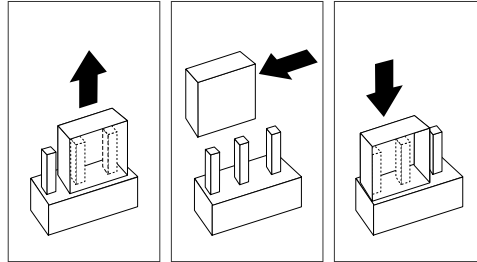
5. Slide the jumper fully onto these pins.

6. Reinstall the server cover. (See "Completing the Installation" on page 113.)

7. Reconnect the server power cord; then, turn on the server.

Switch Settings

There are eight switches on an eight-position switch block. For the location of the eight-position switch block, see "The System Board" on page 212.

The switches have the following meanings:

Switch Number Purpose
1   Core ratio
2   Core ratio
3   Core ratio
4   Core ratio
5   System bus speed
6   System bus speed
7   Serial B/Infrared
                 On   Enables Serial B port
                 Off Enables Infrared port and disables Serial B
                      port
8   Diskette Drive
                 Off Normal diskette operation
                 On   Enables read-only diskette operation

Microprocessor Switches

Attention: If the microprocessor bus-to-core ratio is incorrect, system-board components will overheat and component damage might occur. Be sure that microprocessor switch settings on the eight-position switch block are set properly according to the speed of your microprocessor.

To set bus-to-core ratio for your microprocessor, set switches 1 through 6 for either 180 MHz or 200 MHz as illustrated. Be sure to set the switches according to the appropriate microprocessor speed.

Serial B or Infrared Port Switch

To enable Serial B port or enable the infrared port, set switch 7 as illustrated.
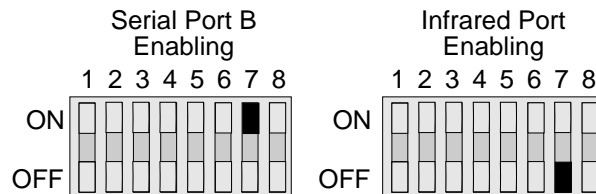
Note: For additional information about the Serial B port or the Infrared port enabling and port assignments, see "Changing the Serial and Infrared Port Assignments" on page 21.

Diskette Operation Switch

To set normal diskette operation (read/write) or for read-only
diskette operation, set switch 8 as illustrated.
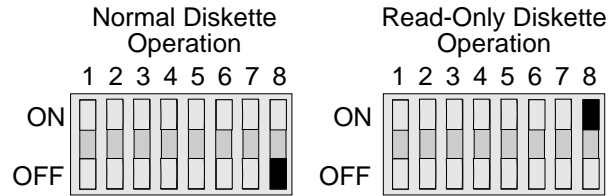
Note: For additional information about diskette-drive access, see
"Restricting Access to Diskette Drives" on page 27.

Appendix B. Changing the Battery

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. This battery contains lithium and can explode if it is 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 batteries as required by local ordinances or regulations.

To order replacement batteries, call 1-800-772-2227 within the United States. In Canada, call 1-800-565-3344 or 1-800-465-7999. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

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.

Before you begin

- Read "Electrical Safety" on page 45.
- Follow any special handling and installation instructions that come with the replacement battery.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover. (See "Removing the Cover" on page 49 if you need additional information.)

Changing the Battery

1. See the system-board illustration in "The System Board" on page 212 for the location of your battery. You might have to remove other server components (such as adapters) to gain access to it. (For information about removing components, see Chapter 3, "Installing Options" on page 43.)

2. Remove the old battery.
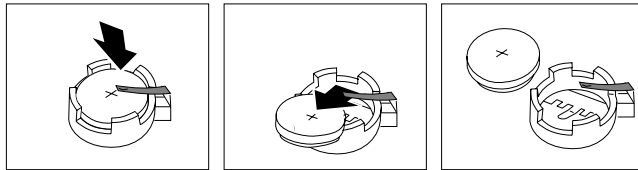
Note: Your battery holder might be different than the one shown.

3. Install the new battery.
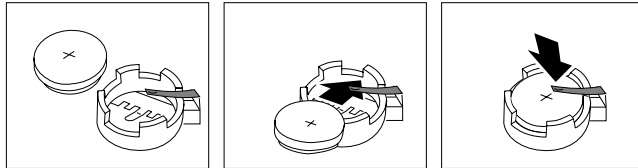
4. Replace any adapters or other components that you might have removed earlier.

> **What to do next**
>
> 1. Replace the server cover; then, reconnect all external cables and power cords. (See "Completing the Installation" on page 113 if you need additional information.)
> 2. Turn on the monitor and server. When the server is turned on the first time after replacing the battery, a battery error message is displayed. This is a normal result of changing the battery.
> 3. Use the Configuration/Setup utility program to reconfigure your server, and to set the date and time. You also might want to set a power-on password while you are using the Configuration/Setup utility program. See "Setting a Power-on Password" on page 26 for more information.

Appendix C. Server Records

Record the Identification Numbers

The locations of the PC Server 315 identification numbers are shown
below. They are located near the bottom, on the front of the server.

Serial Number / Machine Type/Model

Note: Two keys are provided with your server. Store the keys in a
safe place. If you lose the keys, you must order a
replacement lock mechanism and keys from IBM.

Record and retain the following information.

Product Name	IBM PC Server 315
Machine Type	8638
Model	
	_____
Serial Number	_____
Key Serial Number	_____
ServerGuide License Diskette Serial Number	_____

Installed Device Records

Use the following tables to keep a record of the options installed in or attached to your system. You can also record your system's 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's configuration.

Note: If necessary, you can also refer to the system-board layout in "The System Board" on page 212 for connector locations.

Table 3 (Page 1 of 4). Configuration/Setup Utility Program Defaults and Changes

Option	Default Value	New Value	Additional Information
System Summary			
Processor	Pentium Pro	_____	_____
Processor Speed	_____	_____	_____
Math Coprocessor	Internal	_____	_____
System Memory	640 KB	_____	_____
Extended Memory	31 MB	_____	_____
Video Controller	S3 Incorporated. Trio64V+	_____	_____
Cache Size	256 KB	_____	_____
Cache State	Enabled	_____	_____
Shadow RAM	384 KB	_____	_____
System ROM	F000h — FFFFh	_____	_____
Memory Type	ECC	_____	_____
Diskette Drive A:	1.44 MB 3.5"	_____	_____
Diskette Drive B:	Not installed	_____	_____
Mouse	Installed	_____	_____
Product Data			
Machine Type/Model	_____	_____	_____
Flash EEPROM Revision Level	_____	_____	_____
System Board Identifier	_____	_____	_____
System Serial Number	_____	_____	_____
BIOS Date	_____	_____	_____
Devices and I/O Ports			
Mouse	[Installed]	_____	_____
Diskette Drive A:	[1.44 MB 3.5"]	_____	_____
Diskette Drive B:	[Not installed]	_____	_____
Serial Port Setup			
Serial Port A Address	[3F8h]	_____	_____
Serial Port A IRQ	[IRQ 4]	_____	_____
Serial Port B Address	[2F8h]	_____	_____
Serial Port B IRQ	[IRQ 3]	_____	_____
Infrared Port Address	[Disabled]	_____	_____
Infrared Port IRQ	[IRQ 3]	_____	_____
Infrared DMA	[Disabled]	_____	_____
Parallel Port Setup			
Parallel Port	[3BCh]	_____	_____
Parallel Port Mode	[Standard]	_____	_____
Parallel Port Extended Mode	Bidirectional	_____	_____
Parallel Port Extended Mode DMA	No DMA	_____	_____
Parallel Port IRQ	[IRQ 7]	_____	_____
Video Setup			
Video Controller	S3 Incorporated. Trio64V+	_____	_____
Video Memory	1024 KB	_____	_____
Palette Snooping	[Disabled]	_____	_____
Video Interrupt	[Disabled]	_____	_____

Device Records

Table 3 (Page 2 of 4). Configuration/Setup Utility Program Defaults and Changes			
Option	**Default Value**	**New Value**	**Additional Information**
System Security			
Secure Diskette Drives			
Diskette Drive Access	[Enabled]	_____	_____
POST/BIOS Update			
Update POST/BIOS from network	[Enabled]	_____	_____
Power-On Password		_____	_____
Password Prompt	[On]	_____	_____
Administrator Password		_____	_____
Power-on password changeable	[No]	_____	_____
by user			
Start Options			
Power-On Self-Test	[Enhanced]	_____	_____
Power-On Logos	[Enabled]	_____	_____
Power-On F1/Esc Options	[Enabled]	_____	_____
Plug and Play Operating System	[No]	_____	_____
Virus Detection	[Disabled]	_____	_____
Keyboard NumLock State	[On]	_____	_____
Keyboard Speed	[Fast]	_____	_____
Disketteless Operation	[Disabled]	_____	_____
Keyboardless Operation Mode	[Disabled]	_____	_____
Advanced Setup			
Cache Control			
Cache State	[Enabled]	_____	_____
Cache Size	256 KB	_____	_____
ROM Shadowing			
F0000h – FFFFFh	Enabled	_____	_____
(System BIOS)			
E8000h – EFFFFh	Enabled	_____	_____
E0000h – E7FFFh	Enabled	_____	_____
DC000h – DFFFFh	[Disabled]	_____	_____
D8000h – DBFFFh	[Disabled]	_____	_____
D4000h – D7FFFh	[Disabled]	_____	_____
D0000h – D3FFFh	[Disabled]	_____	_____
CC000h – CFFFFh	[Disabled]	_____	_____
C8000h – CBFFFh	[Disabled]	_____	_____
C0000h – C7FFFh	[Enabled]	_____	_____
(Adapter Video BIOS)			
PCI Control			
PCI Burst Mode	[Enabled]	_____	_____
Network Adapters	[Disabled]	_____	_____
Mass Storage Adapters	[Enabled]	_____	_____
Display Adapters	[Disabled]	_____	_____
Multimedia Devices	Enabled	_____	_____
Communication Adapters	Enabled	_____	_____
Serial Adapters	[Enabled]	_____	_____

Table 3 (Page 3 of 4). Configuration/Setup Utility Program Defaults and Changes			
Option	**Default Value**	**New Value**	**Additional Information**
Plug and Play			
Set Device Node	[Enabled]	_____	_____
Processor Control			
Processor 0 ID	0617 or 0619	_____	_____
Processor Updating	[Enabled]	_____	_____
ISA Legacy Resources			
Memory Resources			
A0000h – A3FFFh	Video	_____	_____
A4000h – A7FFFh	Video	_____	_____
A8000h – ABFFFh	Video	_____	_____
AC000h – AFFFFh	Video	_____	_____
B0000h – B3FFFh	Video	_____	_____
B4000h – B7FFFh	Video	_____	_____
B8000h – BBFFFh	Video	_____	_____
BC000h – BFFFFh	Video	_____	_____
C0000h – C1FFFh	Video BIOS	_____	_____
C2000h – C3FFFh	Video BIOS	_____	_____
C4000h – C5FFFh	Video BIOS	_____	_____
C6000h – C7FFFh	Video BIOS	_____	_____
C8000h – C9FFFh	[Available]	_____	_____
CA000h – CBFFFh	[Available]	_____	_____
CC000h – CDFFFh	[Available]	_____	_____
CE000h – CFFFFh	[Available]	_____	_____
D0000h – D1FFFh	[Available]	_____	_____
I/O Port Resources			
100h – 103h	[Available]	_____	_____
104h – 107h	[Available]	_____	_____
108h – 10Bh	[Available]	_____	_____
10Ch – 10Fh	[Available]	_____	_____
110h – 113h	[Available]	_____	_____
114h – 117h	[Available]	_____	_____
118h – 11Bh	[Available]	_____	_____
11Ch – 11Fh	[Available]	_____	_____
120h – 123h	[Available]	_____	_____
124h – 127h	[Available]	_____	_____
128h – 12Bh	[Available]	_____	_____
12Ch – 12Fh	[Available]	_____	_____
130h – 133h	[Available]	_____	_____
134h – 137h	[Available]	_____	_____
138h – 13Bh	[Available]	_____	_____
13Ch – 13Fh	[Available]	_____	_____
140h – 143h	[Available]	_____	_____
DMA Resources			
Channel 0	[Available]	_____	_____
Channel 1	[Available]	_____	_____

Device Records

Table 3 (Page 4 of 4). Configuration/Setup Utility Program Defaults and Changes			
Option	**Default Value**	**New Value**	**Additional Information**
Channel 2	Diskette	_____	_____
Channel 3	[Available]	_____	_____
Channel 4	[Available]	_____	_____
Channel 5	[Available]	_____	_____
Channel 6	[Available]	_____	_____
Channel 7	[Available]	_____	_____
Interrupt Resources			
00	Timer	_____	_____
01	Keyboard	_____	_____
02	Interrupt Controller	_____	_____
03	Serial Port B[1]	_____	_____
04	Serial Port A	_____	_____
05	[Available]	_____	_____
06	Diskette	_____	_____
07	Parallel Port	_____	_____
08	Real Time Clock	_____	_____
09	[Available[1]]	_____	_____
10	[Available]	_____	_____
11	[Available]	_____	_____
12	Mouse	_____	_____
13	Coprocessor	_____	_____
14	[Available]	_____	_____
15	[Available]	_____	_____
Note: [1] Serial B and the Infrared port share a port assignment.			

Table 4 shows the defaults for system, extended, and video memory in your server. Record changes to existing memory and upgrades here.

Option	Default Value	New Value	Additional Information
System Memory	32 MB	_____	_____
Extended Memory	512 MB	_____	_____
Connector 0, DIMM 0	32 MB	_____	32 MB 64 MB 128 MB
Connector 1, DIMM 1		_____	32 MB 64 MB 128 MB.
Connector 2, DIMM 2		_____	32 MB 64 MB 128 MB
Connector 3, DIMM 3		_____	32 MB 64 MB 128 MB
Total Memory	32 MB	_____	_____
Video Memory	1 MB	_____	1 MB 2 MB

Table 4. Memory Default Settings and Changes

Device Records

Record expansion-slot configuration information for your server in the following table.

Slot	IRQ	DMA	I/O Port	ROM/RAM Address	Option Description and Additional Information
1	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____
5	Not	Available			
6	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____
8	_____	_____	_____	_____	_____

Note: Before setting values, review "Resolving Configuration Conflicts" on page 30 and follow the instructions for avoiding configuration conflicts.

Table 5. Expansion Slot Configuration Information

Record the types and SCSI IDs for drives or devices attached to your server in Table 6.

Location	Drive or Device Description
	Internal Devices
Bay 1	_____
Bay 2	_____
Bay 3	_____
Bay 4	_____
Bay 5	_____
Bay 6	_____
	External Devices
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____

Table 6. Internal and External Drives and Devices

Note: If you attach a drive or other device to an adapter, be sure to record the descriptive information appropriately.

The System Board

The following simplified layout of the system board identifies server components. You might need to refer to this figure before you install hardware in your server, or when you record information in the tables in "Installed Device Records" on page 204.
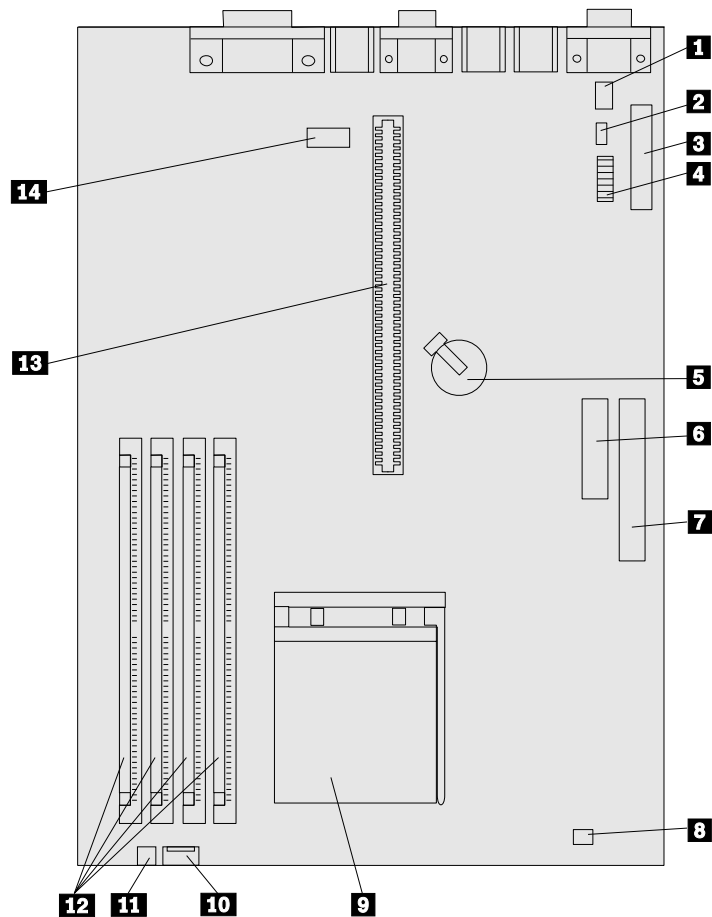
1	Auxiliary power connector
2	CMOS clear (password) jumper
3	Diskette drive connector
4	Switches for microprocessor speeds and diskette write protection
5	Battery
6	3.3 V ac power connector
7	Main power connector
8	Secondary fan connector
9	Microprocessor
10	Power LED connector
11	First fan connector
12	System memory connectors
13	Riser card connector
14	Serial B

Appendix D. Notices

References in this publication to IBM products, programs, or
services do not imply that IBM intends to make these available in all
countries in which IBM operates. Any reference to an IBM product,
program, or service is not intended to state or imply that only that
IBM product, program, or service may be used. Subject to IBM's
valid intellectual property or other legally protectable rights, any
functionally equivalent product, program, or service may be used
instead of the IBM product, program, or service. The evaluation
and verification of operation in conjunction with other products,
except those expressly designated by IBM, are the responsibility of
the user.

IBM may have patents or pending patent applications covering
subject matter in this document. The furnishing of this document
does not give you any license to these patents. You can send license
inquiries, in writing, to:

> IBM Director of Licensing
> IBM Corporation
> 500 Columbus Avenue
> Thornwood, NY 10594
> U.S.A.

215

Trademarks

The following terms are trademarks of the IBM Corporation in the United States or other countries or both:

HelpWare	PS/2
IBM	ServerGuide
OS/2	ThinkPad
PowerPC	ValuePoint

The following terms are trademarks of other companies:

AnyView	Binar Graphics, Inc.
America Online	America Online, Inc.
CompuServe	CompuServe Incorporated
NetWare	Novell, Inc.
Novell	Novell, Inc.
PRODIGY	Prodigy Service Company
QAPlus	DiagSoft, Inc.
QAPlus/PRO	DiagSoft, Inc.
S3	S3 Incorporated
SCSISelect	Adaptec, Inc.
Trio64V+	S3 Incorporated
X/Open	X/Open Company Limited

Intel and Pentium are trademarks or registered trademarks of Intel Corporation in the U.S. or other countries.

Microsoft, Windows, and Windows NT are trademarks or registered trademarks of Microsoft Corporation.

UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Limited.

Other company, product, and service names may be trademarks or service marks of others.

Important Notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

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

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

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

Applications included with IBM products may vary from retail versions and may not include all documentation or functions. Not all products sold separately.

Index

Numerics

A

219

D

damaged system
  dropped   174
  spilled liquid   175
DASD (direct access storage device)
  See the *User's Reference*
Date and Time   22
date, setting   22
deactivated adapters   31
default
  configuration values   205
  values for Configuration/Setup
   Utility   205
description
  passwords   23
  related publications   xv
  server   1
  switch settings   195
device
  adapter locations   205
  configuration error   143
  internal drives   78
  ISA adapter locations   209
  locations   205, 209, 211
  preinstalled   10
  records   205
  SCSI   78
  static-sensitive, handling   46
  termination   80
Devices and I/O Ports   20
diagnostic
  description   124
  diskette   161
  formatting diskettes   178
  insufficient memory for   132
  main menu   128
  runtime options   131
  test   165
  tools overview   123
  using the file editor   178

DIMMs (dual-inline memory
  modules)   68, 69
disconnecting
  cables   ix, x, 45
  drive cables   91
  power cables   48, 91
  signal cables   48, 91
  telephone line   48
disk drive, hard   77
diskette drives
  See also the *User's Reference*
  eject button   7
  in-use light   7, 162
  preinstalled   10
  problems   162
  purpose   77
diskette write-protect (WP)
  switch   111, 195, 197
disketteless operation   28
diskettes
  See also the *User's Reference*
  controlling access   27, 111, 195
  formatting within
   diagnostics   178
  option   127
  ServerGuide License   204
disposing of batteries   xi, 199
DMA (direct memory access)
  See also the *User's Reference*
  system resources   17, 29
drive-support bracket
  installing   94
drives
  See also the *User's Reference*
  bays   77
  cables   78
  CD-ROM   77
  disconnecting cables   91
  diskette   77
  hard disk   77

drives *(continued)*
  installing internal   81
  internal   77, 78
  introduction   77
  location
    bays   78
    device records   211
  removing internal   90
  SCSI   78
  tape   77
  types   77, 78
dropped system   174
dual-inline memory modules
  (DIMMs)   68, 69
duplexing   38
duplicate keys   203

E
editor, ASCII text   178, 180
electrical outlets   13
electrical safety   ix, x, 45
electronic support   185
error messages
  description   125
  diagnostic   125
  format   140
  numeric   141
  POST   125, 140, 141
  SCSI   160
  software-generated   125
  types   125, 140
Ethernet adapter
  cabling   40
  configuring for full duplex   39
  configuring for operating
    systems   38
  hubs   40
  setting duplex mode   39

expansion bays   10
expansion slots
  adapter installation   58
  adapter locations   205, 209
  adapter removal   61
  configuration   56
  location   8
  purpose   55
  shared   56
extension cords   13
external
  device records   205, 209, 211
  options   105
  options, connecting   117
  SCSI connector   8
  SCSI devices   78
  SCSI devices, terminating   117
  views   8, 10

F
fan problems   164
fast Ethernet hubs   40
fatigue   11
fax, getting information by   186
features
  See also the *User's Reference*
  administrator password   24
  at a glance   3
  front view   10
  internal   205, 209, 211
  rear view   8
fee services   188
File Editor
  accessing   180
  using   178
fixed disk   77
  See also hard disk drive
flash memory
  See the *User's Reference*

flickering monitor   163
floor stand
   installing   113
   removing   50
forgotten administrator
   password   24
forgotten password, removing
   administrator   108
   power-on   108
format, low-level
   hard disk drives   34
formatting drives   34
front view   10
full duplex, configuring the Ethernet
   adapter for   39
function keys, using   130

G
general information
   adapters   55
   before installing options   44
   electrical safety requirements   45
   handling static-sensitive
      devices   46
   internal drives   77
   memory-module kits   68
   security options   105
general problems   164
getting help and service   13
getting started   1, 123
glare   12
glides, cover   114
glossary
   See the *User's Reference*

H
handling
   batteries   199
   static-sensitive devices   46

hard disk drive
   See also the *User's Reference*
   in-use light   7
   Low-Level Format   34
   preinstalled   10
   purpose   77
hardfile
   See hard disk drive
hardware
   for installation   44
hardware, removing   53
help   183
   See also customer assistance
home page, IBM Personal
   Computer   183, 186
hubs, Ethernet   40

I
I/O ports
   See also connectors
   configuring   20
   configuring resources   29
IBM service center
   See telephone numbers
identification numbers   203
identifying system board parts   51
in-use lights
   CD-ROM   7
   diskette drive   7, 162
   hard disk drive   7
   not working   164
indicators, status   6
infrared port   3, 8, 9, 196
input/output connectors
   See connectors
installation
   completing   113
   cover   114
   hardware   44

L

LAN (local area network)
  See the *User's Reference*
laser compliance statement   xii
latch
  cover-release   49
legacy resources   17
lighting   12
lights
  CD eject   7
  CD-ROM in-use   7
  diskette drive   7
  hard disk drive   7
  not working   164
  power-on   7
liquid spilled on system   175
lithium battery caution   142
locations
  devices   211
  drive bays   78
  drives   211
  expansion slots   55
  features   8, 10
  jumpers   109
  microprocessor socket   95
  riser   59
  server identification
   numbers   203
  server records   205, 209, 211
  system memory   68
  termination   80, 117
  U-bolt   106, 107
  video memory-module kit   73
lock, cover   49, 114, 164
Low-Level Format program
  backing up files   35
  overview   34
  using   35
  when to use   35

M

Main Menu
  Configuration/Setup utility
   program   20
  PC Server System Board
   Diagnostic   128
math coprocessor
  See the *User's Reference*
memory
  See also the *User's Reference*
  address conflicts   180
  configuration error   144
  default settings   205, 209
  device records   205
  insufficient   132
  list of features   3
  problems   165
  system   68
  system resources   29
  system table   69
  video   73
memory modules
  accessing   53
  dual-inline (DIMMs)   68, 69
  video   73
memory-module kits
  connector locations   68
  purpose   68
  size   68
  speed   68
  type   68
menus
  See also Main Menu
  Local   131
  Module Tests   136
  Options   137
  PC Server System Board
   Diagnostic   128
  SCSISelect Utility program   34

testing *(continued)*
    scripts   136
    system   127
text editor   178, 180
time, setting   22
toll-free numbers   13
tools   44
tracks, server   114
trademarks   216
troubleshooting
    CD-ROM drive problems   162
    charts   161
    Ethernet adapter   168, 170
    overview   126
type
    system memory   68
    video memory   73

U
U-bolt
    installing   105, 106
    location   106, 107
United Kingdom's telephone line
  requirements   ix, 45, 48
universal asynchronous
  receiver/transmitter (UART) serial
  port   3, 8, 9
universal serial bus (USB)
  connectors   3, 8, 9
unknown power-on password,
  removing   108
updating
    server configuration   119
    updating   185
upgrades, microprocessor   95
utility programs
    configuration   16
    Configuration/Setup   19
    diagnostic   128, 178

utility programs *(continued)*
    SCSISelect   33

V
valid test groups, list of   132
venting of hot air   12
video
    See also the *User's Reference*
    configuring options   22
    connector location   9, 73
    controller   3
    default settings   205
    installing   76
    memory   73
    purpose   73
    removing   76
    ROM address conflicts   181
    size   73
    speed   73
    type   73
view
    front   10
    rear   8
virus checking   28, 133

W
warranty extensions and
  upgrades   190
warranty information
    See the *User's Reference*
warranty service   186
warranty statement
    See the *User's Reference*
welcome letter   xvii
Windows
    NT Server 4.0, configuring the
      Ethernet adapter for   36
work area, arranging   11

IBM®

Part Number: 84H5975

Printed in U.S.A.

April 1997