



PC Server 310

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 239. Also read the general information under "Product Warranties and Notices" in the *User's Reference*.

First Edition (July 1996)

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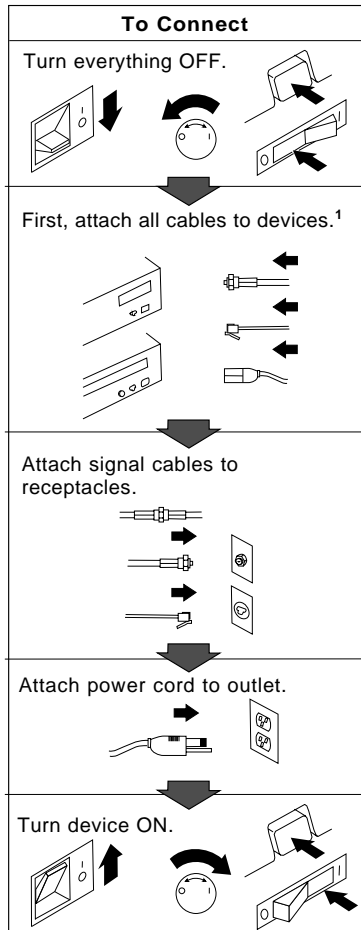
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Safety Information

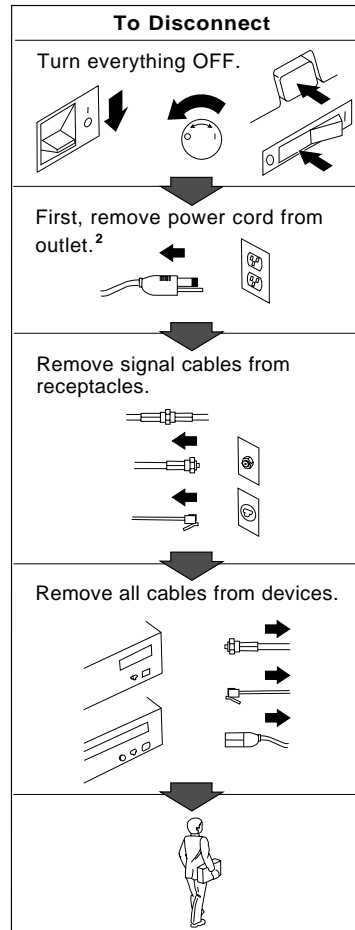


DANGER:

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.



¹ In the U.K., by law, the telephone cable must be connected after the power cord.

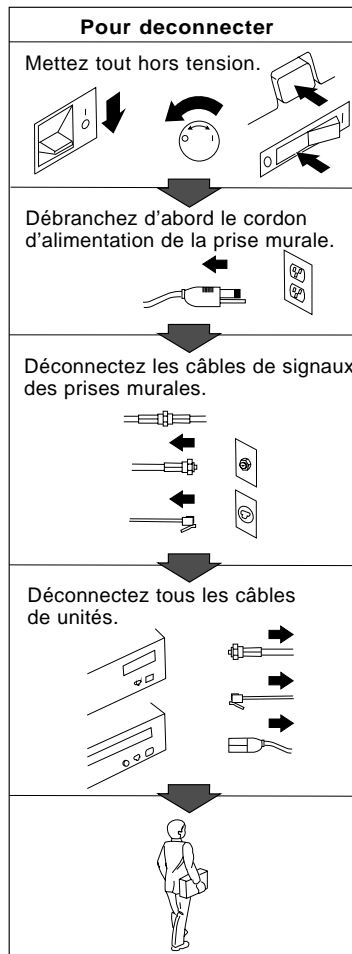
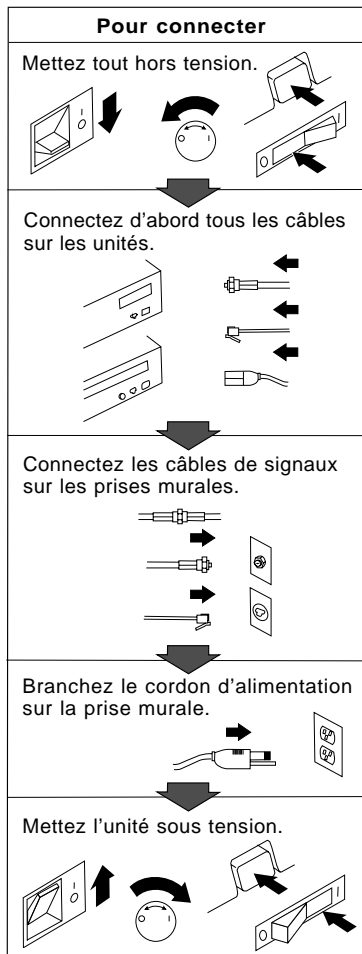


² In the U.K., by law, the power cord must be disconnected after the telephone line cable.



DANGER:

Le courant électrique provenant des câbles d'alimentation, téléphoniques 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.*



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

Laser Compliance Statement

Some IBM server models are equipped from the factory with a CD-ROM drive. 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 Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

Class 1 laser products are not considered to be hazardous.

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.

About This Book

This book provides instructions about how to configure your PC Server 310 and 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 310," provides a general introduction to server features and components.

Chapter 2, "Installing Software," describes the factors that you might want to consider before installing hardware and software in your server. This chapter also contains instructions for installing operating systems and device drivers.

Chapter 3, "Configuring Your Server," describes how to use the Configuration/Setup utility program to configure your server. This chapter also describes how to configure the EtherJet adapter that comes with your server. Also included are instructions for using the SCSISelect utility program.

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

Chapter 5, "Solving Problems," includes an overview of the diagnostic tools, instructions for testing the server, lists of error messages, and troubleshooting charts. This chapter also contains information about checking the server for damage, and resolving configuration conflicts.

Chapter 6, "Getting Help, Service, and Information," contains information to help you solve more complex problems that you might encounter with your server. This chapter provides instructions about how to obtain service and technical assistance for your PC Server 310 and other IBM products that you might plan to

How This Book Is Organized

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.

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 310:

- The *PC Server 310 Setup and Installation* sheet contains the instructions for cabling your server.
- The *PC Server 310 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 Server Hardware Maintenance Manual Supplement* is available for purchase. It contains error codes, advanced diagnostic procedures, and a parts catalog for most models. This manual is 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 1-800-426-7282. In Canada, call Customer Assistance at 1-800-465-1234. 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 310. Your server offers speed, power, expandability, and compatibility with various existing Network Operating Systems and application programs.

The PC Server 310 also comes with IBM PC Server Startup Support, which provides coverage during the first 90 days after installation. IBM PC Server Startup Support is available to PC Server customers 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 other vendors. If you need assistance, call IBM at 1-800-772-2227 in the U.S., or call IBM at 1-800-565-3344 in Canada. 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

Chapter 1. Getting Started with PC Server 310

Your PC Server 310 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.

As an open-architecture, industry-standard system, the PC Server 310 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.

Your PC Server 310 comes with a three-year, on-site limited warranty, plus IBM PC Server Startup Support.

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.

See Chapter 2, "Installing Software" on page 15 for details about installing an operating system and device drivers.

If you plan to install options, see Chapter 4, "Installing Options" on page 57, and install your options before using your server. Then, follow the instructions in Chapter 3, "Configuring Your Server" on page 35 for configuring your server. The troubleshooting information in Chapter 5, "Solving Problems" on page 159 will help you solve some of the simpler problems that might occur. Appendix C, "Server Records" on page 229 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:

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Features at a Glance

<p>Microprocessor</p> <ul style="list-style-type: none"> • Intel Pentium <p>Cache Memory</p> <ul style="list-style-type: none"> • Level-1, 16 KB • Level-2, 256 KB, expandable to 512 KB <p>Memory</p> <ul style="list-style-type: none"> • 16 MB minimum, expandable to 160 MB • 60 ns, ECC-parity • Four SIMM sockets in two banks • One DIMM socket in one bank <p>Diskette Drives</p> <ul style="list-style-type: none"> • Standard: 3.5-inch, 1.44 MB • Optional (internal): 3.5-inch, 1.44 MB <p>Hard Disk Drives</p> <ul style="list-style-type: none"> • Number and capacities of drives vary by model • Supports up to three internal drives <p>CD-ROM Drive</p> <ul style="list-style-type: none"> • Standard: SCSI <p>Keyboard and Auxiliary Device</p> <ul style="list-style-type: none"> • IBM keyboard • Mouse 	<p>Expansion Bays</p> <ul style="list-style-type: none"> • Two 5.25-inch drive bays • Three 3.5-inch drive bays • The number of bays available for expansion varies by model <p>Expansion Slots</p> <ul style="list-style-type: none"> • Two 16-bit ISA bus slots • Three 32-bit PCI/ISA bus shared slots • The number of slots available for expansion varies by model <p>Video</p> <ul style="list-style-type: none"> • Super video graphics array (SVGA) • Compatibility: <ul style="list-style-type: none"> - Color graphics adapter (CGA) - Video graphics array (VGA) <p>Security Features</p> <ul style="list-style-type: none"> • Bolt-down capability • Door lock • Selectable drive-startup • Power-on and administrator passwords <p>Upgradable POST and BIOS</p> <ul style="list-style-type: none"> • Upgradable EEPROM on the system board • POST/BIOS upgrades (when available) 	<p>Input/Output Connectors</p> <ul style="list-style-type: none"> • Infrared port • Keyboard port • Mouse (auxiliary-device) port • Serial port • Two universal serial bus (USB) ports • Parallel port • Video (monitor) port • UltraSCSI adapter <ul style="list-style-type: none"> - One 8-bit internal port - One 16-bit internal port - One 16-bit external port • EtherJet adapter (installed on some models) <ul style="list-style-type: none"> - 10Base-T - 10Base2 - 10Base5 <p>Power Supply</p> <ul style="list-style-type: none"> • 200 Watt with voltage switch (115–230 V ac) • Built-in overload and surge protection
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What Your IBM PC Server 310 Offers

What Your IBM PC Server 310 Offers

The PC Server 310 offers impressive performance using the Intel Pentium microprocessor. Your server also provides large data-storage capabilities, enhanced system expandability, SVGA video graphics, and Ethernet networking. This system's design provides a powerful, cost-effective server.

The PC Server 310 takes advantage of advancements in microprocessor speed, memory capacity, application programs, communication devices, and operating environments.

Your server offers an innovative, multiple-bus architecture. The bus architecture defines the size, physical arrangement, and logical relationships of the expansion slots.

A riser card connected to the system board in your server has three shared PCI/ISA-bus expansion slots and two dedicated ISA-bus expansion slots.

One of the PCI expansion slots contains a wide, UltraSCSI adapter. One of the ISA expansion slots might contain an IBM EtherJet adapter.

Getting Help on the World Wide Web

You can access the latest information about product compatibility and configuration on the World Wide Web. This information is updated as new PC Server products are announced. The following is a sample of the information available at

<http://www.pc.ibm.com/servers/> on the World Wide Web:

- 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 6, “Getting Help, Service, and Information” on page 211.

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.

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

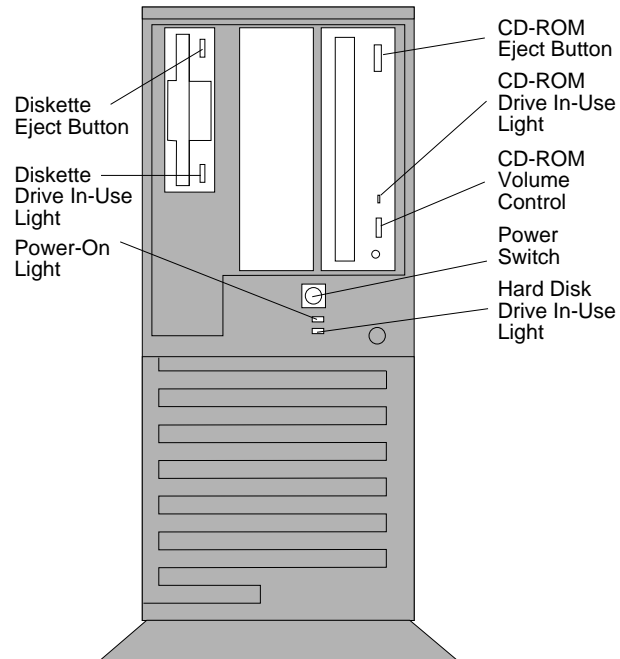
Controls and Status Indicators

- 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 6, “Getting Help, Service, and Information” on page 211.

Controls and Status Indicators

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



Controls and Status Indicators

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

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

Power-On Light: This light comes on when you turn on your server.

CD-ROM Eject Button: Push this button to release a compact disc (CD) from the CD read-only memory (CD-ROM) drive.

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

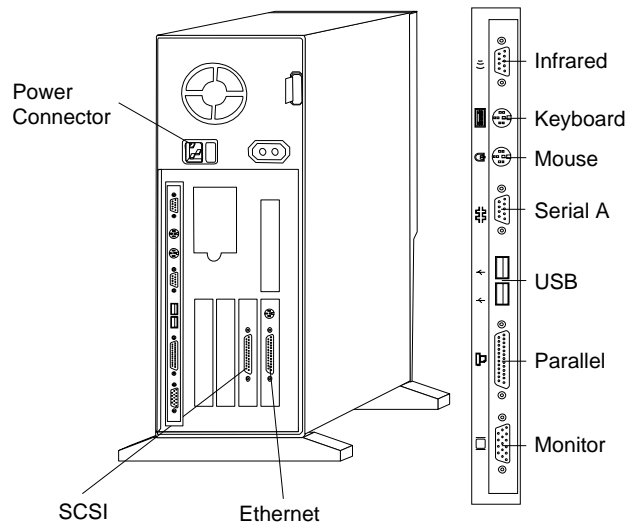
CD-ROM Volume Control: Turn this knob to adjust the CD-ROM playback volume.

Power Switch: Press this switch to turn your server on or off. 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 light comes on when your server is accessing a small computer system interface (SCSI) device.

Input/Output Connectors

Input/Output Connectors



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

Input/Output Connectors

Power Connector: The server power cable connects here.



SCSI Connector: External SCSI devices attach here.

Ethernet Connectors: Ethernet connectors for 10Base-T, 10Base2, or 10Base5 media go here.



Infrared Connector: Your infrared (IR) transceiver module option connects here. To use the infrared transceiver feature, you must select a chip set that supports it. Your IBM reseller or IBM marketing representative can help you to select the appropriate chip set.



Keyboard Connector: The keyboard cable connects here.



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



Serial Connector: The server has one 9-pin, universal asynchronous receiver/transmitter (UART) serial connector (A). Serial signal cables for modems or other serial devices connect 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 41.



Universal Serial Bus Connectors: You can attach I/O devices to these two universal serial bus (USB) connectors. You need a 4-pin cable to connect devices to USB 1 or 2.



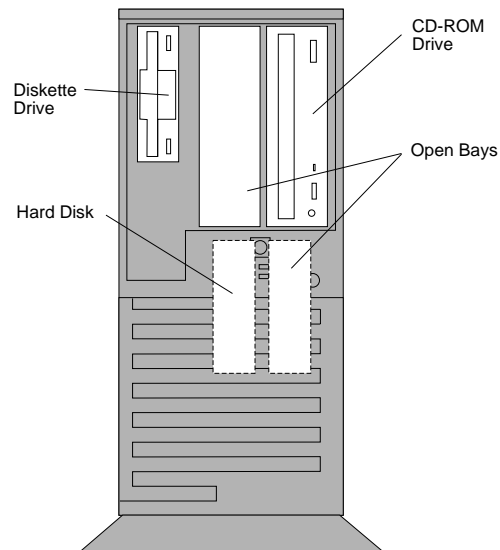
Parallel Connector: The server has one 25-pin parallel port. A signal cable for a parallel device, such as a printer, connects here. For information about displaying and changing port assignments, see “Devices and I/O Ports” on page 41.



Monitor Connector: The monitor signal cable connects here.

Expansion Bays

Expansion Bays



Open Bays: Your server's design accommodates 3.5-inch and 5.25-inch hard disk, tape, and rewritable optical-disc drives.

For information about the supported types of drives and their installation, see “Installing Internal Drives” on page 111.

CD-ROM Drive: Your server comes with a SCSI CD-ROM drive.

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

Hard Disk Drive: All models come with an UltraSCSI adapter. The number and capacities of the hard disk drives vary by model. See the *User's Reference* for additional information about the SCSI subsystem and SCSI hard disk drives.

Arranging Your Workspace

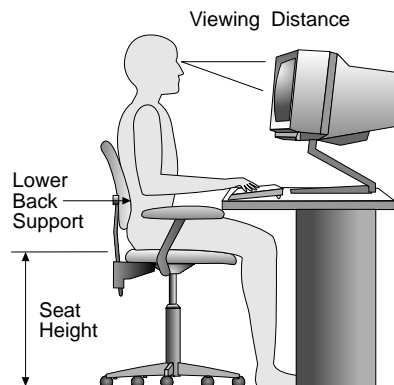
To get the most from your server, arrange both the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

Comfort

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

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

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



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

Arranging Your Workspace

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

Glare and Lighting

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

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

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

Air Circulation

Your server and monitor produce heat. Your server has one or more fans that pull in fresh air and force out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the server and monitor so that nothing blocks the air vents; usually, 127 mm (5 in.) of air space is sufficient. Also, make sure the vented air is not blowing on someone else.

Arranging Your Workspace

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*.

Arranging Your Workspace

Chapter 2. Installing Software

This chapter provides information about installing an operating system and device drivers. You can install an operating system using ServerGuide, or install a separately purchased operating system.

By this time, you should have unpacked your server and attached cables to it. (Refer to the *Setup and Installation* sheet for instructions.)

See Chapter 1, "Getting Started with PC Server 310" for a general introduction to the features of your server.

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Software Considerations

Software Considerations

IBM and other manufacturers of operating systems, network programs, and application programs periodically make software updates available. These updates provide enhancements and corrections. To ensure that the software you install functions properly, contact the manufacturers to obtain current updates.

If you intend to install an IBM operating system or network programs, such as OS/2 or OS/2 LAN Server 4.0 Advanced, you can obtain the most current software updates from the IBM OS/2 Technical Support Center. These software updates are called ServicePaks or corrective-service diskettes (CSDs). In the U.S. or Canada, you can call the IBM OS/2 Technical Support Center at 1-800-992-4777.

For the latest information about hardware device drivers and operating systems supported by your server:

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

Using ServerGuide

It is important that you read and understand the following information, whether you choose to install an operating system that is available in the ServerGuide package or you choose to install *your own* operating system.

One of the easiest and most efficient ways to install an operating system and take advantage of a wide variety of the latest software for networking environments is to use ServerGuide.

You can install an operating system from ServerGuide, or you can install *your own* operating system and still use many of the features available on ServerGuide. (For example, you can install NetFinity, a LAN systems-management program; run demonstration programs; use the performance-tuning feature; and do much more.)

If you have not already done so, take the time now to read the information that came with the ServerGuide package; then, return here.

Note: Whether you choose to install an operating system from the ServerGuide CD package, or *your own* operating system, you must install the SCSI, SVGA, and EtherJet device drivers. Depending upon the ServerGuide version that came with your server, these device drivers might be installed automatically. The device drivers are on the diskettes that came with the server. Follow the installation instructions in “Device Drivers” on page 19. The README files on the diskettes might contain additional information.

Installing an Operating System

You can install an operating system from ServerGuide or from separately purchased diskettes or CDs.

If you have not already installed your options, do so now, before you install your operating system.

You should configure your network adapter before you install your operating system. Refer to the *EtherJet ISA Adapters Installation and User's Guide* that came with your server, for configuration information.

Operating System Considerations

The operating system that you select allows you to optimize some of the features in your server.

Some security features are operating-system dependent, which means that if you want to use them, you must install an operating system that supports them. To find out whether an operating system supports specific security features, see the documentation that comes with the operating system.

OS/2 Considerations

If you install OS/2 2.1, OS/2 2.11, or OS/2 Warp 3 from a diskette, CD-ROM, or network, you must manually install the device drivers and the S3 video drivers. The S3 drivers are on the OS/2 Video Device Drivers Diskette for Trio64V+.

Note:

If you install OS/2 Warp Server from a diskette, CD-ROM, or network, you might see a System Error - sinfb30.exe along with a SYS3175 error on your monitor when you run the System Information program from the SystemView Service Manager package. If so, install and use the NetFinity Service Manager supplied with ServerGuide instead of SystemView Service Manager from OS/2 Warp Server. Refer to the ServerGuide documentation for further information.

Device Drivers

Device drivers are programs designed to support a specific type of hardware device. They provide instructions that enable the server to interact with the device, or to take advantage of a device's special feature.

1. When you install device drivers, follow the installation instructions that come with your operating system. If you install one of the following operating systems, also do the steps that are given in these sections:
 - If you are installing device drivers for OS/2 or OS/2 Warp, go to “Installing Device Drivers for IBM OS/2 and OS/2 Warp” on page 20.
 - If you are installing video drivers for OS/2 or OS/2 Warp, go to “Installing Trio64V+ Video Drivers for IBM OS/2 and OS/2 Warp” on page 21.
 - If you are installing video drivers for Windows 3.1x, go to “Installing Trio64V+ Video Drivers for Microsoft Windows 3.1x” on page 23.
 - If you are installing video drivers for Windows 95, go to “Installing Trio64V+ Video Drivers for Microsoft Windows 95” on page 25.
 - If you are installing device drivers for Microsoft Windows NT Server 3.51, go to “Installing Device Drivers for Microsoft Windows NT Server 3.51” on page 27.
 - If you are installing video drivers for Microsoft Windows NT Server 3.51, go to “Installing Trio64V+ Video Drivers for Microsoft Windows NT Server 3.51” on page 28.
 - If you are installing device drivers for SCO OpenServer, go to “Installing Device Drivers for SCO OpenServer 5.0.x” on page 30.
 - If you are installing device drivers for Novell Netware, go to “Installing Device Drivers for Novell Netware” on page 30.

Device Drivers

2. Go to Chapter 3, “Configuring Your Server” on page 35 or Chapter 4, “Installing Options” on page 57, depending on your server configuration and option-installation requirements.

Installing Device Drivers for IBM OS/2 and OS/2 Warp

After installing the operating system, follow these steps to install the device drivers:

1. From the Desktop, open an OS/2 window.
2. Insert the diskette titled *7800 Family Manager Set For IBM* (use diskette 1). This diskette comes with your server.
3. At the installation drive prompt, type **copy**
A:\OS2\AIC7870.ADD C:\OS2\BOOT and then press **Enter**.
4. If your server has an ISA EtherJet adapter installed, continue with the next step. If your server *does not* have this adapter installed, go to step 6.
5. Refer to the device driver installation chapter in the *EtherJet ISA Adapters Installation and User's Guide* that comes with your server. Follow the instructions to complete the NDIS2 MAC driver installation using LAN Adapter Protocol Support (LAPS) or Multiple Protocol Transport Services (MPTS). All the files needed for OS/2 are on the EtherJet diskette.

Attention: During the installation, if the IBM PCI Ethernet adapter and associated protocols are shown while using LAPS or MPTS, but that adapter is not installed in your server, delete the adapter and protocols before adding the ISA EtherJet adapter.
6. Exit and restart the server to activate the new device driver.

Installing Trio64V+ Video Drivers for IBM OS/2 and OS/2 Warp

Use this procedure for the *initial installation* of Trio64V+ drivers for OS/2 and OS/2 Warp and to change resolutions after you install the driver. If you want to change resolutions after you install the driver, start at step 16 on page 22.

To install the graphics-accelerated device driver from diskette, do the following steps:

1. Ensure that the server is in VGA mode. (Refer to the readme.txt file on the OS/2 Device Drivers for S3 Trio64V+ diskette for details.)
2. Start OS/2, if it is not already running.
3. Double-click on the **OS/2 System** icon.
4. Double-click on the **Command Prompts** icon.
5. Double-click on the **OS/2 Window** icon.
6. Insert the OS/2 Device Driver for S3 Trio64V+ diskette into drive A.
7. At the OS/2 command prompt, type **A:SETUP** and then press **Enter**.
8. When you are prompted to do so, select **OK** to perform a shutdown, and remove the diskette from drive A. Press **Ctrl+Alt+Del** to restart your server.
9. Double-click on the **OS/2 System** icon.
10. Double-click on the **System Setup** icon.
11. Double-click on the **Display Driver Install** icon. When the Display Driver Install window appears, select **Primary Display Driver** and then select **OK**.
12. When the Display Driver Select window appears, select **Vision864/868/964/Trio64/64V+ Version 2.83.01** to install the video driver.
13. When the Monitor Configuration/Selection Utility window appears, the **Install Using Defaults for Monitor Type** choice is

Device Drivers

preselected. You can accept this choice or select **Install Using Display Adapter Utility Program** to choose a different refresh rate.

Note: For further instructions on choosing a different refresh rate, refer to the README file on the OS/2 Device Driver for S3 Trio64V+ diskette.

14. When the Source Directory pop-up window appears, ensure that the OS/2 Device Driver for S3 Trio64V+ diskette is in drive A; then, select **Install...**
15. When the installation is complete, shut down your server, remove the diskette, and restart your server.
16. When OS/2 has restarted, do the following steps to select the type of monitor:
 - a. Double-click on the **OS/2 System** icon.
 - b. Double-click on the **System Setup** folder.
 - c. Double-click on the **System** icon.
 - d. Go to the second page of the Screen tab.

Note: If you have a Display Data Channel (DDC) monitor installed, the second page will have DDC Monitor for the display name.
 - e. Select the type of monitor you have from the list in the Display name pulldown menu.
17. Go to the first page of the Screen tab and select the desired resolution, color depth, and monitor refresh. To minimize flicker, select the highest refresh rate that the monitor supports.
18. When you are finished selecting the resolution, color depth, and refresh rate, double-click on the upper-left corner of the System Settings window to close it.
19. Select **Yes** if a screen appears indicating that the system needs to run the SVGA utility program.
20. Restart OS/2 by shutting down OS/2 and pressing **Ctrl+Alt+Del**. The new resolution, color depth, and refresh rate will be active.

21. To change the resolution again, or if you are changing monitors and resolutions, perform steps 16 through 20 on page 22.

Installing Trio64V+ Video Drivers for Microsoft Windows 3.1x

Notes:

1. Windows 3.1x includes the following operating systems:
 - Windows 3.1
 - Windows 3.11
 - Windows 3.11 for Workgroups
2. Currently Windows 3.1x does not include the correct video driver for the S3 Trio64V+ chip set. For best results, install the video driver from the Windows 3.1x Device Driver for S3 Trio64V+ diskette.

Use this procedure for the *initial installation* of Trio64V+ drivers for Windows 3.1x. If you want to change resolutions after you install the driver, follow the steps in “Changing Windows 3.1x Video Settings” on page 24.

Follow these instructions to install the S3 Trio64V+ video drivers on Windows 3.1x:

1. Exit from Windows.
2. Change to the Windows directory (type **CD\WINDOWS** and then press **Enter**).
3. Type **SETUP** and then press **Enter**.
4. A screen displays the current Windows configuration. Move the highlight bar to the Display entry and then press **Enter**.

Note: In this step, **Display** means a monitor mode or video mode provided by a video driver.
5. Move the highlight bar to **Other** and then press **Enter**.
6. Insert the Windows 3.1x Device Drivers for S3 Trio64V+ diskette into drive A: and press **Enter**.

Device Drivers

7. Select the desired resolution and press **Enter**. Refer to the information that comes with your monitor to determine which resolutions your monitor supports.
8. Press **Enter** to complete the changes.
9. If you get a message that the driver is already installed, press **Esc** to replace the driver.
10. If you are prompted to insert a diskette, type **A:** and then press **Enter**.
11. When Setup is complete, the DOS prompt appears. Type **WIN** and press **Enter** to start Windows. The new video driver is now installed and is controlling your monitor.
12. Repeat this procedure for other resolutions, if desired.

Changing Windows 3.1x Video Settings

To change your monitor (video) settings, do the following steps:

1. Start Windows.
2. In the Program Manager, select **Main**.
3. In the Main group, select **Windows Setup**.
4. In the Windows Setup window, select **Options**.
5. In the Options menu, select **Change System Settings**.
6. In the Change System Settings window, select **Display**.
7. Select the Down Arrow (↓) at the Display field; then, select the desired resolution for the S3 Trio64V+ graphics accelerator.

Installing Trio64V+ Video Drivers for Microsoft Windows 95

Use this procedure for the *initial installation* of Trio64V+ drivers for Windows 95. If you want to change resolutions after you install the driver, follow the steps in “Changing Windows 95 Video Settings” on page 26.

Note: Currently Windows 95 does not include the correct video driver for the S3 Trio64V+ chip set. For best results, install the video driver from the Windows 95 Device Driver for S3 Trio64V+ diskette.

1. Start Windows 95.
2. Click on the **Start** button.
3. Select **Settings**.
4. Select **Control Panel**.
5. Double click on the **Display** icon. The Display Properties window appears.

Note: You can also click on the right mouse button anywhere on the desktop and select the Properties option from the pop-up menu.
6. Click on the **Settings** tab.
7. Click on the **Change Display Type...** button. The Change Display Type... window appears.
8. Under Adapter Type, click on the **Change...** button.
9. Click on the **Have Disk...** button.
10. Change directories by typing **A:** and then pressing **Enter**.
11. Click on the **OK** button.
12. Select **S3 Trio64V+ PCI driver** from the list, and click on the **OK** button. If you receive a message stating that one or more driver files are older than the files on the system, click on **No**.
13. Click on the **Close** button.
14. Select the appropriate resolution using the Desktop Area and Color Palette options.

Device Drivers

15. Click on the **Apply** button. A System Settings Change Box appears.
16. Click on **Yes** to restart your server. The new Windows 95 video driver installation is now complete.

Changing Windows 95 Video Settings

To change your monitor (video) settings, do the following steps:

1. Start Windows 95.
2. Select **Settings**.
3. Select **Control Panel**.
4. Double click on the **Display** icon. The Display Properties window appears.
Note: You can also click on the right mouse button anywhere on the desktop and select the Properties option from the pop-up menu.
5. Click on the **Settings** folder.
6. Change the resolution, color palette, or font size; then, click on **OK**.

Installing Device Drivers for Microsoft Windows NT Server 3.51

While installing the Microsoft Windows NT Server 3.51 operating system, follow the steps in this section to install the device drivers.

During installation, a window appears with a statement that the system cannot find any mass storage devices. You now have the option of installing an additional SCSI adapter.

1. From this window, press **S**.
2. Scroll down to the end of the list and select **Other**.
3. At the **Insert Disk** window, insert the diskette titled *7800 Family Manager Set For IBM* (use diskette 1) and press **Enter**.
4. Select **Adaptec AHA-2940/AIC78XX (PCI) NT v3.5x** and press **Enter**.
5. Once the driver is loaded, Setup will display your choice. Press **Enter**.
6. Continue with the standard operating system installation. When you are prompted for the device driver, insert the diskette titled *7800 Family Manager Set For IBM* (use diskette 1). Press **Enter**.
7. Follow the instructions on the screen to complete device driver installation.
8. After you install Windows NT Server 3.51, you must install the NDIS3 MAC driver if your server has an ISA EtherJet adapter installed. Follow the instructions in the *EtherJet ISA Adapters Installation and User's Guide* that comes with the server, to complete the NDIS3 MAC driver installation. Go to "Installing Trio64V+ Video Drivers for Microsoft Windows NT Server 3.51" on page 28.
9. If your server *does not* have an EtherJet adapter installed, go to "Installing Trio64V+ Video Drivers for Microsoft Windows NT Server 3.51" on page 28.

Installing Trio64V+ Video Drivers for Microsoft Windows NT Server 3.51

Notes:

1. Currently Windows NT Server 3.51 does not include the correct video driver for the S3 Trio64V+ chip set. For best results, install the video driver from the Windows NT Server 3.51 Device Drivers for S3 Trio64V+ diskette.
2. While installing Windows NT Server 3.51, the default S3 compatible driver might not function correctly on servers with the Trio64V+ chip set. During the initial startup of Windows NT Server 3.51, the following message appears: Please select the operating system to start. Select **VGA mode** to place the system in VGA mode for installation of the new video device driver.

Use this procedure for the *initial installation* of Trio64V+ drivers for Windows NT Server 3.51. If you want to change resolutions after you install the driver, follow the steps in “Changing Windows NT Server 3.51 Video Settings” on page 29.

1. Start Windows NT Server 3.51.
2. When the message Please select the operating system to start:... appears, select **Windows NT Workstation Version 3.51 [VGA mode]**.
3. Double-click on the **Control Panel** icon in the **Main** folder.
4. Double-click on the **Display** icon.
5. Select and click on the **Change Display Type....** button.
6. Select and click on the **Change....** button on the Display Type screen under the Adapter Type section.
7. Select the **Other....** button.
8. Insert the Windows NT Device Drivers for Trio64V+ diskette into drive A: and then select **OK** or press **Enter**.
9. When the S3 video driver update appears in the list, click on **Install**.

Device Drivers

10. Click on **Yes** if the following message appears: This operation will change your system configuration. Do you want to proceed anyway?
Note: If a message appears asking for the full path, click on **OK**. The default path is **A:**.
11. If a message appears stating that the driver is already installed, select **New**.
12. If prompted for the driver diskette a second time, click on **Continue**.
13. When the message The drivers were successfully installed appears, remove the video driver diskette; then, click on **OK**.
14. When you are prompted to do so, shut down and restart Windows NT Server 3.51.

Changing Windows NT Server 3.51 Video Settings

To change your monitor (video) settings, do the following steps:

1. Start Windows NT Server 3.51.
2. Select **Main**.
3. Select **Control Panel**.
4. Double-click on the **Display** icon.
5. Change the resolution, color palette, or font size.
6. Click on the **Test** button; then, select **OK** to run the test.
7. If bitmap image formatted correctly, click on **Yes** and then restart Windows NT Server 3.51. If the bitmap image did not format correctly, go to step 5 and select different settings.

Device Drivers

Installing Device Drivers for SCO OpenServer 5.0.x

After installing the Santa Cruz Operation (SCO) OpenServer 5.0.x operating system, follow these steps to install the device drivers.

1. Install the device drivers as described in your SCO OpenServer 5.0.x publications.
2. If your server requires a Boot Time Loadable Driver (BTLDD), use **alad325**. This driver is located on the diskette titled *7800 Family Manager Set For IBM* (use diskette 2).

If your server does not require this type of driver, go to step 3.

3. If your server has an ISA EtherJet adapter installed, locate the *ISA EtherJet Adapter Driver Diskette for SCO OpenServer 5.0.x* that comes with your server.

If your server *does not* have this adapter installed, you have completed the steps required to install the SCO OpenServer 5.0.x device drivers.

4. Configure the ISA EtherJet adapter as described in the SCO OpenServer 5.0.x publications.

Installing Device Drivers for Novell Netware

Separate instructions are provided for Novell Netware Versions 3.12 and 4.1.

Note: If you have more than one EtherJet Adapter installed, see the *EtherJet ISA Adapters Installation and User's Guide* that comes with your server for the appropriate AUTOEXEC.NCF statements.

Novell NetWare 3.12 Operating System

After installing the operating system, follow these steps:

1. When the server returns to the system console prompt for the first time:
 - a. Type **DOWN** and then press **Enter**.
 - b. Type **EXIT** and then press **Enter**.
 - c. At the prompt, type **CD\SERVER.312** and then press **Enter**.

Device Drivers

2. Insert the diskette titled *7800 Family Manager Set For IBM* (use diskette 1). This diskette comes with your server.
3. At the command prompt, type **copy**
a:\netware\v3_1x\aic7870.* c:\server.312 and then press **Enter**.
4. When you are prompted to overwrite the existing file, type **Y** for Yes; then, press **Enter**.
5. If your server has an EtherJet ISA adapter installed, continue with the next step. If your server *does not* have this adapter installed, go to step 14.
6. Insert the *IBM EtherJet ISA Adapter Device Drivers Diskette* into the drive.
7. At the command prompt, type **copy a:\netware*.***
c:\server.312 and then press **Enter**.
8. At the system console prompt, type **LOAD INSTALL** and then press **Enter**.
9. Select the **System Options** choice in the Installation Options menu; then, press **Enter**.
10. Edit the AUTOEXEC.NCF file and add the following statements to the end of the AUTOEXEC.NCF file:

```
LOAD c:\server.312\ibeinws.lan
BIND IPX TO IBEINWS NET=x
```

where *x* is the unique hexadecimal number for your LAN.
11. Press **Esc** to save the changes to the AUTOEXEC.NCF file.
12. Press **Esc** again to exit from the INSTALL program.
13. At the system console prompt:
 - a. Type **DOWN** and then press **Enter**.
 - b. Type **EXIT** and then press **Enter**.
14. Type **SERVER** and then press **Enter** to restart the server and activate the new device drivers.

Device Drivers

Novell NetWare 4.1 Operating System

After installing this operating system, follow these steps:

1. When you are prompted to select a disk driver, insert the diskette titled *7800 Family Manager Set For IBM* (use diskette 1). This diskette comes with your server. Press **Enter**.
2. Press the **Insert** key to install the Unlisted disk driver; then, press **Enter**.
3. Select **AIC7870.DSK** and then press **Enter**.
4. When you are prompted to overwrite the existing file, type **Y** for Yes; then, press **Enter**.
5. When you are prompted with Do you want to select an additional disk driver?, select **Yes** and then press **Enter**.
6. When you are prompted to overwrite the existing file, type **Y** for Yes; then, press **Enter**.
7. If your server has an ISA EtherJet adapter installed, continue with the next step. If your server *does not* have this adapter installed, go to step 17 on page 33.
8. Insert the *IBM EtherJet ISA Adapter Device Drivers Diskette* into the drive.
9. When you are prompted to select a network driver, press the **Insert** key and then press **Enter**.
10. Select **IBMEINWS.LAN** by pressing **Enter**.
11. Select **Save Parameters and Continue**.
12. Select **No** to install additional drivers.
13. Select **Continue installation** and press **Enter**.
14. To accept the slot number that the system offers, press **Enter**.
15. When you are prompted to do so, insert the Novell Netware License diskette in drive A; then, press **Enter**.

Device Drivers

16. At the system console prompt:
 - a. Type **DOWN** and then press **Enter**.
 - b. Type **EXIT** and then press **Enter**.
17. Type **SERVER** and press **Enter** to restart the server and activate the new device drivers.

Device Drivers

Chapter 3. Configuring Your Server

This chapter provides information about the configuration and utility programs that come with your server, as well as instructions that tell you 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.

The PC Server Diagnostic Diskette that comes with the server provides additional configuration and diagnostic support for the system board, disk drives, and other system components.

This chapter contains:

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Configuration Overview

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 and ISA adapters and SCSI devices. This flexibility lets you choose from many adapters and devices that comply with these standards. Your server supports a variety of operating systems that run many software applications.

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.

Configuration Overview

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 table 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 221.
3. Set jumpers or switches on the device.
See the device installation instructions.
4. Install the device in the server.
See Chapter 4, "Installing Options" on page 57.

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 Setup" on page 50 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 50.

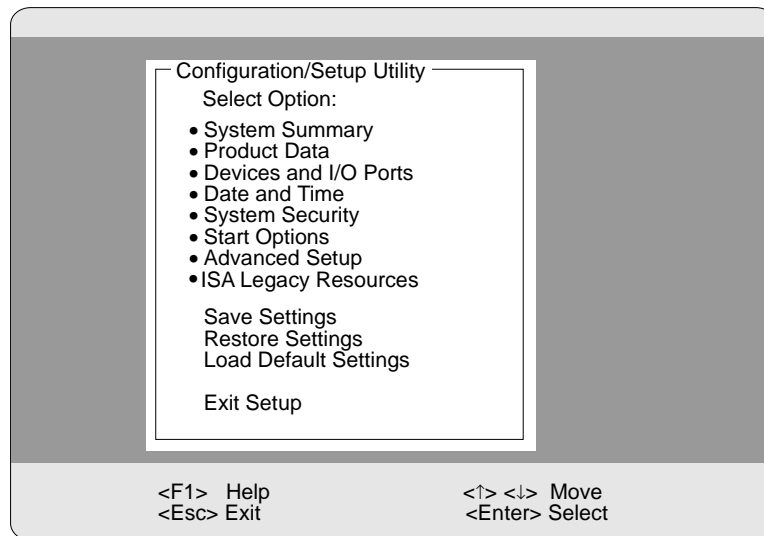
Using the Configuration/Setup Utility Program

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.

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 5 on page 231) before making any changes.

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



Note: Depending on the level of password protection, a limited version of the menu might appear. See “Password Overview” on page 44 for more information.

Using the Configuration/Setup Utility Program

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).

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 on-line 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 50).

To access the Configuration/Setup Utility program:

1. Turn on the server and watch the screen.
2. When the message Press F1 to enter Configuration/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 bar 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 it causes an error during the power-on self-test (POST), a “▲” displays next to the menu selection that contains the change.

Using the Configuration/Setup Utility Program

Installing a 70 ns Memory Upgrade

The main memory in your server uses memory modules¹ for temporary storage of data and instructions. These modules are also known as *single-inline memory module (SIMMs)* and *dual-inline memory modules (DIMMs)*. The system board contains four SIMM sockets and one DIMM socket, where you can install extra memory modules. See “Working with Memory-Module Kits” on page 81 for installation instructions and additional information about memory modules.

Your server comes with a minimum of two 8 MB, 60 nanosecond (ns), fast page (FP), parity SIMMs. If you need additional memory for your server, you must install SIMMs or DIMMs as described in “Working with Memory-Module Kits” on page 81.

The POST that your server performs always sets the system memory to 60 ns timing. When you add SIMMs or DIMMs with 70 ns timing, you must use the Configuration/Setup utility program to set the memory accordingly.

Note: Your server will operate properly with a combination of 60 ns and 70 ns memory modules, if you set the speed to 70 ns. You must change the memory speed to 70 ns if any memory modules have 70 ns timing.

To set the memory to 70 ns:

1. Install the 70 ns SIMMs or DIMMs in the available sockets, as described in “Working with Memory-Module Kits” on page 81.
2. Start the Configuration/Setup utility program as described in “Using the Configuration/Setup Utility Program” on page 38.
3. Select **Advanced Setup** from the Configuration/Setup utility program menu.
4. Select **Memory Control**.
5. Use the arrow keys to select 70 ns timing.

¹ Your server supports a maximum of 128 MB of SIMMs. The maximum amount of memory (combined SIMMs and DIMMs) that your server supports is 160 MB.

Using the Configuration/Setup Utility Program

6. Save the new settings and turn off the server.

System Summary

Select this choice to view system information, including the type and speed of the microprocessor, amount of memory, and the number of disk 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 and on the limited Configuration/Setup user's menu.

Product Data

Select this choice to display information about your PC Server 310, 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, and also on the limited Configuration/Setup user's 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 assignments for devices, video, or serial or parallel ports:

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**.

Using the Configuration/Setup Utility Program

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.

Assigning Serial Ports

Select this choice to assign serial ports and infrared ports.

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

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

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.

Your system comes with one infrared port where you can connect an optional infrared transceiver module. This enables you to transfer data to and from other infrared-capable computers or printers. Use this choice to change the infrared assignment.

Using the Configuration/Setup Utility Program

Configuring Parallel Ports

Select this choice 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, you should review the documentation that comes with the display to determine the display 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 **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.

Using the Configuration/Setup Utility Program

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 hard disk drive and diskette drive access.

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

Password Overview

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

The server displays the Enter password prompt when:

- You enter the Configuration/Setup utility program
- You start the server from a diskette
- An administrator password is the only password set
- A power-on password is the only password and the password prompt is set to **On**
- Both an administrator and power-on password are set and the password prompt is set to **On**

The server does not display a password prompt when:

- Neither a power-on or administrator password is set
- A power-on password is the only password, the password prompt is set to **OFF**, 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.

Using the Configuration/Setup Utility Program

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

Type of Password	Results
No password set	<ul style="list-style-type: none">• No password required to start system.• User can access all choices on the Configuration/Setup utility program menu.
Power-on password only	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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 <i>and</i> power-on password	<p>User can enter either password to complete the system startup.</p> <ul style="list-style-type: none">• 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.

To set an administrator password:

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

Following a warning, the **Administrator Password** menu appears.

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

Using the Configuration/Setup Utility Program

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.

The password becomes effective immediately after you select **Set or Change Administrator Password**.

To delete an administrator password:

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

Following a warning, the **Administrator Password** menu appears.

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.

Using the Configuration/Setup Utility Program

Setting a Power-on Password

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

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.

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.

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.

Using the Configuration/Setup Utility Program

Restricting Access to Hard Disk Drives and Diskette Drives

The setting for the **Secure Hard Disk Drives and Diskette Drives** option controls who has access to the hard disk drives or 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 hard disk drives and diskette drives.

To change this setting so that the access to the hard disk drives and diskette drives is disabled, select the System Security menu option; then, select **Secure Hard Disk Drives and 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 the administrator password is enabled, only the administrator can change this setting.

Defining the Start Options

Start options take effect when you start your server.

You can select keyboard operating characteristics, such as the keyboard speed. You can also specify whether the keyboard number lock 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 hard disk drive in bay 1.

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 the tests that your server runs at startup. This includes the SureTest BIOS test tool and a virus detection test. You can also choose whether to run the POST in enhanced or quick mode.

Using the Configuration/Setup Utility Program

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.

Advanced Setup

Select **Advanced Setup** to change values for advanced hardware features such as cache control and ROM shadowing. A warning message appears when you select this choice, to alert you that the system might malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

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** when you restart your server after adding or replacing an L2 cache kit, to enable the cache. Use the following procedure:

1. Start the Configuration/Setup utility program.
2. Select **Advanced Setup**.
3. Select **Cache Control**.
4. Select **Cache State**.
5. Press the Left Arrow (←) or Right Arrow (→) key to change the cache state to **Enabled**.

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 node. When you change this value to **Disabled**, the system is unable to update the configuration during POST.

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

Resolving Configuration Conflicts

ISA Legacy Resources Setup

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

- Memory
- I/O ports
- DMA
- Interrupt

These resources are not used by the system or by Plug and Play adapters.

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 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).

Resolving Configuration Conflicts

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 52 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 and change resources used by the system board functions. Record the current settings before making any changes. (See “Starting the Configuration/Setup Utility Program” on page 39 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 77.

Resolving Configuration Conflicts

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 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 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 PC Server screen appears briefly and then disappears. 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

Using the SCSISelect Utility Program

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*.
- Host Adapter SCSI Termination
Select this choice to configure SCSI controller termination. The default value is *Enabled*.
- 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 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 SCSISelect Utility Program

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.

3. For information about installing an operating system after the hard disk drive is formatted, see Chapter 2, “Installing Software.”

Using the SCSISelect Utility Program

Chapter 4. Installing Options

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

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Before You Begin

Before You Begin

- Become familiar with the safety and handling guidelines specified under “Safety Information” on page ix, “Electrical Safety” on page 59, and “Handling Static-Sensitive Devices” on page 60. 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.
- 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

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:

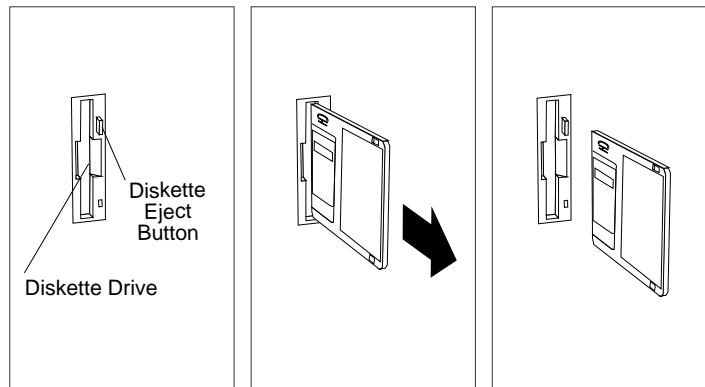
- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters, the riser card, and memory-module kits by the edges. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you are installing a new 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 59 and “Handling Static-Sensitive Devices” on page 60.

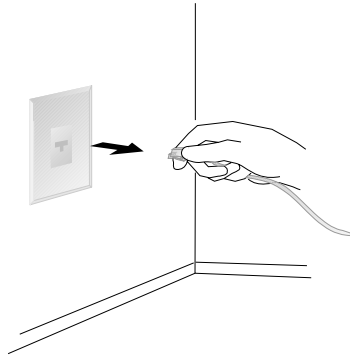
1. Unlock the server door, if locked.
2. Remove the front door. Open the front door completely and lift it up. Set the door aside.
3. Remove any media (diskettes or tapes) from the drives; then, turn off all attached devices and the server.



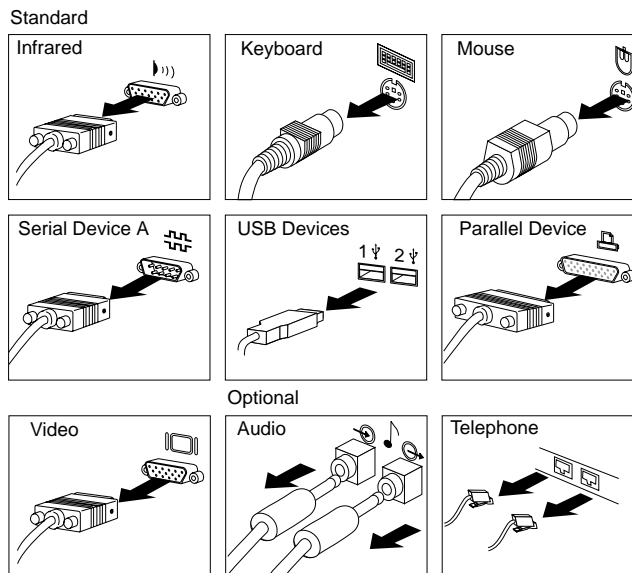
Preparing to Add Options

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

Note: If you are in the United Kingdom, you must perform this step *before* disconnecting the power cord.

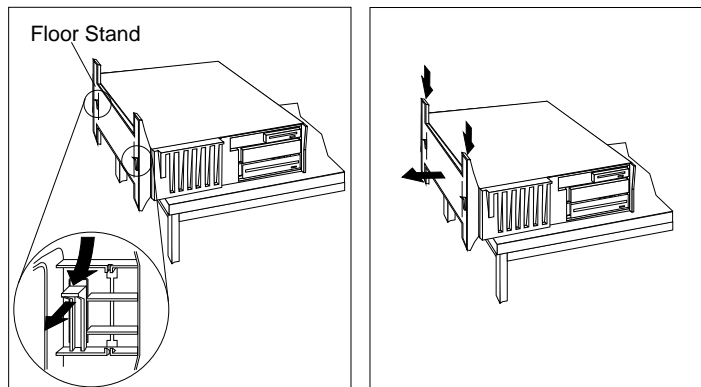


5. Unplug all power cords (cables) from electrical outlets; then, disconnect all other cables from the back of the server. This includes standard and optional features.



Removing the Floor Stand

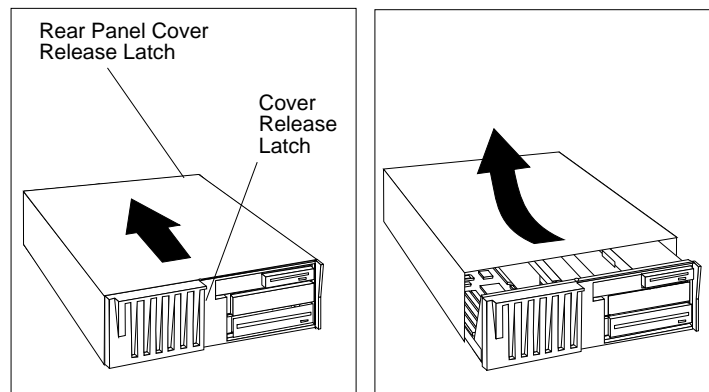
1. Position the server on a table.
2. Turn the server on its side so that the front door hinges are at the top of the machine, facing you.
3. Extend the left side of the server (the side with the floor stand) over the end of the table, approximately 40 mm (1.5 in.).
4. Locate the two release tabs on the bottom of the floor stand.
5. Hold the server firmly against the desk or table, and press both release tabs downward.
6. Slide the stand downward and remove it from the server cover. Be sure to hold onto the floor stand to prevent it from falling once it is released from the cover.
7. Set the floor stand aside.



Preparing to Add Options

Removing the Cover

1. Slide the front panel cover release latch down, displaying the Unlocked icon.
2. Press on the cover release latch on the back panel above the fan and slide the cover away from the front panel.
3. Lift up the cover and remove it. Set it aside.



Preparing to Add Options

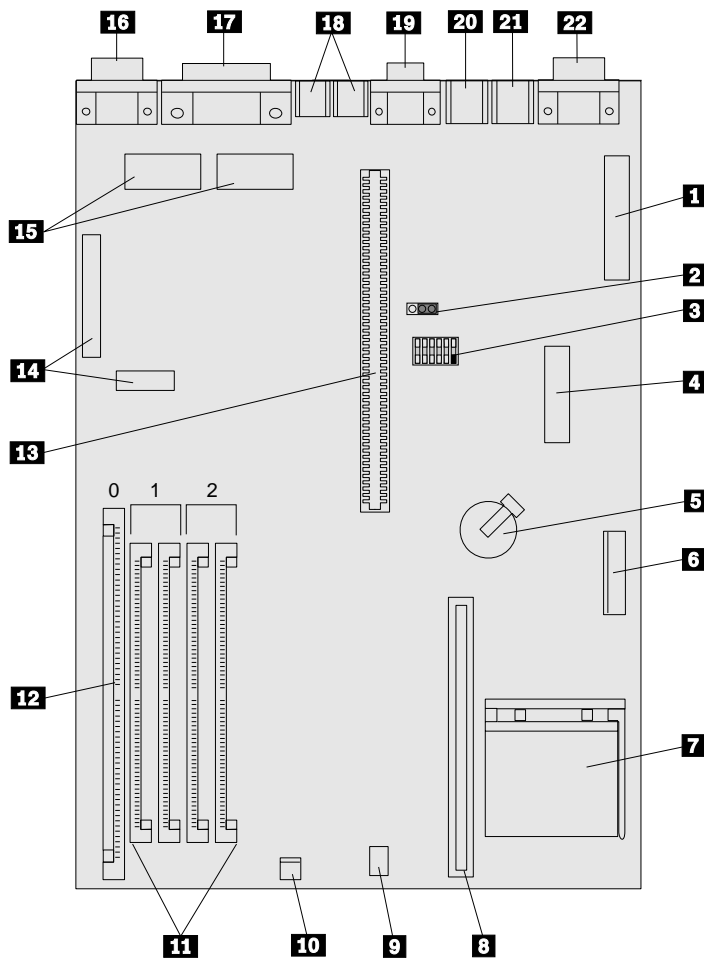
To install or remove

- An adapter, go to “Working with Adapters” on page 68
- A memory-module kit, go to “Working with Memory-Module Kits” on page 81
- A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
- A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
- An internal drive, go to “Working with Internal Drives” on page 106
- A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132

Locating System-Board Components

Locating System-Board Components

The following simplified layout of the system board identifies server components. You might need to refer to this figure before you install hardware in or remove hardware from your server, or when you record information in the tables in “Installed Device Records” on page 230.



Locating System-Board Components

The system-board components are:

1	Power connector (5 V)
2	Password jumper, normal position
3	Configuration switch set
4	Diskette connector
5	Battery
6	Power connector (3.3 V)
7	Processor socket
8	Cache memory module connector
9	Fan connector
10	Power LED ² connector
11	SIMM ² connectors (Banks 1 and 2)
12	DIMM ² connector (Bank 0)
13	Riser connector
14	VESA ² passthrough connectors
15	Video upgrade sockets
16	Video port
17	ECP/EPP ² parallel port
18	USB ports (1 and 2)
19	Serial port A
20	Mouse port
21	Keyboard port
22	Infrared port

² DIMM = dual-inline memory-module; ECP/EPP = extended capabilities port/enhanced parallel port; LED = light-emitting diode; SIMM = single-inline memory-module; VESA = Video Electronics Standards Association.

Working with Adapters

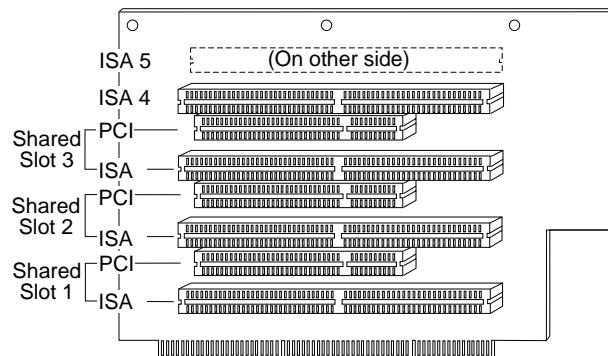
You can add adapters to provide communication, specialized graphics, and sound. This extends the capabilities and power of your server. Many adapters provide bus-master capabilities, which enable the adapters to perform operations without interrupting the server's microprocessor.

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.

The server riser card has five 16-bit, industry-standard architecture (ISA) bus expansion slots (four on one side, one on the other side), and three 32-bit, peripheral component interconnect (PCI) bus expansion slots. Three of the ISA/PCI slots are shared, and two of the ISA slots are dedicated. You can use only one ISA or PCI adapter per shared slot.



Working with Adapters

One PCI/ISA slot contains an UltraSCSI adapter³. This PCI adapter is also known as the Ultra/Ultra Wide adapter. One of the ISA slots contains an EtherJet adapter. The remaining slots are available for future expansion and growth.

Your server supports 3.3-volt PCI adapters.

Plug and Play

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

Plug and Play Adapters

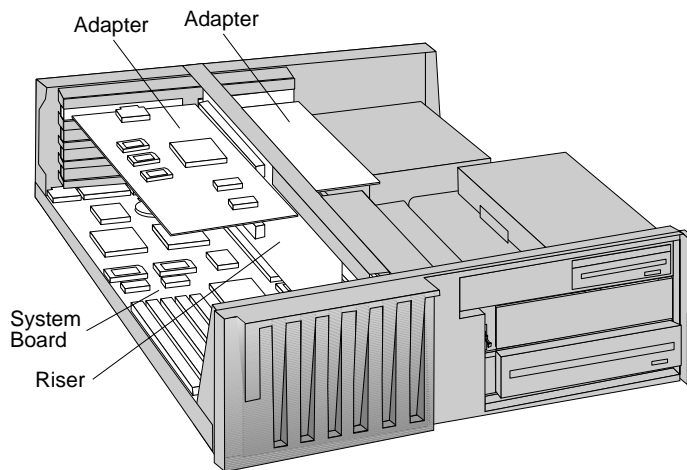
Plug and Play adapters are easier to install and set up because they are auto-configuring. This means that there are no jumpers or switches to set.

A Plug and Play adapter comes with built-in identification and configuration specifications set in memory on the adapter that provide 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.

³ This adapter conforms to the proposed ANSI SCSI-3 Fast-20 standard (also known as UltraSCSI).

Working with Adapters

The following figure shows where adapters and the riser card are located in the server.



Note: This illustration is an example configuration only. The adapters in your server might be in different slots.

Legacy Adapters

If an adapter that you install is not Plug and Play compatible, the Configuration/Setup utility program can help you manually configure the adapter. Adapters that are not Plug and Play compatible are known as *legacy devices*.

Configuration/Setup Utility Program

Within the Configuration/Setup utility program, the ISA Legacy Resources screen displays server resources that are typically required by adapters:

- I/O port address
- Memory address
- IRQ line
- DMA channel

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

Working with Adapters

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

Notes:

1. Refer to the documentation that comes with the adapter for information about required system resources. Then make the appropriate jumper or switch settings on the adapter.
2. If you have a resource conflict, set the resources used by the ISA legacy adapter to **[Not available]**. This will manually configure the ISA legacy adapter to that specific server resource. Once Plug and Play detects that a resource is not available, it will skip that resource, and reconfigure to other available system resources. (See “Using the Configuration/Setup Utility Program” on page 38.).

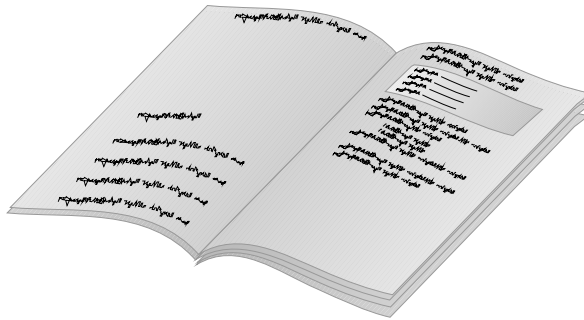
Working with Adapters

Installing Adapters

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- 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 64).

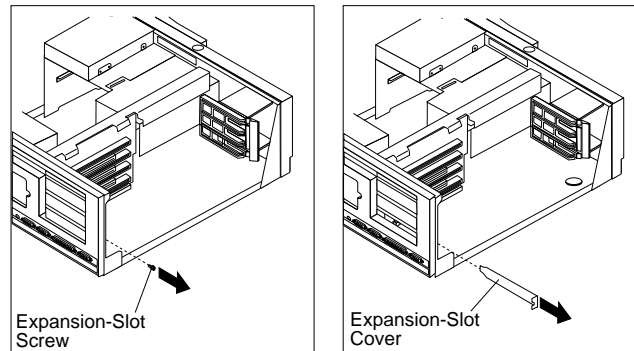
1. Review the instructions that came with the adapter:
 - a. Determine if the adapter must be installed in a certain slot. If there are no restrictions other than those previously discussed in this chapter, you may use any empty, bus-compatible slot.
 - b. If you need to change the switch or jumper settings on your adapter, follow the instructions that came with the adapter.



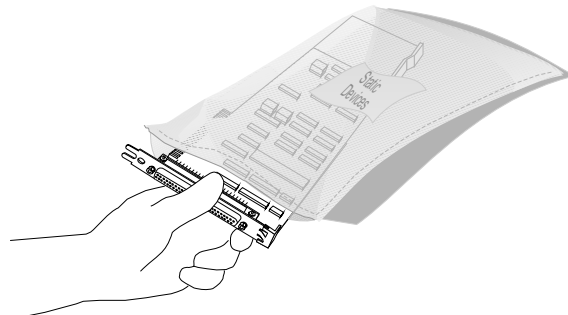
2. Determine which expansion slot you will use for the adapter.

Working with Adapters

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.



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

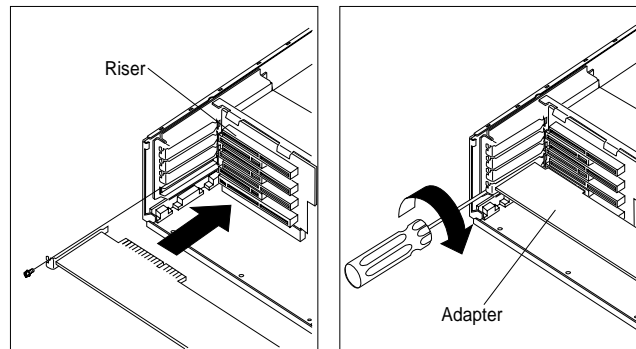


Working with Adapters

5. Install the adapter:

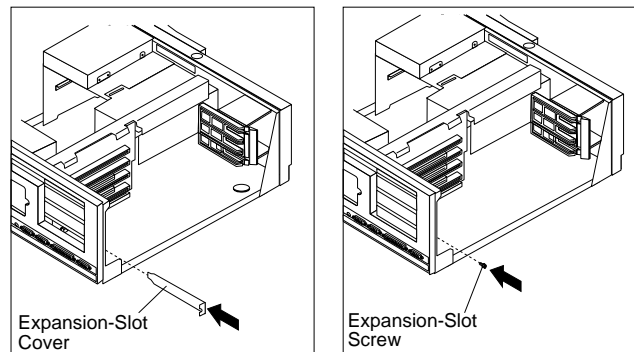
Note: If a component in the server or on the adapter interferes with the installation, use another slot.

- a. Carefully grasp the adapter and align it with the expansion slot.
- b. Press the adapter *firmly* into the expansion slot.
- c. Tighten the expansion-slot screw on the top of the adapter bracket.

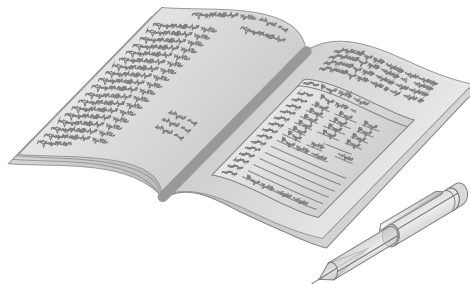


Working with Adapters

6. Replace the expansion-slot cover:
 - a. Slide the cover over the expansion slot that contains the adapter that you just installed.
 - b. Replace and tighten the expansion-slot screw on the top of the expansion-slot cover.



7. Go to the device-record form in Appendix C, “Server Records” on page 229, and write the adapter name next to the slot into which it is installed; then, return here.



Working with Adapters

What to do next?

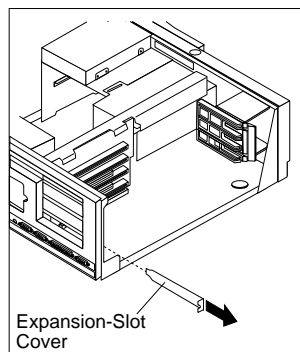
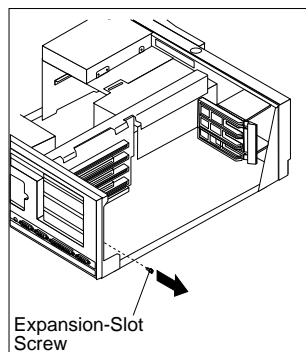
- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 81
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Removing Adapters

Before you begin:

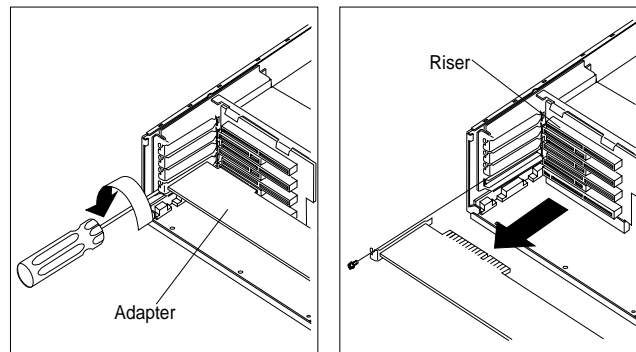
- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

1. Remove the expansion-slot cover from the slot where you want to remove 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.

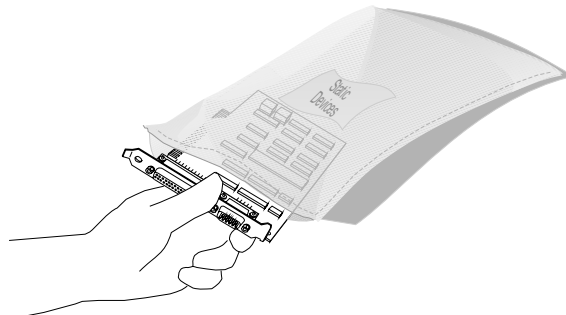


Working with Adapters

2. 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.



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

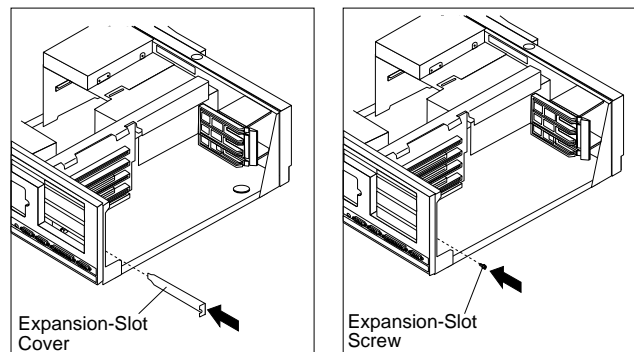


Working with Adapters

4. If you are installing another adapter in this expansion slot, see “Installing Adapters” on page 72 for instructions.

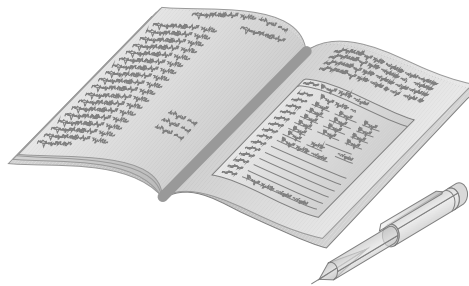
If you are not installing another adapter in this expansion slot, replace the expansion-slot cover:

- 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.



Working with Adapters

5. Go to the device-record form in Appendix C, “Server Records” on page 229, and delete the name of the adapter that you removed; then, return here.



What to do next?

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 81
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Working with Memory-Module Kits

Adding system memory to your server is an easy way to make programs run faster. You can increase the amount of system memory by installing options called *memory-module kits*. You can increase system memory by installing one or more memory-module kits. Your server can hold two types of memory-module kits: single-inline memory-module (SIMM) and dual-inline memory-module (DIMM).

Your server has four SIMM connectors distributed between two banks (1 and 2). Each SIMM kit contains two memory modules. Your server supports industry-standard, 72-pin, tin-lead SIMMs. Each kit that you install must contain matched-pair, parity SIMMs. The correct speed for these SIMM kits is 60 or 70 ns. You can install 4 MB, 8 MB, 16 MB, and 32 MB SIMMs in your server.

In addition to the SIMM connectors, your server has one vacant dual-inline memory module (DIMM) connector on the system board, in bank 0. You can install one parity DIMM into this connector. Later, if you need to increase the amount of memory in the server, you can remove the currently installed DIMM from the connector and replace it with a larger-sized DIMM. Your server supports industry-standard, 168-pin, gold DIMMs. The correct speed for these DIMM kits is 60 or 70 ns. You can install 16 MB and 32 MB DIMM kits in your server.

Notes:

1. Memory modules can have a maximum height of 1.2 inches. However, if you use SIMMs that are more than one inch high in your server, you cannot install a full-length adapter in the bottom expansion slot of the riser.
2. Install only parity SIMMs/DIMMs to enable parity.
3. A combination of parity and non-parity SIMMs/DIMMs will configure as non-parity.
4. A configuration option is available to allow parity memory to be used in Error Correction Code-Parity (ECC-P) mode.

Working with Memory-Module Kits

5. You can use a combination of extended data output (EDO) and fast page (FP) SIMMs/DIMMs, provided that matched pairs are installed in each bank.
6. Your server runs a POST that sets the system memory to 60 ns timings.
 - a. When you add SIMMs or DIMMs with 70 ns timing, you must run the Configuration/Setup utility program to set the memory to that value, if any of the memory modules in your server have 70 ns timing. See “Installing a 70 ns Memory Upgrade” on page 40 for details about setting the memory to 70 ns.
 - b. Your server will operate properly with a combination of 60 ns and 70 ns memory modules, if you set the speed to 70 ns. You must change the memory speed to 70 ns if any memory modules have 70 ns timing.

What to do next?

- Before you install memory modules, review the information in “Standard and Optional Memory-Module Configurations” on page 83.
- To install or remove SIMMs, go to “Installing or Removing SIMM Kits” on page 83.
- To install or remove a DIMM, go to “Installing or Removing DIMM Kits” on page 89.

Working with Memory-Module Kits

Standard and Optional Memory-Module Configurations

Table 1 shows the standard memory-module configurations⁴.

<i>Table 1. Standard Memory-Module Configuration</i>					
Type	Speed	EDO/FP	Parity	Size	Total
SIMMs	60 ns	FP	Y	8 MB (two)	16 MB

Table 2 shows the SIMMs and DIMMs that your server supports⁵.

<i>Table 2. Optional Memory-Module Configuration</i>					
Type	Speed	EDO/FP	Parity	Sizes Supported	
SIMM	60 ns	EDO	N	4, 8, 16, 32 MB	
SIMM	60 ns	FP	Y	4, 8, 16, 32 MB	
SIMM	70 ns	FP	N	4, 8, 16, 32 MB	
SIMM	70 ns	FP	Y	4, 8, 16, 32 MB	
DIMM	60 ns	EDO	N	16, 32 MB	
DIMM	60 ns	FP	Y	16, 32 MB	

Installing or Removing SIMM Kits

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

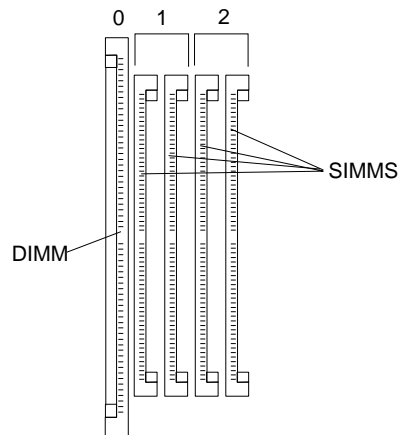
⁴ Standard memory-module configurations are subject to change.

⁵ Your server supports a maximum of 128 MB of SIMMs. The maximum amount of memory (combined SIMMs and DIMMs) that your server supports is 160 MB.

Working with Memory-Module Kits

1. The following illustration shows the memory banks on your server system board. These banks are located at the left-front corner of the system board. (See the system-board illustration in “Locating System-Board Components” on page 66.)

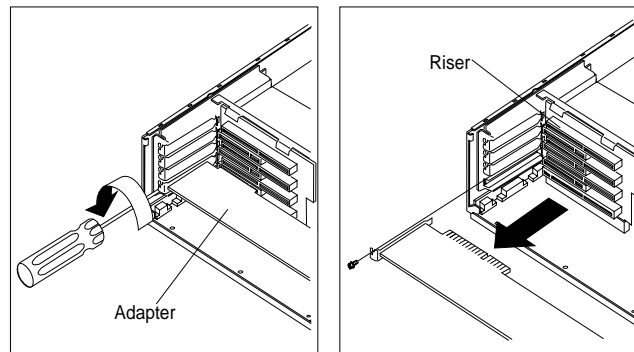
Bank 1 and bank 2 hold matched-pair SIMM kits. When installing a SIMM kit, a matched-pair is first loaded into bank 1, and then into bank 2 as required.



Determine the appropriate bank or banks for the SIMM kits that you want to install or remove.

Working with Memory-Module Kits

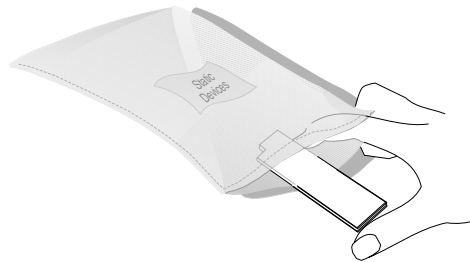
2. Note the slot position of any installed adapters; then, remove any adapters that block access to the SIMM kit connectors. (In most cases, it is not necessary to remove half-length adapters. For information about removing an adapter, see “Removing Adapters” on page 77.)



What to do next?

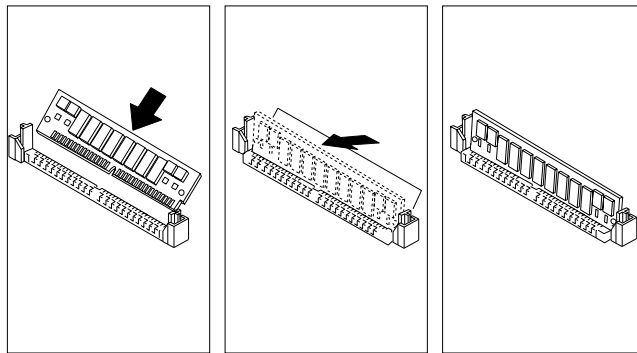
- If there are empty SIMM kit connectors on the system board, use the procedure in step 3 to install memory.
- If no empty SIMM kit connectors remain on the system board, continue with step 4 on page 87 to remove memory.

3. Use the following procedure to install SIMMs:
 - a. Touch the static-protective package containing the SIMM kit to any *unpainted* metal surface on the server; then, remove the memory-module kit from the package.



Working with Memory-Module Kits

- b. With the notch in the SIMM kit toward the front of the server, align the center key slot and insert a SIMM kit into the left-most empty SIMM kit connector. The SIMM kit will seat at an angle.
- c. Pivot the top of the SIMM kit toward the connector until it snaps into the retaining clips.



Installing a SIMM Kit

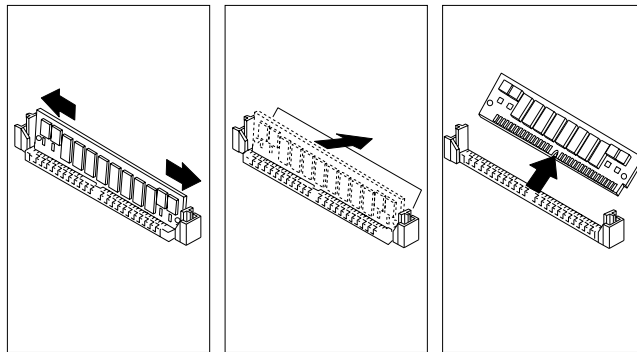
- d. Repeat this procedure for each SIMM kit that you want to install. (Remember to install them in matched pairs.)

What to do next?

- To install a DIMM kit, go to step 3 on page 91.
- To remove SIMM kits, go to step 4 on page 87.
- If you do not have more memory to install or remove, continue with step 5 on page 87.

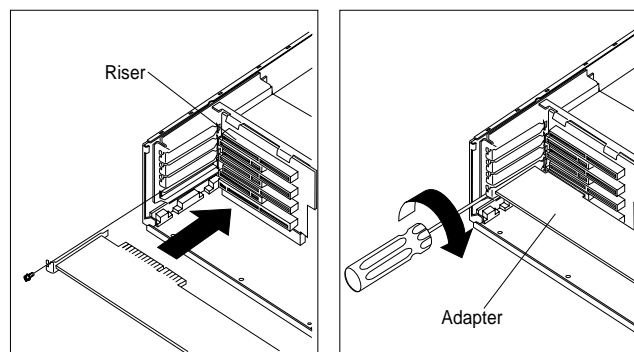
Working with Memory-Module Kits

4. Use the following procedure to remove SIMMs:
 - a. Starting with the right-most populated SIMM connector, push outward against the retaining clips at both ends of the SIMM kit connector.
 - b. Pivot the SIMM kit away from the connector until it is released from the clips.
 - c. Lift the SIMM kit out of the connector.



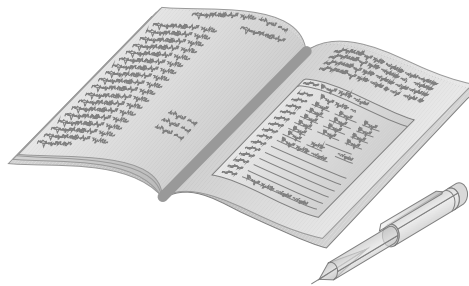
Removing a SIMM Kit

- d. Repeat this procedure for each SIMM kit that you want to remove. (Remember to remove them in matched pairs.)
5. Reinstall any previously removed adapters into the same slots from which they were removed. For information about installing adapters, see “Installing Adapters” on page 72.



Working with Memory-Module Kits

6. Go to the device-record form in Appendix C, “Server Records” on page 229, and update the current configuration of the memory-module kits.



What to do next?

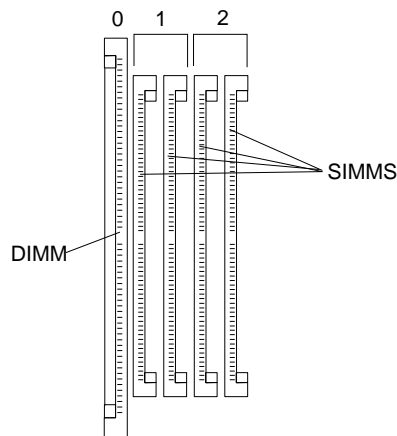
- If you installed 70 ns memory modules, you must run the Configuration/Setup utility program afterwards. See Chapter 3, “Configuring Your Server” for details about the Configuration/Setup utility program.
- To install or remove:
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Installing or Removing DIMM Kits

1. Locate the DIMM kit connector at the left-front corner of your server system board. (See the system-board illustration in “Locating System-Board Components” on page 66.)

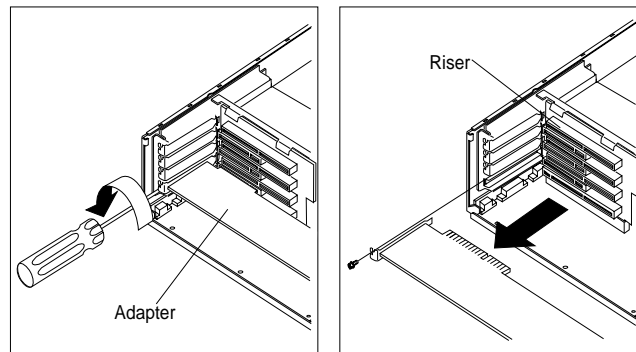
The following illustration shows the memory banks on your server system board.

Bank 0 holds one DIMM.



Working with Memory-Module Kits

2. Note the slot position of any installed adapters; then, remove any adapters that block access to the DIMM kit connector. (In most cases, it is not necessary to remove half-length adapters. For information about removing an adapter, see “Removing Adapters” on page 77.)

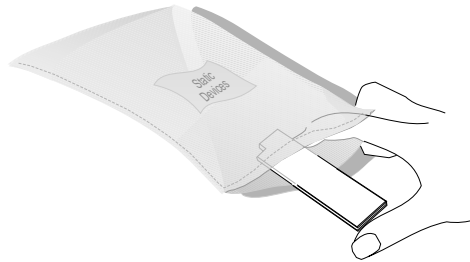


What to do next?

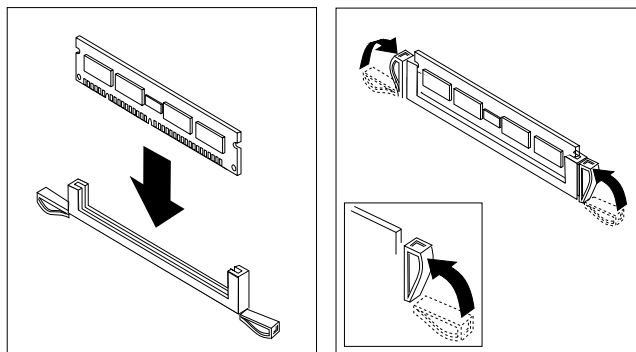
- To install a DIMM kit, go to step 3 on page 91.
- To remove a DIMM kit, go to step 5 on page 92.

Working with Memory-Module Kits

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.)

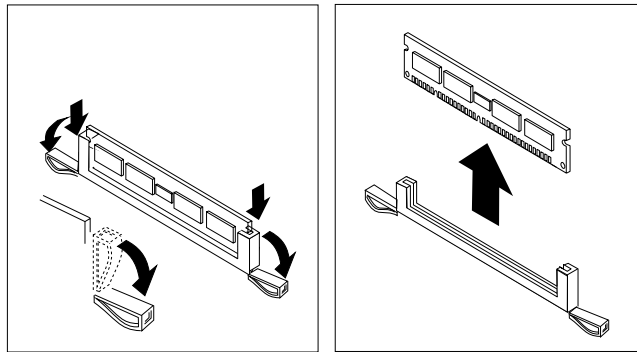


Installing a DIMM Kit

4. Go to step 6 on page 92.

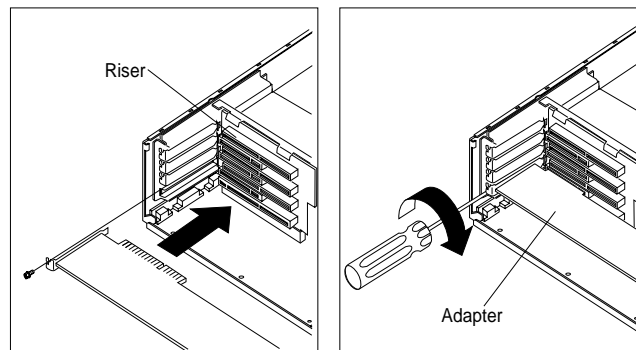
Working with Memory-Module Kits

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 eject the DIMM kit from the connector.
 - b. Lift the DIMM kit out of the connector.



Removing a DIMM Kit

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 72.)



Working with Memory-Module Kits

7. Go to the device-record form in Appendix C, “Server Records” on page 229, and update the current configuration of the memory-module kits.



What to do next?

- If you installed 70 ns memory modules, you must run the Configuration/Setup utility program afterwards. See Chapter 3, “Configuring Your Server” for details about the Configuration/Setup utility program.
- To install or remove:
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Working with Video Memory-Module Kits

Working with 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 system board comes with 1 MB of preinstalled video memory. If you expand the memory buffer to 2 MB, your server controller will support high-resolution graphics and text modes with 132 columns. You can increase the memory buffer size of the video memory in your server to a maximum of 2 MB, by installing two optional, complementary metal oxide semiconductor (CMOS) 40-pin, .5 MB, 256 KB x 16-bit, 60 ns, dynamic random-access memory (DRAM) modules with Fast Page Mode. These options are called *video memory-modules*. The system board has sockets for two optional video memory-modules.

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

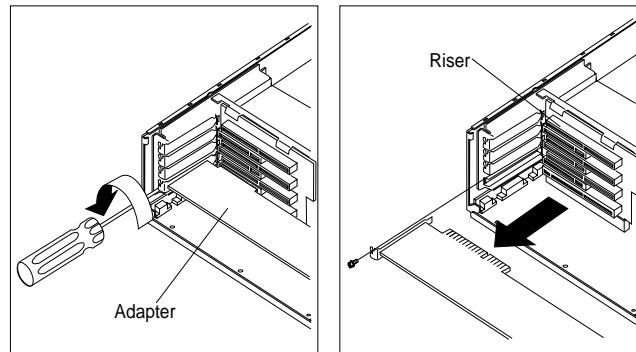
Installing Video Memory-Module Kits

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

Working with Video Memory-Module Kits

1. Locate the video memory-module connectors (sockets) on your server system board. (See the system-board illustration in “Locating System-Board Components” on page 66.)
2. Note the slot position of any installed adapters; then, remove any adapters that block access to the video memory-module connector. (For information about removing an adapter, see “Removing Adapters” on page 77.)

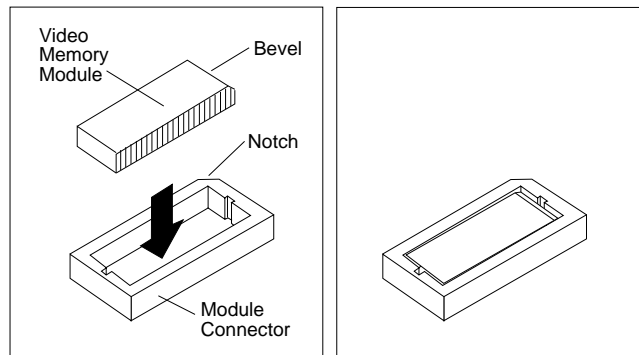


3. Install the video memory modules:
 - a. Touch the static-protective package containing the video memory-module kit to any *unpainted* metal surface on the server; then, remove the video memory-module kit from the package.



Working with Video Memory-Module Kits

- 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 video-memory socket on the system board.
- d. Press the video memory-module down firmly into the socket. Make sure that the video memory-module is fully inserted into the connector.

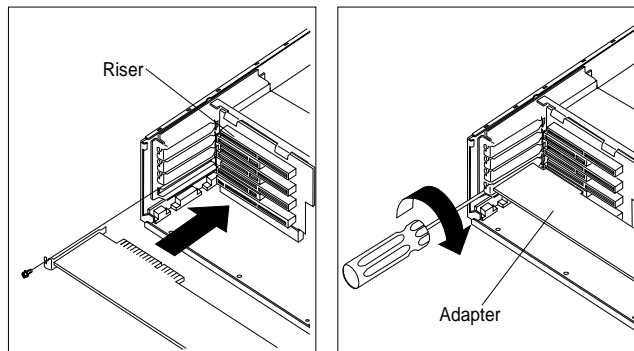


Installing a Video Memory Module

4. Repeat steps 3a on page 95 through 3d for the remaining video memory-module.

Working with Video Memory-Module Kits

5. 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 72.)



6. Go to the device-record form in Appendix C, “Server Records” on page 229, and update the current configuration of the video memory-module kit.



Working with Video Memory-Module Kits

What to do next?

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 81
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Working with Cache Memory-Module Kits

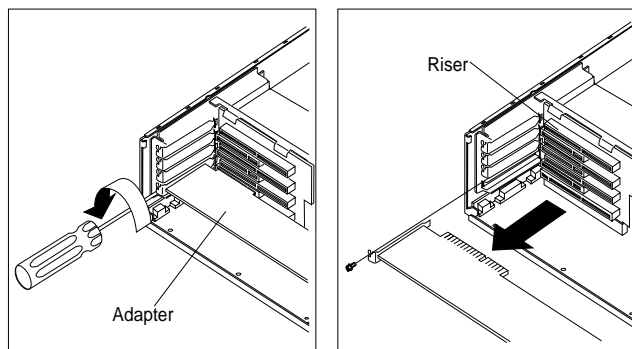
Adding cache memory increases the processing speed of the microprocessor in your server. Your server comes with 256 KB of preinstalled cache memory. An optional cache memory-module upgrade of 512 KB is available. Select the size that best suits your server processing requirements. Your server has one cache memory-module connector.

Installing Cache Memory-Module Kits

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

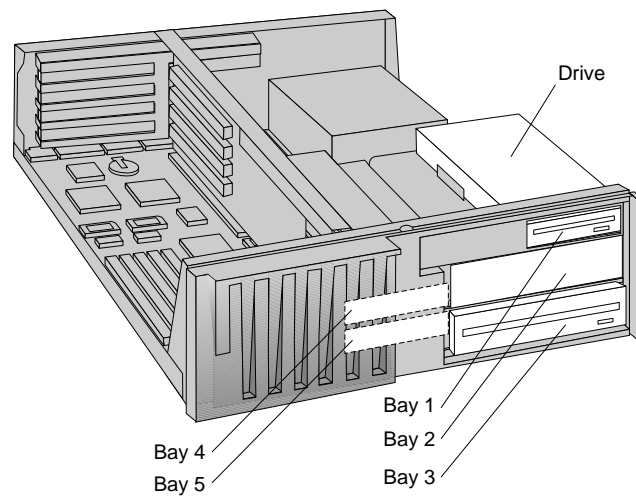
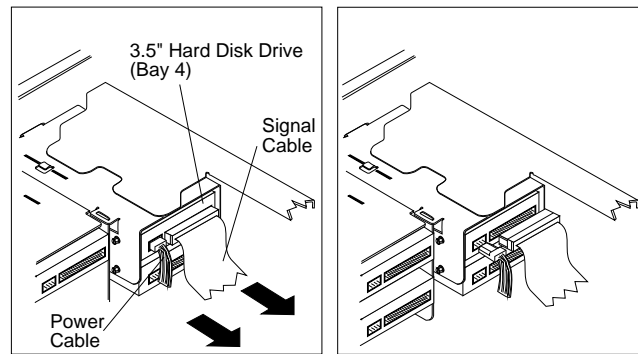
1. Locate the cache memory-module connector on your server system board. (See the system-board illustration in “Locating System-Board Components” on page 66.)
2. Note the slot position of any installed adapters; then, remove any adapters that block access to the cache memory-module connectors. (In most cases, it is not necessary to remove half-length adapters. For information about removing an adapter, see “Removing Adapters” on page 77.)



Working with Cache Memory-Module Kits

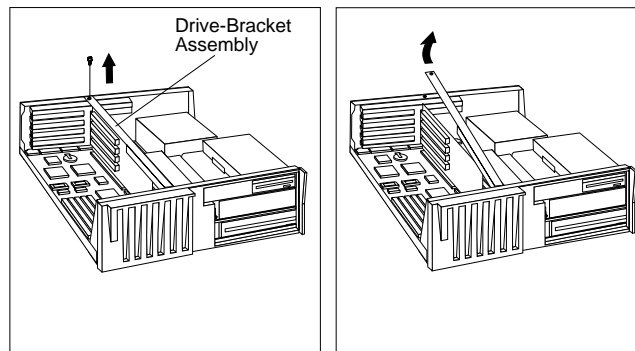
3. Disconnect the signal and power cables from the drives in the drive-bracket assembly.

Note: As an example, the following illustration shows how to remove these cables from a drive in bay 4.

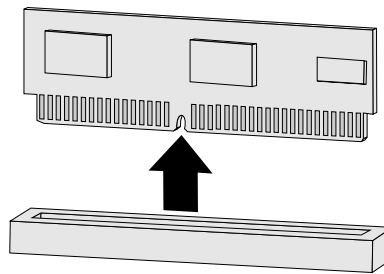


Working with Cache Memory-Module Kits

4. Remove the drive-bracket assembly from the server.



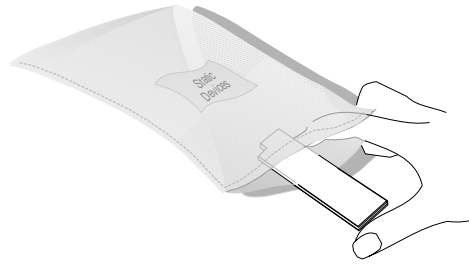
5. Gently pull the top edge of the currently installed cache memory-module up and out of the connector.



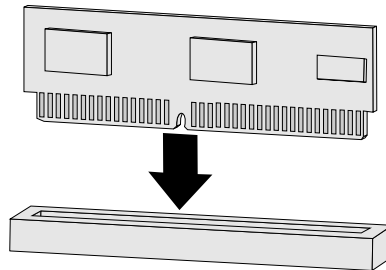
Removing a Cache Memory Module

Working with Cache Memory-Module Kits

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



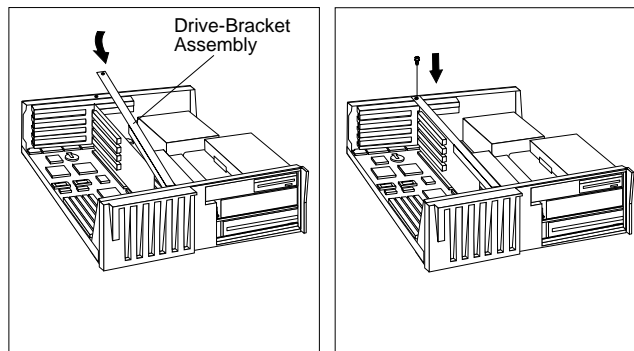
7. Position the module so that the notch on the bottom edge aligns with the notch in the connector.
8. Insert the bottom edge of the memory module into the connector and push down evenly. Make sure that the module is fully inserted into the connector.



Installing a Cache Memory Module

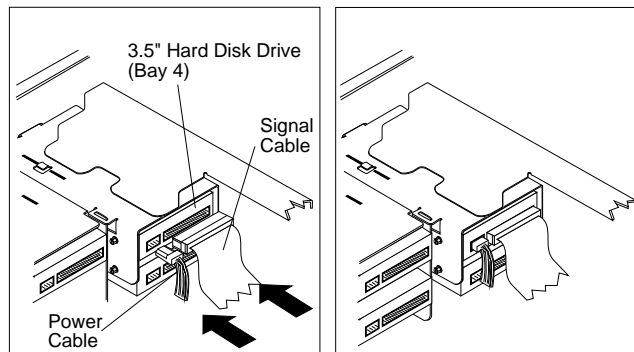
Working with Cache Memory-Module Kits

9. Reinstall the drive-bracket assembly.



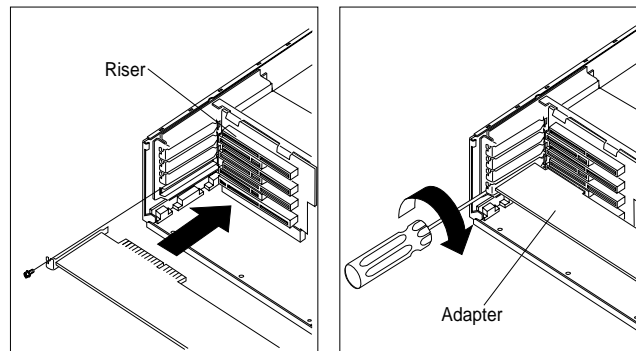
10. Reconnect the signal and power cables to the drives.

Note: As an example, the following illustration shows how to connect these cables from a drive in bay 4. (For an illustration of bay locations, see step 3 on page 100.)

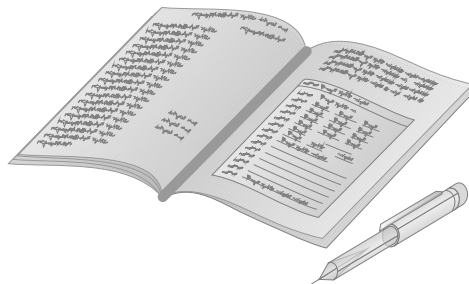


Working with Cache Memory-Module Kits

11. 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 72.)



12. Go to the device-record form in Appendix C, “Server Records” on page 229, and record the current configuration of the cache memory.



Working with Cache Memory-Module Kits

What to do next?

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 81
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Working with Internal Drives

Working with Internal Drives

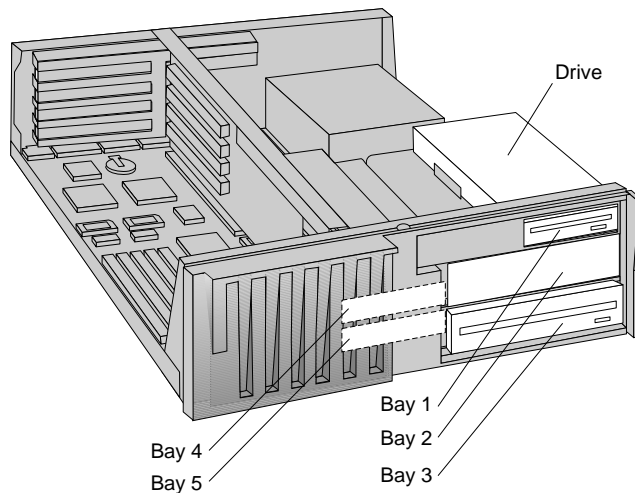
Drives are devices that your server uses to read, store, and retrieve data. Different types of drives are available, such as:

- Diskette drives
- Hard disk drives
- Tape drives
- CD-ROM drives

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 PC Server 310 comes with a diskette drive preinstalled in bay 1, a CD-ROM drive preinstalled in bay 3, and three additional bays, two of which are used only for hard disk drives (bays 4 and 5). Depending on the number of available bays, your server can accommodate up to three hard disk drives.

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



Working with Internal Drives

Table 3 describes the types of drives that you can install in each bay. Table 4 describes the respective height requirements for the drives that you install in each bay.

Bays	Drives
Bay 1	3.5-inch diskette drive (installed)
Bay 2	5.25-inch diskette drive 3.5-inch diskette drive Tape backup drive CD-ROM drive Hard disk drive
Bay 3	CD-ROM drive (installed)
Bay 4	Hard disk drive
Bay 5	Hard disk drive

Bay	Maximum Height mm (in.)	Minimum Height mm (in.)
1	25.4 (1.0)	—
2	41.3 (1.6)	25.4 (1.0)
3	41.3 (1.6)	25.4 (1.0)
4	25.4 (1.0)	—
5	25.4 (1.0)	—

Notes:

1. Drives that are greater than 41.3 mm (1.6 in.) high cannot be used.
2. Drives that are 41.3 mm (1.6 in.) high are also known as full-height drives.
3. Drives that are 25.4 mm (1.0 in.) high are also known as half-height drives.

Working with Internal Drives

SCSI Devices

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.

Your server has two types of internal drive cables:

- 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. 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 three drive connectors. A fourth, unique connector attaches to the system board. 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. Use the middle connectors as required for additional diskette or tape drives.

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

Working with Internal Drives

The internal SCSI cable is attached to the hard disk drive, the CD-ROM drive, and the UltraSCSI adapter. You can attach two additional SCSI devices to this cable.

Notes:

1. Ensure that the drive connector at the end of a flat-ribbon cable is always connected to a device. This lowers the volume of electronic noise that emanates from the server. Ensure that the other end connector is connected to the SCSI adapter. Use the middle connectors as required for additional devices.
2. If you want to install more than one diskette drive, you must purchase a four-wire, Y-cable that provides two power connectors.

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.

Working with Internal Drives

If you install wide (16-bit) SCSI devices, you can set the IDs to any whole number between 8 and 15. If you install narrow (8-bit) SCSI devices, you can set the IDs to any whole number between 0 and 6. Refer to the instructions that come with the SCSI devices for information about setting a SCSI ID.

Termination Requirements

The devices at both ends of the SCSI bus must be terminated. If you attach SCSI devices (internal or external), you must terminate the last device in the chain. A special connector, called a terminator, is used to terminate a SCSI chain.

If you attach internal SCSI devices to the SCSI internal connector in your server, you must terminate the last internal device on the bus (cable) and disable the termination on the other devices connected to the UltraSCSI adapter. The UltraSCSI adapter is already terminated.

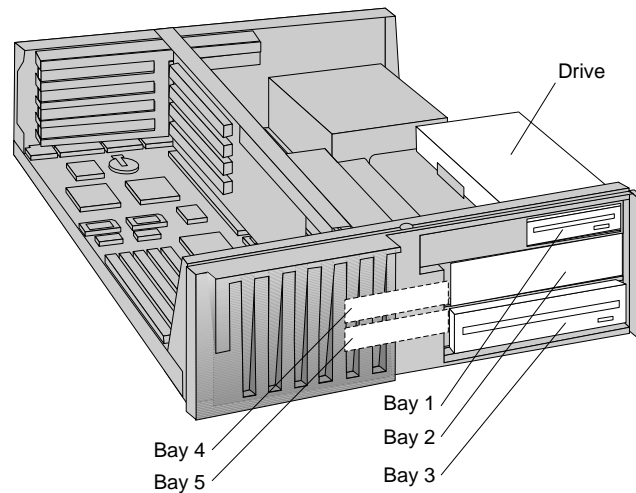
Refer to the instructions that come with the SCSI device for more information about termination. Refer to the *User's Reference* for additional information about your server's SCSI subsystem.

Installing Internal Drives

Before you begin:

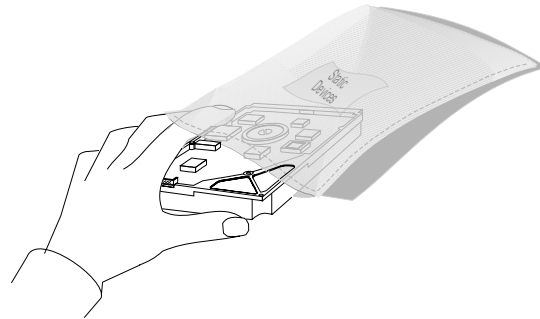
- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Read the instructions that came with the internal drive.
- Obtain a special mounting bracket, if you are installing a 3.5-inch device in bay 2. (See step 1 for bay locations. To order this bracket, contact your IBM reseller or IBM marketing representative.)
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

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



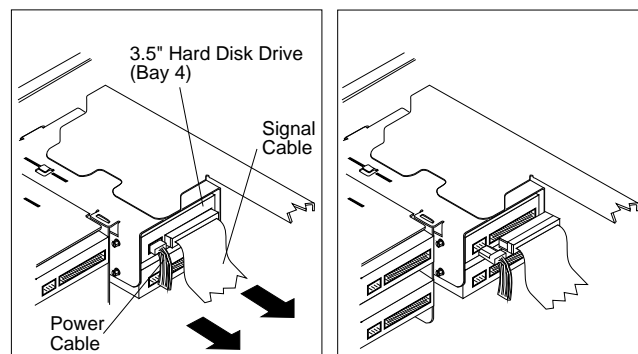
Working with Internal Drives

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



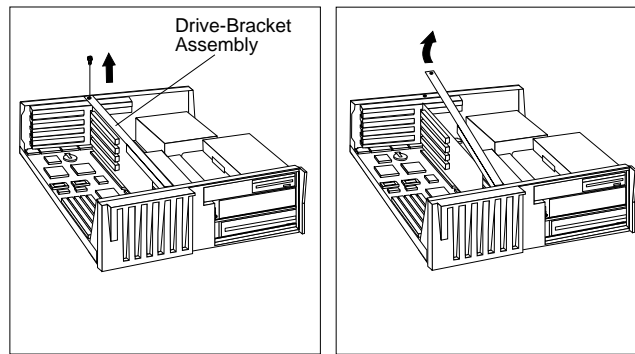
3. Using the instructions that came with the drive, together with these instructions, check that any switches or jumpers on the drive are set correctly. Change the settings if necessary.
4. Disconnect all cables from any drives in bays 4 and 5.

Note: As an example, the following illustration shows how to remove the cables from the drive in bay 4.



Working with Internal Drives

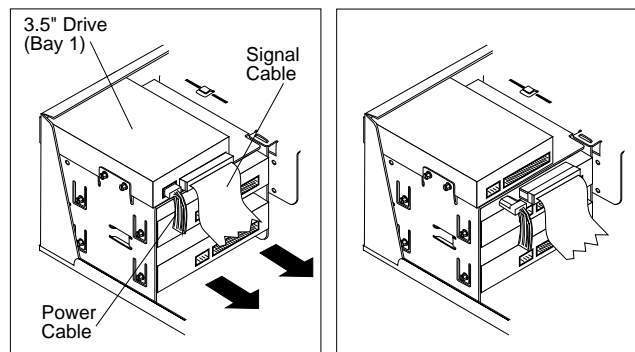
5. Remove the screw that secures the drive-bracket assembly; then, remove the assembly from the server.



What to do next?

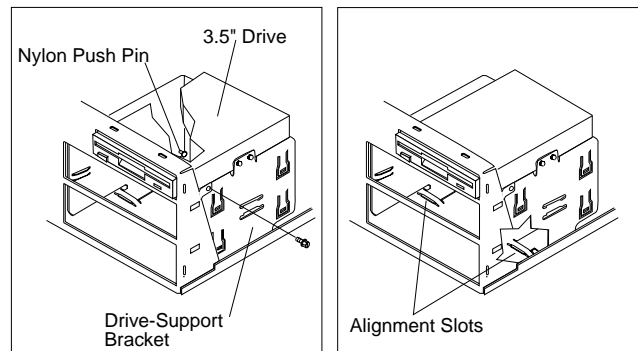
- To install a drive in bay 2, continue with the next step.
- To install a drive in bay 4, go to step 13 on page 118.
- To install a drive in bay 5, go to step 14 on page 119.

6. To install a drive in bay 2, disconnect the cables from the drives in bays 1, 2, and 3.

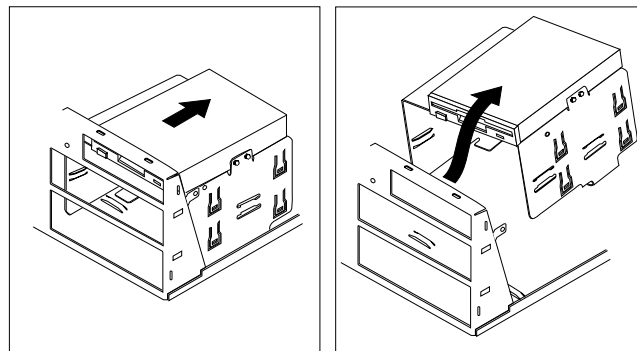


Working with Internal Drives

7. Remove the screws from the drive-support bracket.
 - a. Remove the screw from the upper-right front corner of the drive-support bracket.
 - b. If present, remove the nylon push pin at the lower-left rear of the bracket. (This shipping pin can be discarded.)
 - c. Carefully note how the tabs at the base of the drive-support bracket fit into the alignment slots on the server frame.

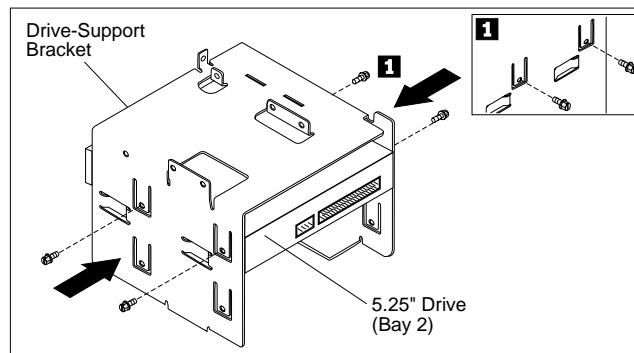


8. Slide the bracket slightly to the rear, then up and out of the server.



Working with Internal Drives

9. Attach the drive in bay 2 of the drive-support bracket.



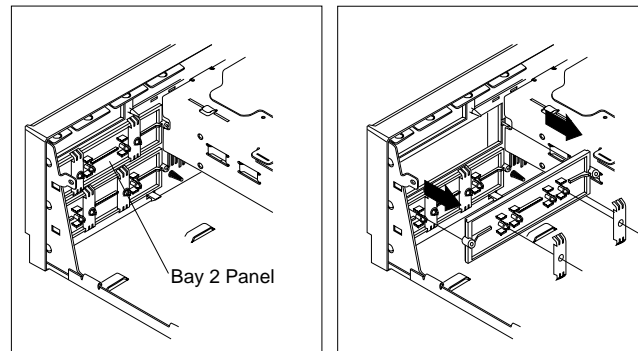
Note: To fit a 3.5-inch device in bay 2, a special mounting bracket is required. Attach the 3.5-inch device to the mounting bracket and fit the device in bay 2 in the same manner as a 5.25-inch device. Be sure that the screw holes in the mounting bracket line up with the screw holes in bay 2.

Working with Internal Drives

10. If you installed a drive other than a hard disk drive, remove the bay panel for bay 2.

Notes:

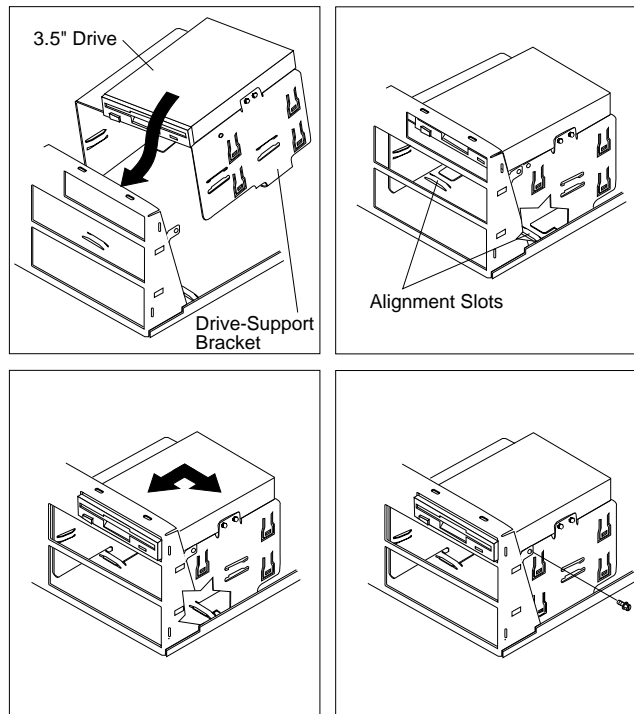
- a. To remove the front panel, tap lightly against each end of the panel using a small tool.
- b. Save the panel in case you need to use it again.



Working with Internal Drives

11. Reinstall the drive-support bracket.

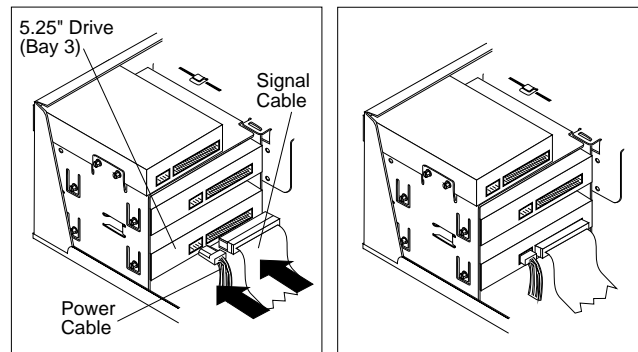
Note: Be sure the bracket tabs are inserted properly into the alignment slots.



Working with Internal Drives

12. Connect the signal and power cables to each of the installed drives. As an example, the following illustration shows how to connect the cables to the drive in bay 3.

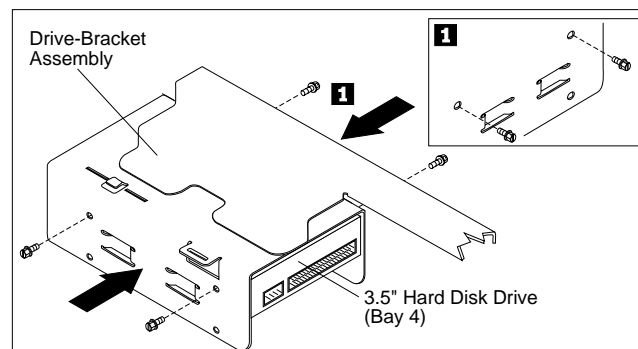
Note: Cable connectors are keyed and connect only one way.



What to do next?

- To install a drive in bay 4, continue with the next step.
- To install a drive in bay 5, go to step 14 on page 119.
- If you do not want to install any other drives, go to step 15 on page 119.

13. Attach the drive in bay 4 of the drive-bracket assembly.

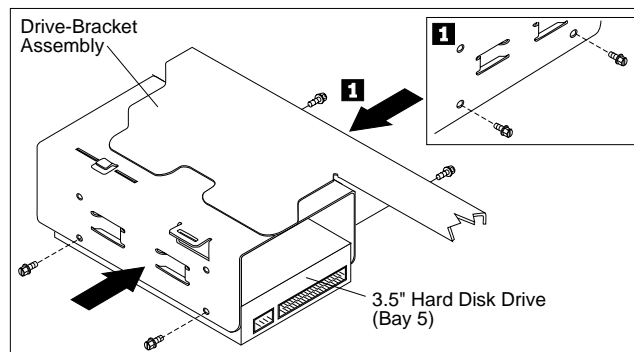


Working with Internal Drives

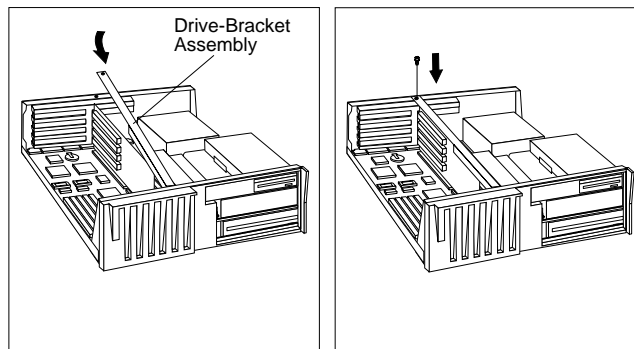
What to do next?

- To install a drive in bay 5, continue with the next step.
- If you do not want to install any other drives, go to step 15.

14. Attach the drive in bay 5 of the drive-bracket assembly.



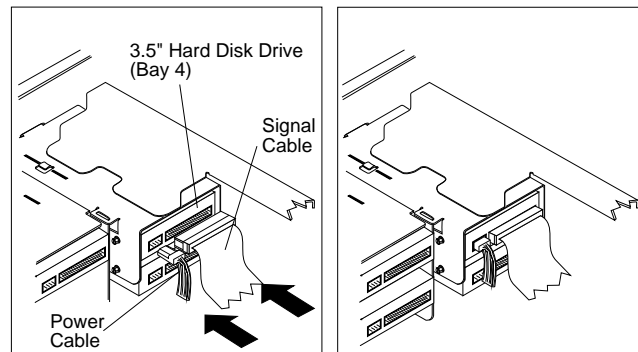
15. Reinstall the drive-bracket assembly and secure it with the screw.



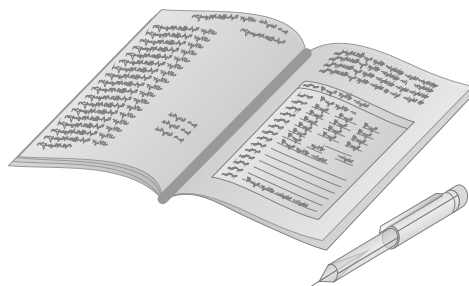
Working with Internal Drives

16. Connect the signal and power cables to each of the installed drives. As an example, the following illustration shows how to connect the cables to the drive in bay 4.

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



17. Go to the device-record form in Appendix C, "Server Records" on page 229, and update the drive information.



Working with Internal Drives

What to do next?

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 81
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

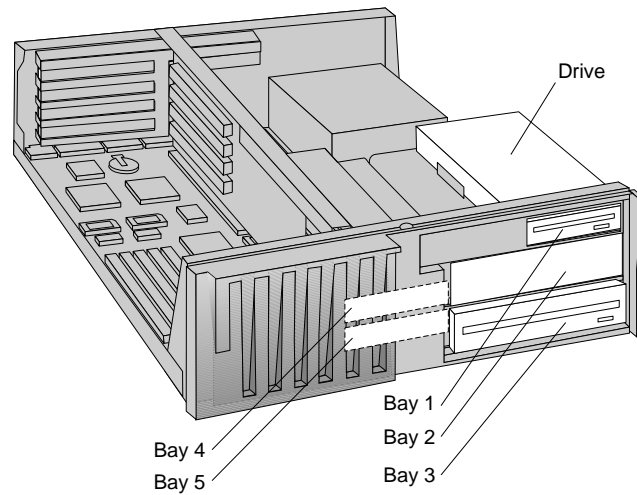
Working with Internal Drives

Removing Internal Drives

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

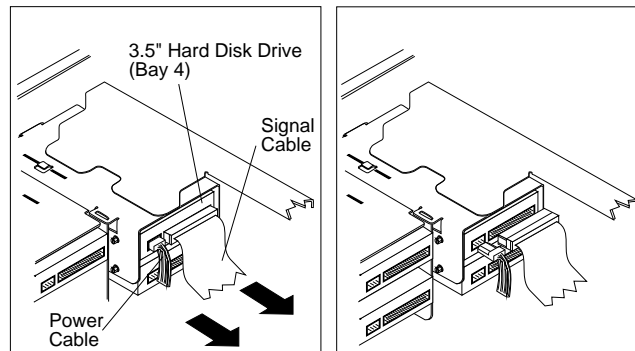
1. Determine the location of the drive that you want to remove.



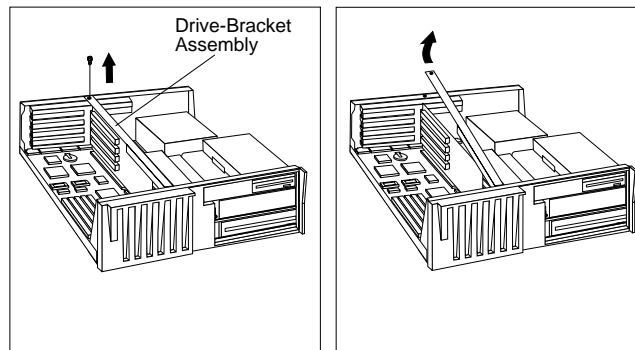
Working with Internal Drives

2. Disconnect all cables from any drives in bay 4 and bay 5.

Note: As an example, the following illustration shows how to remove the cables from the drive in bay 4.



3. Remove the screw that secures the drive-bracket assembly; then, remove the assembly from the server.

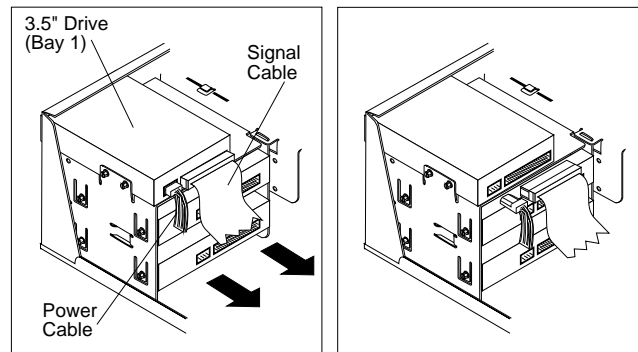


What to do next?

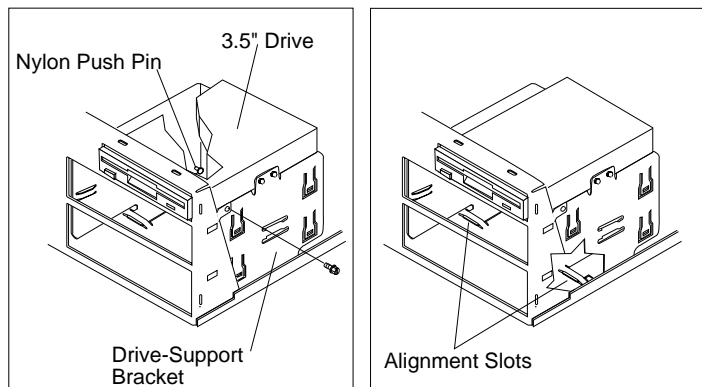
- To remove a drive from bay 2, continue with the next step.
- To remove a drive from bay 4 or bay 5, go to step 11 on page 129.

Working with Internal Drives

4. To remove a drive from bay 2, disconnect the cables from any drives in bays 1, 2, and 3.

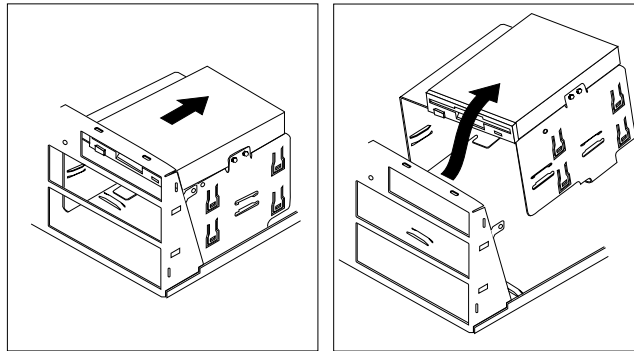


5. Remove the screws from the drive-support bracket.
 - a. Remove the screw from the upper-right front corner of the drive-support bracket.
 - b. If present, remove the nylon pushpin at the lower-left rear of the bracket. (This shipping screw can be discarded.)
 - c. Carefully note how the tabs at the base of the drive-support bracket fit into the alignment slots on the server frame.

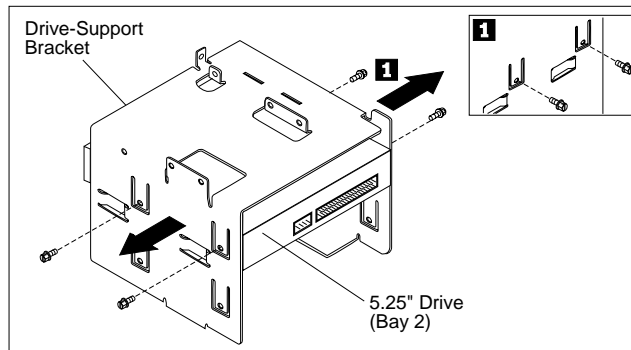


Working with Internal Drives

- Slide the bracket slightly to the rear, then up and out of the server.



- To remove the drive from bay 2, remove the four screws, and then slide the drive out of the bay.



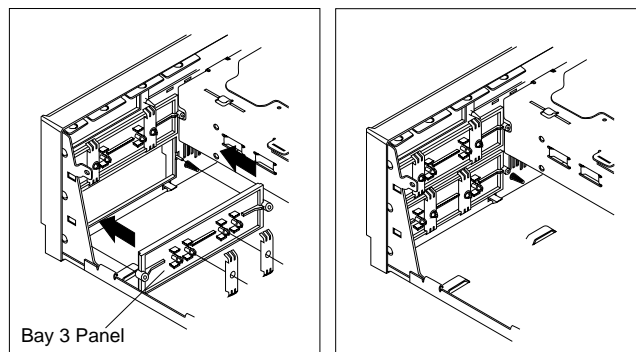
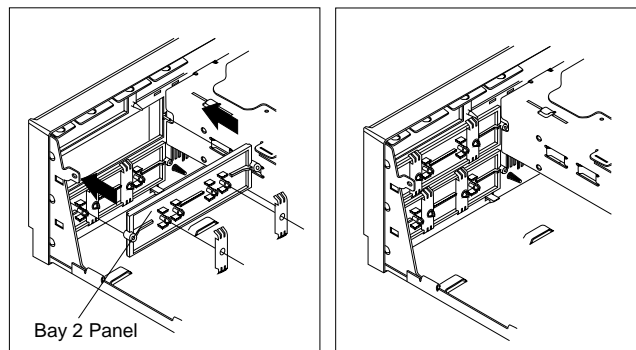
Note: If you installed a 3.5-inch device in bay 2 in step 9 on page 115, this bay also contains a mounting bracket. Remove the bracket from the bay by removing the four screws; then, remove the drive from the mounting bracket.

Working with Internal Drives

What to do next?

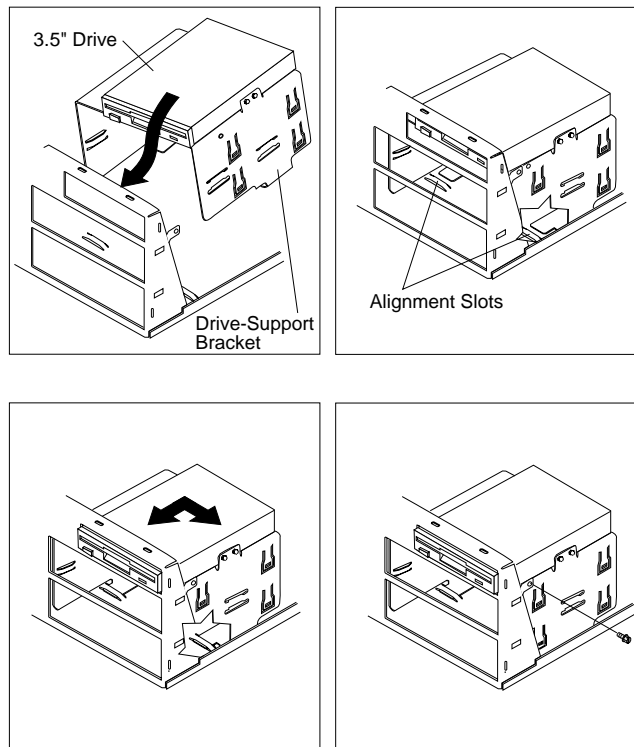
- To install an internal drive in bay 2, go to “Installing Internal Drives” on page 111.
- If you do *not* have a drive to install in bay 2, continue with the next step.

8. If you removed a drive (other than a hard disk drive) from bay 2, reinstall the bay panel.



Working with Internal Drives

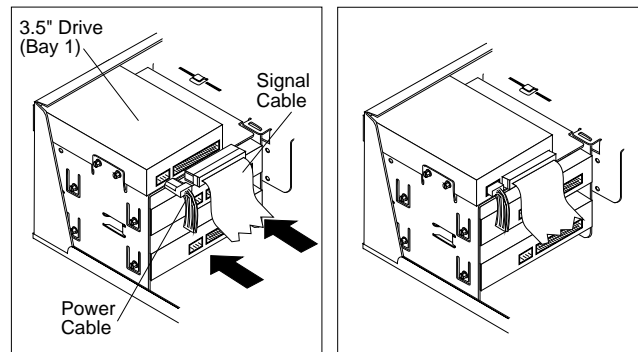
9. Reinstall the drive-support bracket. Be sure to insert the bracket tabs into the alignment slots.



Working with Internal Drives

10. Reconnect all signal and power cables to the remaining drives. As an example, the following illustration shows how to connect the cables to the drive in bay 1.

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

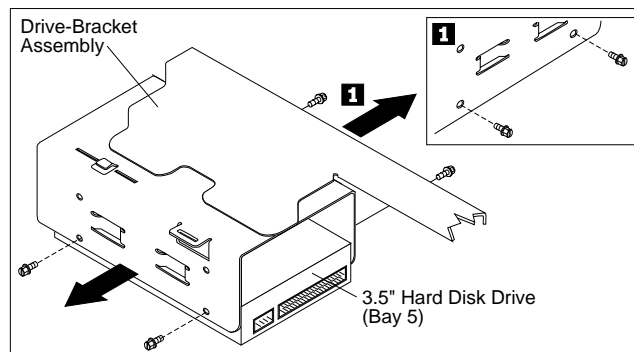
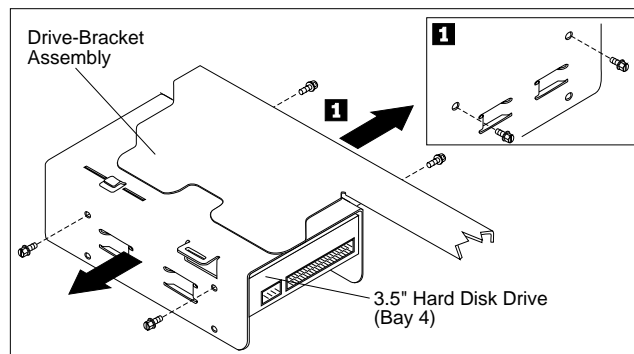


What to do next?

- To remove a drive from bay 4 or bay 5, continue with the next step.
- If you do not want to remove any other internal drives, go to step 14 on page 131.

Working with Internal Drives

11. To remove a drive from bay 4 or bay 5, remove the four screws, and then slide the drive out of the bay.

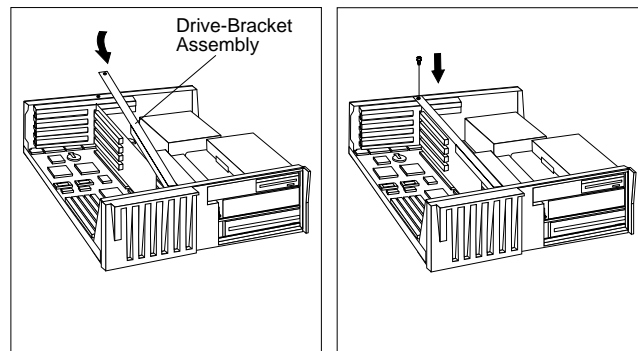


What to do next?

- If you do not want to install another drive, continue with the next step.
- To install an internal drive, go to “Installing Internal Drives” on page 111.

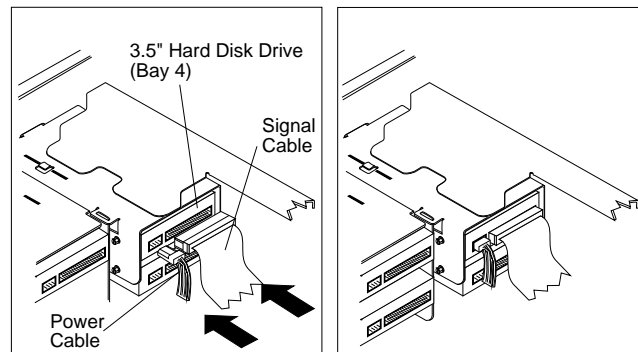
Working with Internal Drives

12. Reinstall the drive-bracket assembly.



13. Reconnect all signal and power cables to each drive. As an example, the following illustration shows how to connect the cables to the drive in bay 4.

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



Working with Internal Drives

14. Go to the device-record form in Appendix C, “Server Records” on page 229, 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 81
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 132
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Working with 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 processor socket with a new microprocessor.

Installing Microprocessor Upgrades

Before you begin:

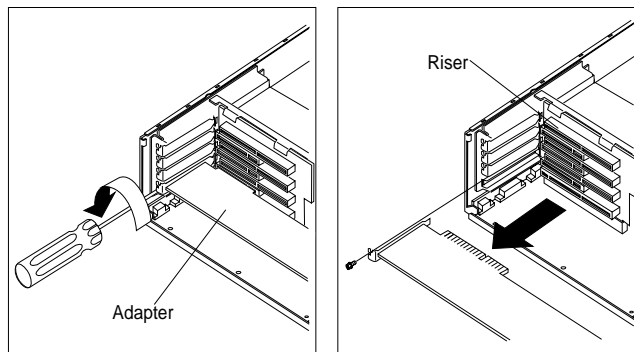
- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Read the instructions that came with the microprocessor upgrade.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

1. Locate the processor socket on the server system board. (See the system-board illustration in “Locating System-Board Components” on page 66.)

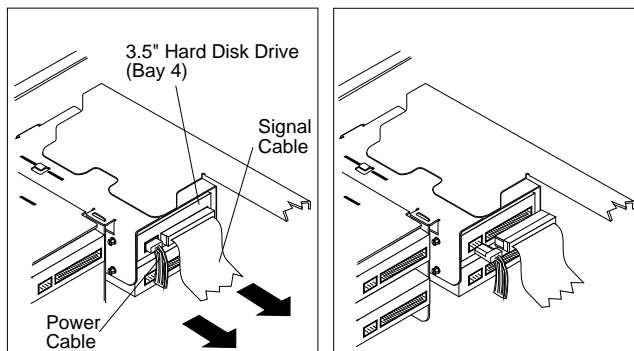
Note: When you install a microprocessor upgrade, you also might have to change microprocessor jumper positions on the system board. See Appendix A, “Jumpers and Switches” on page 221 for detailed information on changing jumper positions.

Working with Microprocessor Upgrades

2. Note the slot position of any installed adapters; then, remove any adapters that block access to the processor socket. (For information about removing an adapter, see “Removing Adapters” on page 77.)

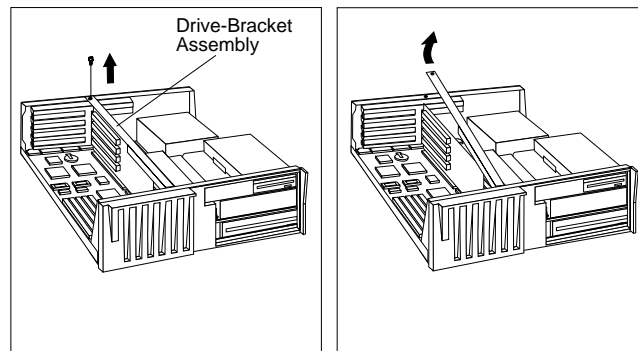


3. Disconnect the signal and power cables from the drives in bays 4 and 5. (See “Working with Internal Drives” on page 106 to find the location of each drive bay.)



Working with Microprocessor Upgrades

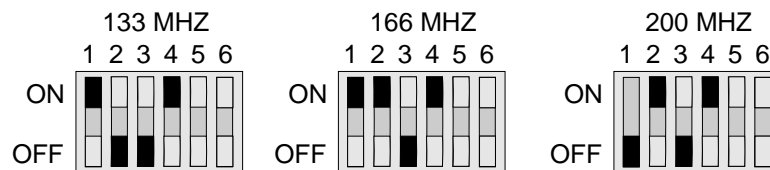
4. Remove the drive-bracket assembly from the server.



5. Locate the configuration switch set and the processor socket in the system-board illustration in "Locating System-Board Components" on page 66.
6. When installing a microprocessor upgrade, you must change the microprocessor/bus speed-ratio switch-set to the correct settings.

The wrong setting will result in an incorrect value being displayed in the Configuration/Setup utility program and unreliable server operation.

Use the following illustration to set switches (1 to 4) on the configuration switch set.

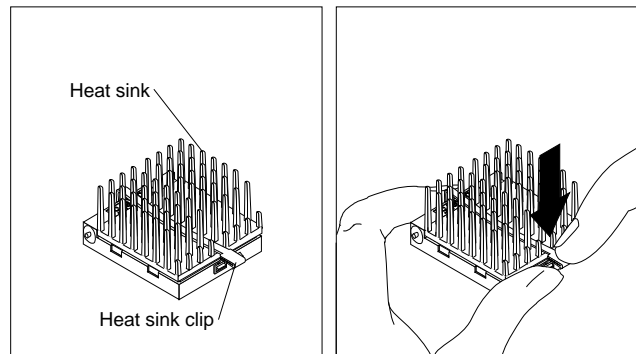


Note: This illustration shows the switch set as viewed from the rear of the server.

Working with Microprocessor Upgrades

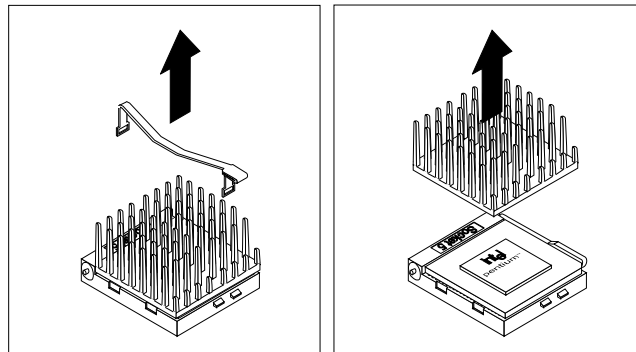
7. Press on the heat sink clip tab to release the heat sink clip from the socket flange.

Note: Your heat sink and heat-sink clip might differ from those shown here. Refer to your upgrade kit for further details.



8. Remove the heat sink clip and heat sink.

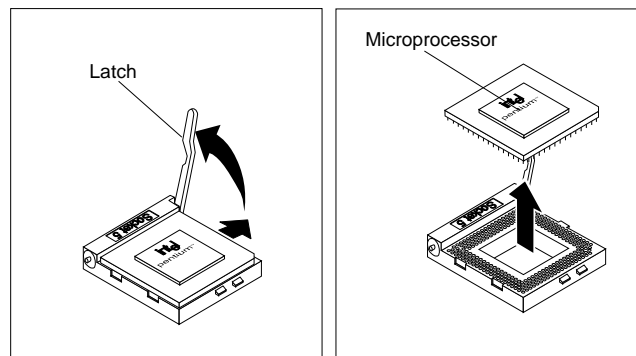
Attention: A thermal compound is on the top of the microprocessor and the base of the heat sink. Avoid getting this material on your skin or clothing. You should use a soft, lint-free cloth to remove the thermal compound before storing the old microprocessor, heat sink, and heat sink clip.



Working with Microprocessor Upgrades

9. Lift the latch on the socket. 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.



10. 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.



Working with Microprocessor Upgrades

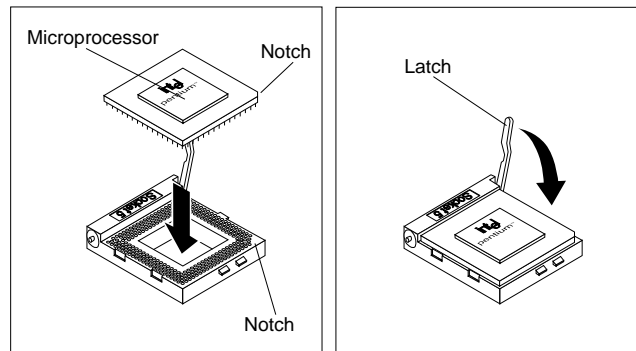
11. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.



12. Install the new microprocessor:

Note: To install the new microprocessor, follow the instructions given here, plus the instructions that come with the new microprocessor. You might have to coat the microprocessor with a conductive lubricant or change the heat sink. Refer to your upgrade kit for further details.

- a. Locate the notch (beveled corner) on the microprocessor.
- b. Align the notch of the microprocessor with the notch on the socket.

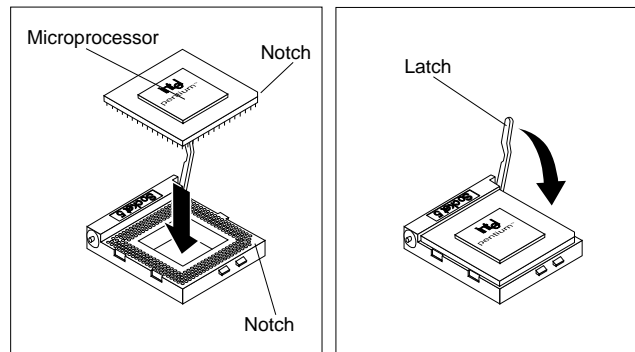


Working with Microprocessor Upgrades

- c. Center the microprocessor over the socket.
- d. 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.

- e. Move the latch downward until the microprocessor is completely locked into the socket. Make sure that the latch is in the fully closed position.

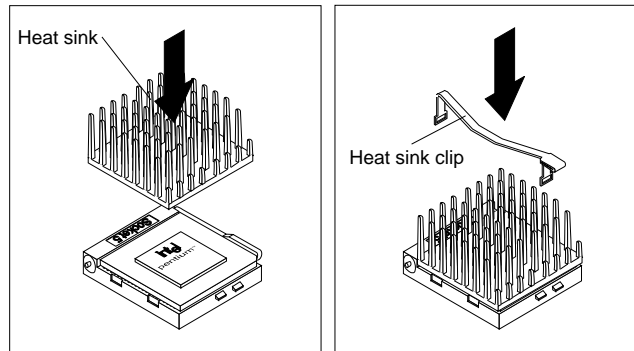


Working with Microprocessor Upgrades

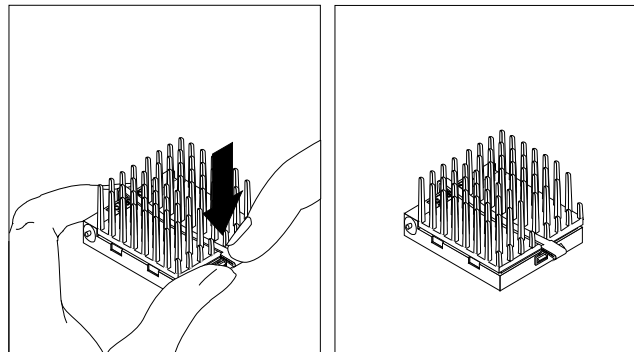
13. Reinstall the heat sink and heat-sink clip:

Note: To install the heat sink and heat-sink clip, follow the instructions given here, plus the instructions that come with the new microprocessor. You might have to coat the microprocessor with a conductive lubricant or change the heat sink.

- a. Position the heat-sink clip over the flange, as shown.

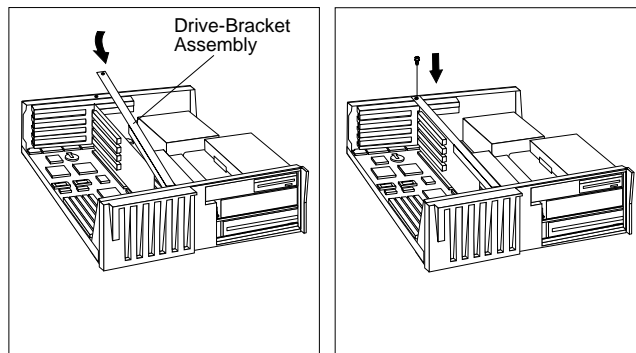


- b. Clip one end of the heat-sink clip over the flange. Then, place the clip over the top of the heat sink and press down until it is secure on both sides of the socket.



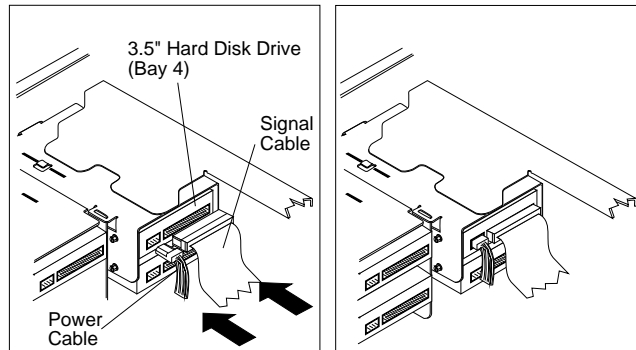
Working with Microprocessor Upgrades

14. Reinstall the drive-bracket assembly.



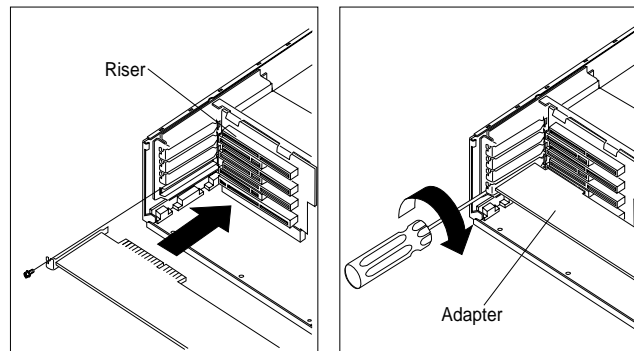
15. Reconnect the signal and power cables to the drives. As an example, the following illustration shows how to connect the cables to the drive in bay 4.

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

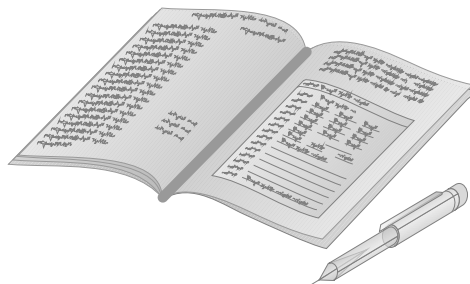


Working with Microprocessor Upgrades

16. 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 72.)



17. Go to the device-record form in Appendix C, “Server Records” on page 229, and update the processor socket information.



Working with Microprocessor Upgrades

What to do next?

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 81
 - A video memory-module kit, go to “Working with Video Memory-Module Kits” on page 94
 - A cache memory-module kit, go to “Working with Cache Memory-Module Kits” on page 99
 - An internal drive, go to “Working with Internal Drives” on page 106
 - A security option, go to “Adding Security Options” on page 143
- To complete the installation, go to “Completing the Installation” on page 154.

Adding 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 an administrator password
- Setting, removing, and changing a power-on password
- Setting the diskette write-protect switch
- Restricting access to the hard disk drives

These options (except the last item in the preceding list) are discussed in the following sections. Chapter 3, “Configuring Your Server” contains more details about setting passwords and controlling access to the diskette drive and hard disk drives. Additional security information is provided in the *User's Reference*.

Installing a U-Bolt and Security Cable

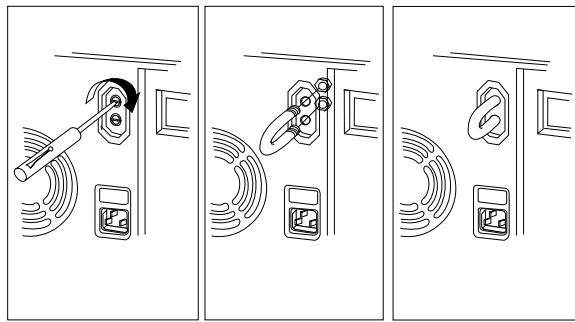
You can deter unauthorized removal of your server hardware by installing a U-bolt and security cable on the rear of your server.

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 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

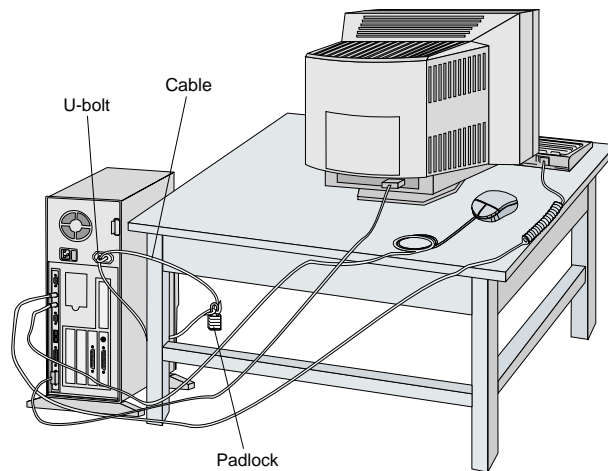
Adding Security Options

1. Install the U-bolt:
 - a. Locate the two holes for the U-bolt in the rear panel of the server.
 - b. Insert the U-bolt through the holes and secure it in place with the nuts.



Adding Security Options

2. Insert the security cable through the U-bolt. Loop the cable around (or through) an object from which it cannot be removed; then, fasten the cable ends together with the lock or padlock.



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 154 if you need additional information).

Adding Security Options

Removing an Unknown Power-On Password

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

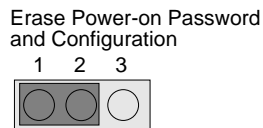
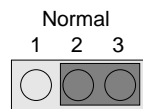
Note: The administrator password and power-on password share the same jumper, known as the password jumper.

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

Adding Security Options

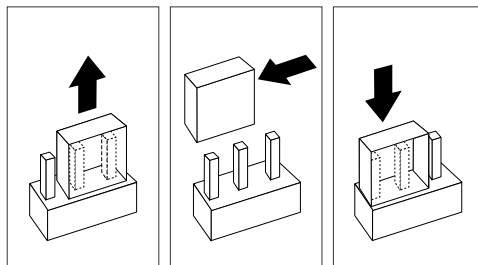
1. If an adapter is installed in slot 5, remove it. (See “Removing Adapters” on page 77.)
2. Locate the password jumper (PWD) in the system-board illustration in “Locating System-Board Components” on page 66. The jumper settings are shown in the following illustration.



You might have to remove other server components (such as adapters) to gain access to the jumper.

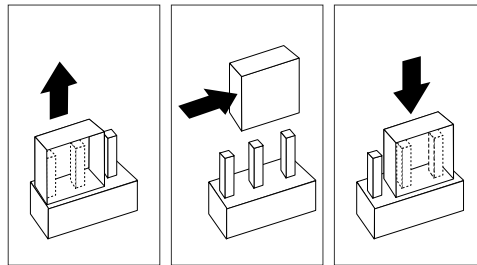
3. Change the jumper's position:
 - a. Lift the jumper straight off the pin block.
 - b. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.
 - c. Slide the jumper over these pins.

This procedure removes the password.



Adding Security Options

4. Wait one minute; then, move the jumper back to its original position. You are now able to set a new password.



To set a new power-on password, follow the instructions in “Setting a Power-on Password” on page 47.

5. 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 154 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 3, “Configuring Your Server” 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.

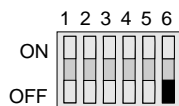
Note: This switch does not affect the ability to read information from a diskette.

Before you begin:

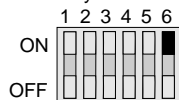
- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

1. Locate the configuration switch set in the system-board illustration in “Locating System-Board Components” on page 66.
2. For normal diskette operation or for read-only diskette operation, set switch 6 as illustrated.

Normal Diskette Operation



Read-Only Diskette Operation



Notes:

1. This illustration shows the switch set as viewed from the rear of the server.

Adding Security Options

2. For more information about diskette access, see “Restricting Access to Hard Disk Drives and Diskette Drives” on page 48.

What to do next?

- Replace the server cover and reconnect all external cables and power cords (see “Completing the Installation” on page 154 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 3, “Configuring Your Server” for more information.

Removing an Administrator Password

The administrator password is used to restrict access to the Configuration/Setup utility program. It allows only a system administrator to change the system configuration. If you do not enter the administrator password, you can only view the configuration.

The following procedure describes how to remove an administrator password. The administrator password and power-on password share the same jumper, known as the password jumper.

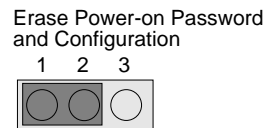
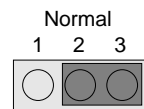
Attention: This procedure erases your current server configuration. Be sure to record the server configuration before performing this procedure. You must reconfigure your server after you move the password jumper.

Before you begin:

- Read “Electrical Safety” on page 59 and “Handling Static-Sensitive Devices” on page 60.
- Turn off the server.
- Disconnect all external cables and power cords; then, remove the server cover (see “Removing the Cover” on page 64).

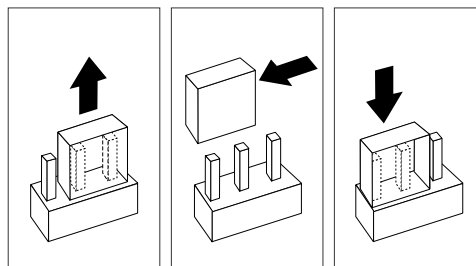
Adding Security Options

1. If an adapter is installed in slot 5, remove it. (See “Removing Adapters” on page 77.)
2. Locate the password jumper (PWD) in the system-board illustration in “Locating System-Board Components” on page 66. The jumper settings are shown in the following illustration.



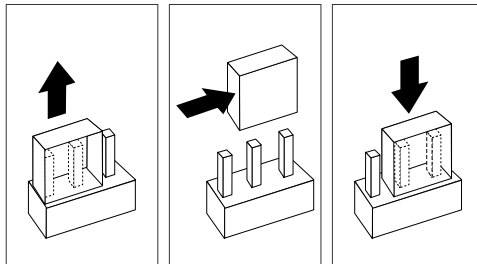
You might have to remove other server components (such as adapters) to gain access to the jumper.

3. Move the jumper from its normal position pins (2 and 3) to pins 1 and 2. This procedure removes the password.



Adding Security Options

4. Wait one minute; then, move the jumper back to its normal position (pins 2 and 3). You are now able to set a new password.



To set a new administrator password, follow the instructions in “Setting an Administrator Password” on page 45.

5. 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 154 if you need additional information).
- Turn on the monitor and server.
- Use the Configuration/Setup utility program to set an administrator password and to reconfigure your server. See Chapter 3, “Configuring Your Server” for more information.

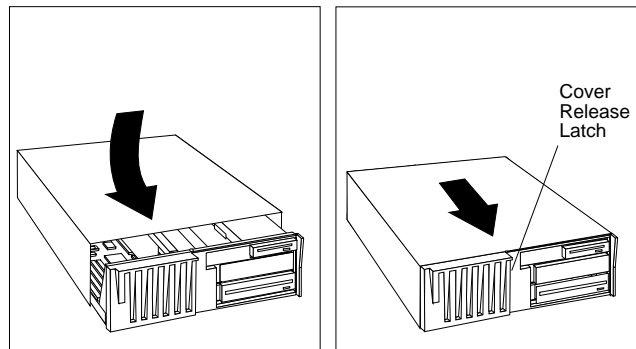
Completing the Installation

Completing the Installation

Before you begin:

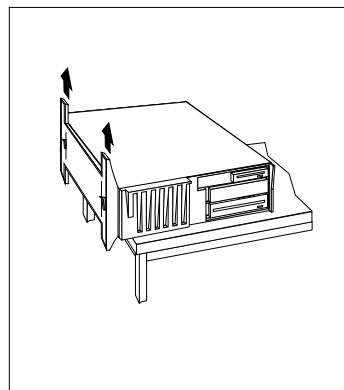
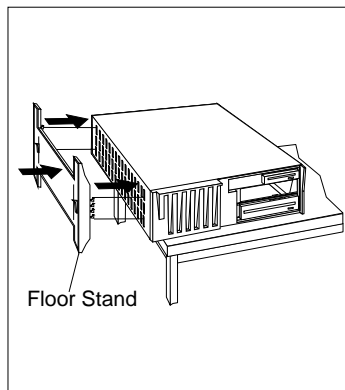
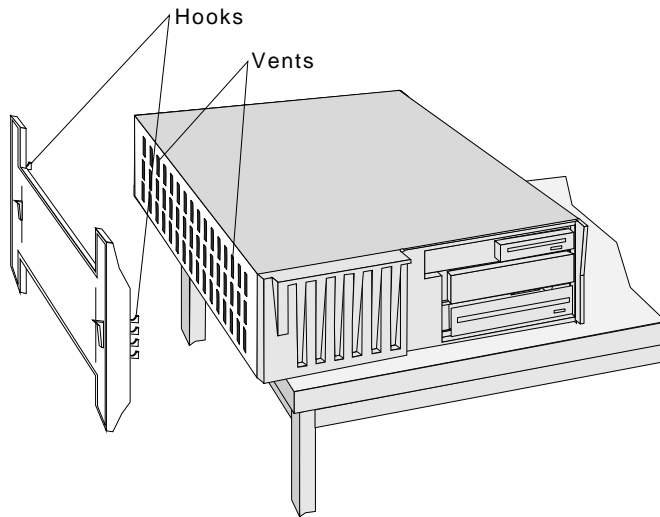
Complete all the installation procedures for the options that you have chosen to install.

1. Install the cover on the server.



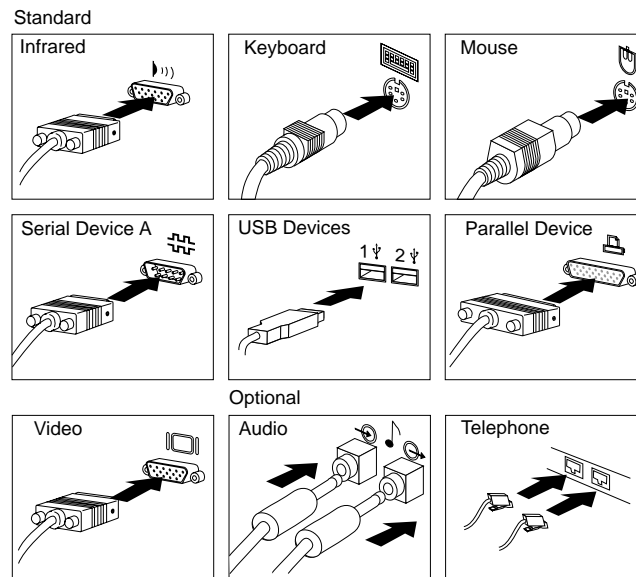
Completing the Installation

2. Attach the floor stand to the vents in the cover of your server.



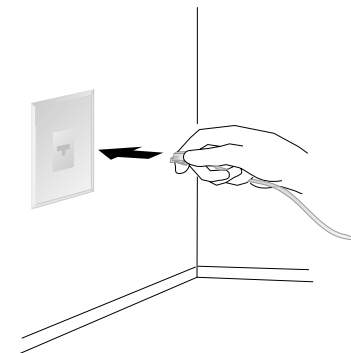
Completing the Installation

3. 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.



4. 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.



Updating the Server Configuration

What to do next?

When you have completed installing the cover and cables, go to “Updating the Server Configuration.”

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 came 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 5, “Solving Problems” 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 form in Appendix C, “Server Records” on page 229.



Updating the Server Configuration

Chapter 5. Solving Problems

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:

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Test Programs	162
Error Messages	163
Troubleshooting Charts	164
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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 178.
- For more information about a hardware failure (for example, keys on the keyboard not working) or a screen prompt, go to “Troubleshooting” on page 192.

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

Diagnostic Tools Overview

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, 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.

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 199.

Test Programs

The PC Server 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 310.

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 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.

Diagnostic Tools Overview

The programs on the PC Server 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.

Test options let you batch 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.

These test programs also allow you 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 numeric. 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 "POST Error Message Table" on page 179.

Diagnostic Tools Overview

POST Beep Codes

POST beep codes are sounds emitted from the speaker when POST finishes. One beep indicates POST completed successfully. Multiple beeps indicate that POST found a problem. A list of the beep error codes is given in “Beep Codes” on page 199.

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 numeric. 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

The troubleshooting charts given in “Troubleshooting Charts” on page 192 list 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 3, “Configuring Your Server” on page 35 for instructions on installing the configuration files, or see “Installing Additional Test Programs” on page 204 for installing diagnostic files.

Testing the System

Note: You might have 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 310.

Testing the System

Using the PC Server System Board Diagnostic Diskette

Note: Always use the backup copy of the PC Server System Board Diagnostic Diskette when configuring and troubleshooting your server.

To start the diagnostic programs:

1. Insert the backup copy of the PC Server 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 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 192 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.

Testing the System

- **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 173 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 175.
- **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 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 206.
- **Exit:** Select this choice to exit from the PC Server System Board Diagnostic Diskette.

Testing the System

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. Pressing F1 from within a Help screen provides a help index from which you can select different categories. Pressing Esc exits Help and returns 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 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 **/OXXX** 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 **/IXXX** for a list of valid test groups.)

/OALL The **/OALL** option omits all test groups from testing. (See **/IXXX** for more information.)

/IXXX The **/IXXX** 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
```

Testing the System

- /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 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

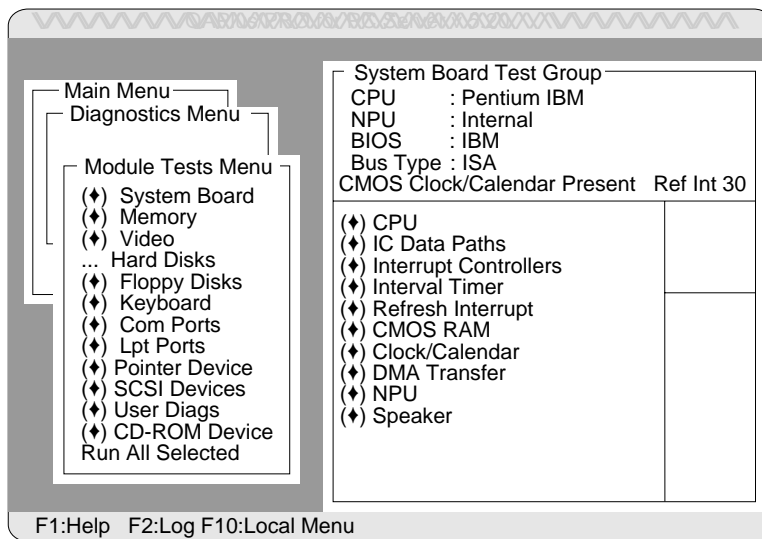
When you select Quick Tests or Module Tests from the Diagnostic Menu, a Test Group window appears. (For Module Tests, if you press Tab, the window expands to a full screen.) The Test Group window shows the attributes, parameters, and selected tests of the corresponding Test Group. The diamond “◆” mark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

Testing the System

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.



Using the Module Tests

To start the Module Tests from the Main Menu of the PC Server System Board Diagnostic Diskette:

1. Start the diagnostic programs. If you do not know how to do this, see “Using the PC Server System Board Diagnostic Diskette” on page 166.
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 ♦ appears next to the selection.

Attention: An (*) 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.

Testing the System

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 “◆”) and deselect.

Attention: An (*) 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 set up 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.

Testing the System

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.

Option Diskettes

- **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 via 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 174 for a more detailed description of scripting.

Option Diskettes

An optional device or adapter might come with a diskette. If it does, follow the instructions that come with the option. 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 3, “Configuring Your Server.”)
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	<p>A failure occurred during testing of the system board and microprocessor.</p> <p><i>Action:</i> Have the system serviced.</p>
110	<p>A memory parity failure occurred during testing of the system board.</p> <p><i>Action:</i> Run the diagnostic tests to verify that a problem exists in the memory-module kits.</p> <p>See the system memory table in “Working with Memory-Module Kits” on page 81 to see if you can reconfigure (swap) your system memory to aid in identifying the defective memory module.</p> <p>If you cannot identify the defective memory module in this way, have the system serviced.</p>
111 112 113	<p>An input/output (I/O) channel check occurred during testing of the system board and memory. This failure is generally caused by an adapter.</p> <p><i>Action:</i> Have the system serviced.</p>

Error Messages

POST Message	Description
114	<p>An adapter read-only memory (ROM) error occurred.</p> <p><i>Action:</i> Remove the options. If you can boot the system without the option installed, reinstall each option and retest. When an option fails, replace it.</p> <p>If the problem cannot be isolated and corrected, have the system serviced.</p>
115	<p>A DMA error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
116	<p>A system-board port read/write error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
120	<p>A microprocessor error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
121	<p>A hardware error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
129	<p>An internal cache error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
151	<p>A failure occurred during the testing of the real-time clock.</p> <p><i>Action:</i> Run the diagnostic programs to get more information.</p>
161	<p>The battery on the system board is dead.</p> <p>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.</p> <p><i>Action:</i> 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" for additional instructions.)</p>

Error Messages

POST Message	Description
162	<p>A change in device configuration occurred. This error occurs under one or more of the following conditions:</p> <ul style="list-style-type: none">• A new device has been installed.• A device has been moved to a different location or cable connection.• A device has been removed or disconnected from a cable.• A device is failing and is no longer recognized by the server as being installed.• An external device is not turned on.• An invalid checksum is detected in the battery-backed memory. <p><i>Action:</i> Verify that all external devices are turned on. External devices must be turned on before the server is turned on.</p> <p>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.</p>
163	<p>The clock is not working correctly.</p> <p><i>Action:</i> Set the correct date and time. If the date and time are set correctly and saved and the 163 error message reappears, replace the battery.</p> <p>If this does not correct the problem, have the system serviced.</p> <p>Until the system is serviced, the server can be used, but any application programs that use the date and time will be affected.</p>

Error Messages

POST Message	Description
164	<p>A change in the memory configuration occurred. This error can be caused by adding memory, removing memory, or incorrectly installing memory.</p> <p><i>Note:</i> The server can be used with decreased memory capacity.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. If you have newly installed memory, see “Working with Memory-Module Kits” on page 81 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	<p>A hardware error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
176	<p>The server cover has been removed.</p>
177	<p>A hardware error occurred.</p>
178	<p><i>Action:</i> Have the system serviced.</p>
183	<p>An administrator password is set and must be entered.</p> <p><i>Action:</i> Enter the administrator password.</p> <p>Attention: You have only three chances 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 chances to enter the password. If you cannot enter the correct password, follow the instructions in “Removing an Administrator Password” on page 151; then, set a new administrator password as described in “Setting an Administrator Password” on page 45.</p>

Error Messages

POST Message	Description
184	<p>The power-on password information stored in your server was removed.</p> <p><i>Action:</i> 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 3, “Configuring Your Server.” If this information cannot be restored, have the system serviced.</p>
185	<p>A power failure damaged the stored information about the drive-startup sequence.</p> <p><i>Action:</i> 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 3, “Configuring Your Server.”</p>
186	<p>A system board or security hardware error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
189	<p>An attempt has been made to access the server with invalid passwords.</p>
20X	<p>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.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. If you just installed memory, see “Working with Memory-Module Kits” on page 81 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. <p>If the system diagnostic tests fail, have the system serviced.</p>
229	<p>An external cache error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>

Error Messages

POST Message	Description
301 302 303 304 305	<p>A failure occurred during testing of the keyboard and keyboard controller. These error messages also might be accompanied by continuous beeping.</p> <p><i>Action:</i> Ensure that:</p> <ol style="list-style-type: none">1. Nothing is resting on the keyboard and pressing a key.2. No key is stuck.3. The keyboard cable is connected correctly to the keyboard and to the correct connector on the server. <p>Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced.</p> <p><i>Note:</i> 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.</p> <p>If the error message remains, have the keyboard and cable or the system serviced.</p>
601	<p>A failure occurred during testing of the diskette drive and diskette-drive controller. This error can be caused by a loose or incorrectly connected cable, a failing drive, or a failing system board.</p> <p><i>Action:</i> 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.</p>
602	<p>The server cannot start the diskette in the drive. The diskette might be damaged or formatted incorrectly.</p> <p><i>Action:</i> Try another startable diskette that is in working condition.</p>
604	<p>A failure occurred during the testing of a diskette drive.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Verify that the Configuration/Setup utility program correctly reflect the type of diskette drive you have installed.2. Run the diagnostic programs.3. If the diagnostic programs fail, replace the diskette drive.

Error Messages

POST Message	Description
662	<p>A diskette drive configuration error occurred.</p> <p><i>Action:</i> 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 3, "Configuring Your Server."</p>
962	<p>A parallel-port configuration error occurred.</p> <p><i>Action:</i> 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 3, "Configuring Your Server."</p>
11XX	<p>A failure occurred during testing of the system-board serial port.</p> <p><i>Action:</i> 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:</p> <ol style="list-style-type: none">1. Turn off the server.2. Disconnect the serial cable from the serial port.3. Turn on the server. <p>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.)</p> <p>If the POST error message reappears, have the system serviced.</p>
1162	<p>A serial port configuration error occurred.</p> <p><i>Action:</i> 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 3, "Configuring Your Server."</p>

Error Messages

POST Message	Description
1762	<p>A hard disk configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">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 3, "Configuring Your Server."
178X	<p>A failure occurred during testing of the hard disk drive.</p> <p><i>Action:</i> Run the system diagnostic tests.</p>
1800	<p>A PCI adapter has requested a hardware interrupt that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that the PCI Adapter and any ISA legacy adapters are set correctly 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 3, "Configuring Your Server."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 77.

Error Messages

POST Message	Description
1801	<p>A PCI adapter has requested memory resources that are not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that the PCI Adapter and any ISA legacy adapters are set correctly 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 3, "Configuring Your Server."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 77.
1802	<p>A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure the PCI adapter and any ISA legacy adapters are set correctly 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	<p>A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that any ISA legacy adapters are set correctly 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 3, "Configuring Your Server."2. If the memory resources settings are correct, the PCI adapter might be defective. Have the system serviced.

Error Messages

POST Message	Description
1804	<p>A PCI adapter has requested a memory address that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that any ISA legacy adapters are set correctly 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 3, "Configuring Your Server."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 77.
1805	<p>A PCI adapter ROM error occurred.</p> <p><i>Action:</i> Remove the PCI adapter. If you can start the system without the option, reinstall each option and retest. When an option fails, replace it.</p> <p>If the problem cannot be isolated and corrected, have the system serviced.</p>
1962	<p>A boot sequence error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure 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 3, "Configuring Your Server."2. Make sure that all adapters are installed correctly. For instructions on installing adapters, see "Installing Adapters" on page 72.
2401	<p>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.</p> <p><i>Action:</i> Verify that the monitor is connected correctly to the video port. If so, have the system serviced.</p>

Error Messages

POST Message	Description
2462	<p>A video configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure 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 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 3, "Configuring Your Server."3. If the error recurs, you might need to replace the video memory module.4. If the error persists, have the system serviced.
8601 8602 8603	<p>A failure occurred during testing of the pointing device (mouse) and pointing device controller.</p> <p><i>Note:</i> An 8603 error can be caused by the addition or removal of a mouse.</p> <p>This error can be caused by the pointing device or by a failing system board.</p> <p><i>Note:</i> 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.</p> <p><i>Action:</i> Ensure that the keyboard and pointing device are attached to the correct connectors. If they are connected correctly, use the following procedure:</p> <ol style="list-style-type: none">1. Turn off the server.2. Disconnect the pointing device from the server.3. Turn on the server. <p>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.</p> <p>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.</p>
19990301	<p>A hard disk failure occurred.</p> <p><i>Action:</i> Have the system serviced.</p>

Error Messages

POST Message	Description
19990305	<p>An operating system could not be found.</p> <p><i>Action:</i> Have the system serviced. Run diagnostic tests to verify that the hard disk is functioning correctly. If there is a problem with the hard disk (such as a bad sector), you might have to reinstall the operating system.</p> <p>If you cannot reinstall the operating system, have the system serviced.</p>
Other Numbers	<p>The server POST found an error.</p> <p><i>Action:</i> Follow the instructions on the screen.</p>

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	<p>One or more of the following might be causing the problem.</p> <ul style="list-style-type: none"> • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration • Duplicate SCSI IDs in the same SCSI chain • An improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable <p><i>Action:</i> Verify that:</p> <ul style="list-style-type: none"> • 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 106 for more information about SCSI termination.) • The SCSI devices are configured correctly. <p>If the above are correct, run the diagnostics for additional information about the failing device. If the error recurs, have the system serviced.</p>

Troubleshooting

Troubleshooting

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

Troubleshooting Charts

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

- Remove the software or device that you just added.
- Run the diagnostic test programs to determine if your server is running correctly.
- Reinstall the new software or new device.

When using the troubleshooting charts, look for the symptom of the problem in the left column of the chart. You will find instructions and possible solutions to the problem in the right column of the chart.

Troubleshooting

CD-ROM Drive Problems	Action
The CD is not working properly.	<p>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.</p> <p>If this does not correct the problem, clean the optical-head lens. Discs for cleaning the lens are available from your place of purchase.</p> <p>If a problem still exists, have the system serviced.</p>
CD-ROM Drive Tray Not Working	The system must be 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 SCSISelect to verify the SCSI ID of the CD-ROM drive (see "SCSISelect Utility Program Options" on page 53 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.	<p>If there is a diskette in the drive, verify that:</p> <ol style="list-style-type: none">1. The diskette drive is enabled in the Configuration/Setup utility program.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). <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, have the server serviced.</p>

Monitor Self-Tests	Action
	<p>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.</p> <p>If you still cannot find the problem, have the monitor and server serviced.</p>

Troubleshooting

Monitor Problems	Action
Wavy, unreadable, rolling, distorted screen, or screen jitter.	<p>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.</p> <p><i>Notes:</i></p> <ol style="list-style-type: none">1. The distance between monitors and diskette drives should be at least 76 mm (3 in.) to prevent diskette drive read/write errors.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. <p>If the problem recurs, have the monitor and system serviced.</p>
Screen flickers.	<p>Set the monitor for the highest, noninterlaced refresh rate available.</p> <p>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.</p>
The monitor works when you turn on the system, but goes blank when you start some application programs.	<p>Verify that the primary monitor cable is connected to the video port.</p> <p>To find the video port, see "Input/Output Connectors" on page 8.</p> <p>Be sure you installed the necessary drivers for the applications.</p>

Troubleshooting

Monitor Problems	Action
Blank screen	Verify that: <ol style="list-style-type: none">1. The system power cord is plugged into the system and a working electrical outlet.2. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.3. The 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: <ol style="list-style-type: none">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.	<ol style="list-style-type: none">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.

Troubleshooting

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: <ol style="list-style-type: none">1. The memory modules are seated properly.2. Memory modules are installed in pairs (when required).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: <ol style="list-style-type: none">1. The option is designed for the system.2. You followed the installation instructions supplied 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.	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the items above are correct and the test programs found no problem, have the server and option serviced.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none">1. The cables for all external SCSI options are connected correctly.2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.3. All external SCSI options are turned on. External SCSI options must be turned on before the system is turned on. <p>For more information, see your SCSI documentation.</p> <p>If the problem recurs, have the system serviced.</p>

Parallel Port Problems	Action
The number of parallel ports displayed is less than the number of parallel ports installed.	<p>Verify that:</p> <ol style="list-style-type: none">1. Each port is assigned a unique address.2. The parallel-port adapter, if you installed one, is seated properly. <p>If the items above are correct, have the system serviced.</p>

Serial Port Problems	Action
The number of serial ports displayed is less than the number of serial ports installed.	<p>Verify that:</p> <ol style="list-style-type: none">1. Each port is assigned a unique address.2. The serial-port adapter, if you installed one, is seated properly. <p>If the items above are correct, have the server serviced.</p>

Troubleshooting

Printer Problems	Action
The printer does not work.	<p>Verify that:</p> <ol style="list-style-type: none">1. The printer is turned on and is online.2. The printer signal cable is connected to the correct serial or parallel port on the system. (For the location of the serial or parallel port, see "Input/Output Connectors" on page 8.) <p><i>Note:</i> Non-IBM printer cables might cause unpredictable problems.</p> <ol style="list-style-type: none">3. You have assigned the printer port correctly in your operating system or application program.4. You have assigned the printer port correctly using the Configuration/Setup utility program. <p>If the items above are correct and the printer still does not work, run the tests described in the documentation that comes with your printer. If the tests show the printer is OK, have the server serviced.</p>
<hr/>	
Software Problems	Action
Is your software program OK?	<p>To determine if problems are caused by the software, verify that:</p> <ol style="list-style-type: none">1. Your system has the minimum memory requirements needed to use the software. Refer to the information that comes with the software to verify memory requirements. <p><i>Note:</i> If you have just installed an adapter or memory, you might have a memory address conflict.</p> <ol style="list-style-type: none">2. The software is designed to operate on your system.3. Other software works on your system.4. The software you are using works on another system. <p>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 problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase or service technician for help.</p>

Beep Codes

Note: If you cannot find the problem in the troubleshooting charts, go to “Testing the System” on page 165 to test the system. If you already have run the test program, or if running the test does not reveal the problem, have the system serviced.

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
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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

Beep Codes

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
<i>Action:</i> 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
<i>Action:</i> Reseat the memory module and cache module. If the problem recurs, have the system serviced.	

Checking the System for Damage

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 59 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 165 for instructions.

Checking the System for Damage

After Spilling Liquid on It

If liquid gets on the keyboard:

1. Turn off the system.
2. Unplug the keyboard from the back of the system.
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 system. 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 system.
3. Unplug the monitor from the system and the electrical outlet.
4. Have the monitor serviced immediately.

If liquid gets inside the system:

1. Turn off the system and all attached devices.
2. Unplug the system from the electrical outlet and all attached devices.
3. Have the system serviced immediately.

Installing Additional Test Programs

Installing Additional Test Programs

You can add other test programs to the PC Server 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 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 of 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

Installing Additional Test Programs

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 follow:

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

Using the Utility Programs

206 CMD 2

207 CMD 3

Using the Utility Programs

The PC Server 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
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Arrows	Use the arrow keys to move the cursor to the place in the text where you want to make changes.
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Using the Utility Programs

- 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**.

Resolving Configuration Conflicts

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.

Resolving Configuration Conflicts

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.

Resolving Configuration Conflicts

Chapter 6. Getting Help, Service, and Information

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section provides information about those 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 310, see “Troubleshooting Charts” on page 192, “Power-On Self-Test (POST)” on page 161, and “SCSI Messages” on page 191.) For information about the diagnostic tests that you can perform, see “Using the PC Server System Board Diagnostic Diskette” on page 166.

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 5, “Solving Problems” on page 159, and take the appropriate action.

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

Using the HelpWare Support Family

IBM HelpWare is the solution for IBM PC service and support wherever IBM products are sold and serviced. Purchasing an IBM PC hardware product entitles you to standard help and support during the warranty period. If you need additional support and

services, HelpWare provides a wide variety of extended services 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

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>

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 HelpWare PC Support Line. Expert technical-support representatives are available to assist you with questions you might have on the following:

- Setting up your server and IBM monitor
- Installing and setting up IBM options purchased from IBM or an IBM reseller
- 60-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 PC 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 server, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

If possible, be at your server when you call.

These services are available 24 hours a day, 7 days a week (excluding some holidays).*

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

For more information or to register for International Warranty Service in the U.S. or Canada, call 1-800-497-7426.

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

Purchasing Additional HelpWare Services

During and after the warranty period, you can purchase additional HelpWare 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.

Using the World Wide Web

Also available to you is the latest information about product compatibility and configuration. This information is updated as new PC Server products are announced. For a product to be included in the PC Server compatibility list, it must pass a strict set of hardware and operating system compatibility tests. The following is a sample of the information available at <http://www.pc.ibm.com/servers/> on the World Wide Web.

- 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).
- Direct access to device drivers, flash BIOS updates, and other code.
- Descriptions of PC Server compatibility and certification tests.
- Detailed reports about the performance of PC Servers.

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.

* IBM makes no guarantee regarding the compatibility of specific products.

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 217.

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 the same support as the Enhanced PC Support line, except for application and non-IBM option support.

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 through Friday). The premium upgrade provides 4-hour average response, 24 hours a day, 7 days a week.

- On-site service to premium on-site service

If your warranty provides for on-site service, you can upgrade to premium on-site service (4-hour average on-site response, 24 hours a day, 7 days a week).

You also can extend your warranty. HelpWare 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 1-800-426-7697.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Obtaining IBM Operating System Updates

IBM provides update diskettes, called ServicePaks or corrective service diskettes (CSDs), to customers who report a DOS or OS/2 problem for which there is or will be a corrective program.

You can obtain update diskettes from the following sources:

- IBM PC Company BBS. See “Using Electronic Support Services” on page 212 for information on how to access this bulletin board system.
- OS/2 BBS. In the U.S. or Canada, call 1-800-547-1283.
- OS/2 Technical Support Center. In the U.S. or Canada, call 1-800-992-4777.
- World Wide Web. The address is <http://www.ibm.com>.
- CompuServe and PRODIGY.
- 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. 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.

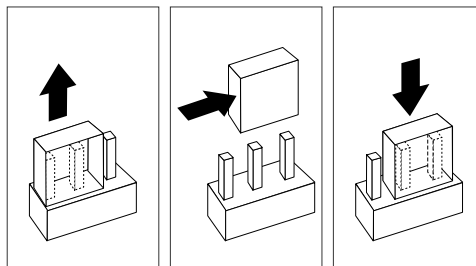
Changing Jumper Positions

Your system board contains three-pin jumper blocks. You can change a jumper's position as described in “Three-Pin Jumper Blocks.”

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 rear or to the front of the center pin (as you face the front of the server). 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.
4. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.



5. Slide the jumper fully onto these pins.
6. Reinstall the server cover (see “Completing the Installation” on page 154).
7. Reconnect the server power cord; then, turn on the server.

Jumper Descriptions

Jumper Descriptions

The following table describes the password jumper, which is located on the system board.

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 rear 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.

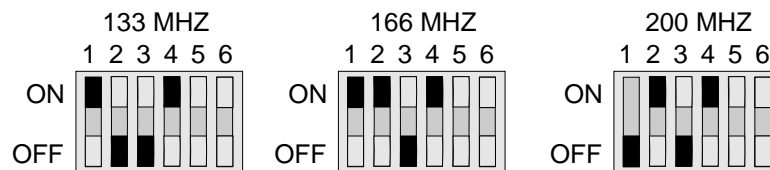
Turn off the server; then, disconnect the power cord before moving any jumpers.

Identifier	Description
PWD	<p>Password jumper</p> <ul style="list-style-type: none">• The password jumper is a three-pin jumper block. (See “Three-Pin Jumper Blocks” on page 221 for details about setting three-pin jumpers.)• If you forget your password, do the following steps:<ol style="list-style-type: none">1. Move the jumper to the RESET position indicated on the system board, opposite pin 1. Pin 1 is the pin that is closest to the riser connector. This erases the password and your configuration settings.2. After one minute, move the jumper to the OP position indicated on the system board, toward pins 2 and 3 (away from the riser connector).3. Turn on your server and use the Configuration/Setup utility program to enter a new password and reconfigure your server.

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.

Switch Settings

The following illustration shows the supported switch settings for your server.



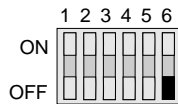
The switch settings have the following meanings:

Switch Number	Purpose
1	Core ratio
2	Core ratio
3	System bus speed
4	System bus speed
5	Unused
6	Diskette write-protect option
	Off Normal diskette operation (allows writing to a diskette)
	On Write-protect (prevents writing to a diskette)

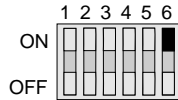
Attention: If the microprocessor bus-to-core ratio is incorrect, system-board components will overheat and component damage might occur. Be sure that the microprocessor core-ratio switches (1 and 2) and the system bus-speed switches (3 and 4) are set properly, according to the speed of your server's microprocessor, as shown in the illustration at the beginning of this section.

For normal diskette operation or for read-only diskette operation, set switch 6 as illustrated.

Normal Diskette Operation



Read-Only Diskette Operation



Note: For additional information about diskette-drive access, see “Restricting Access to Hard Disk Drives and Diskette Drives” on page 48.

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, contact your IBM HelpWare number, place of purchase, or your IBM reseller.

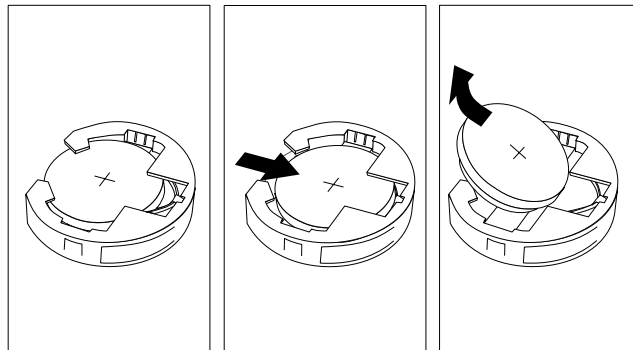
Note: In the U.S., please call 1-800-IBM-4333 for information about battery disposal.

Before you begin

- Read “Electrical Safety” on page 59.
- 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 64 if you need additional information).

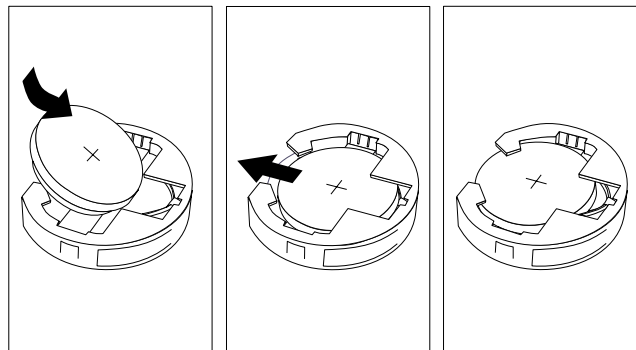
Changing the Battery

1. See the system-board illustration in “The System Board” on page 236 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 4, “Installing Options” on page 57.)
2. If an adapter is installed in slot 5, remove it. (See “Removing Adapters” on page 77.)
3. Remove the old battery.



Note: Your battery holder might be different than the one shown.

4. Install the new battery.



Changing the Battery

5. Replace any adapters or other components that you might have removed earlier.

What to do next

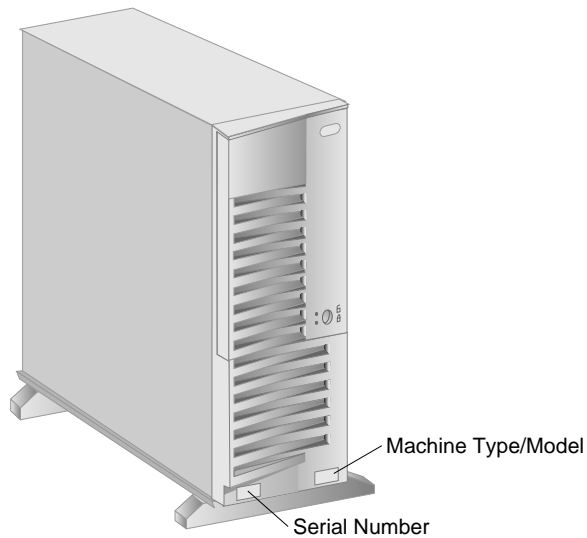
1. Replace the server cover; then, reconnect all external cables and power cords (see “Completing the Installation” on page 154 if you need additional information).
2. Turn on the monitor and server. When the server is turned on the first time after replacing the battery, a battery error message is displayed. 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 47 for more information.

Changing the Battery

Appendix C. Server Records

Record the Identification Numbers

The locations of the PC Server 310 identification numbers are shown below. They are located near the bottom, on the front of the server.



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.

Device Records

Record and retain the following information.

Product Name	IBM PC Server 310
Machine Type	8639
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. It is recommended that you 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 236 for connector locations.

Device Records

Table 5 (Page 1 of 3). Configuration/Setup Utility Program Defaults and Changes

Option	Default Value	New Value	Additional Information
System Summary			
Processor	Pentium	_____	_____
Processor Speed	167 MHz	_____	_____
Math Coprocessor	Internal	_____	_____
System Memory	640 KB	_____	_____
Extended Memory	15360 KB	_____	_____
Video Controller	S3 Incorporated. Trio64V+	_____	_____
Cache Size	256 KB	_____	_____
Cache State	Enabled	_____	_____
Shadow RAM	384 KB	_____	_____
System ROM	F000h — FFFFh	_____	_____
Memory Type	[Parity]	_____	_____
Diskette Drive A:	[1.44 MB 3.5"]	_____	_____
Diskette Drive B:	[Not installed]	_____	_____
Hard Disk Drive 0:	[Not installed]	_____	_____
Hard Disk Drive 1:	[Not installed]	_____	_____
Hard Disk Drive 2:	[Not installed]	_____	_____
Hard Disk Drive 3:	[Not installed]	_____	_____
Mouse	[Installed]	_____	_____
ISA Configuration			
ISA Slot	Ethernet adapter	_____	_____
ISA Slot	Empty	_____	_____
ISA Slot	Empty	_____	_____
ISA Slot	Empty	_____	_____
ISA Slot	Empty	_____	_____
<i>Note:</i> All models, with the exception of open bay models, come with a preinstalled network adapter, which might be installed in any ISA expansion slot.			
PCI Configuration			
PCI Slot	SCSI adapter	_____	_____
PCI Slot	Empty	_____	_____
PCI Slot	Empty	_____	_____
<i>Note:</i> All models come with a preinstalled SCSI adapter, which might be installed in any PCI expansion slot.			
Product Data			
Flash EEPROM Revision Level	_____	_____	_____
System Board Identifier	_____	_____	_____
System Serial Number	_____	_____	_____
POST/BIOS Date	_____	_____	_____
Devices and I/O Ports			
Serial Port A Address	[3F8h - IRQ 4]	_____	_____
Infrared Port Address	[2F8h - IRQ 3]	_____	_____
Parallel Port	[3BCh - IRQ 7]	_____	_____

Device Records

Table 5 (Page 2 of 3). Configuration/Setup Utility Program Defaults and Changes

Option	Default Value	New Value	Additional Information
Parallel Port Mode	[Standard]	_____	_____
Parallel Port Extended Mode	[_____]	_____	_____
Mouse	[Installed]	_____	_____
Video Setup			
Video Controller	SVGA	_____	_____
Video Memory	1024 KB	_____	_____
DDC monitor checking	[Enabled]	_____	_____
Video Monitor Type	[User Defined]	_____	_____
Monitor Horizontal Frequency	[Not Used]	_____	_____
Refresh Rate For (640x480)	[60 Hz]	_____	_____
Refresh Rate For (800x600)	[56 Hz]	_____	_____
Refresh Rate For (1024x768)	[43 Hz interlaced]	_____	_____
Refresh Rate For (1280x1024)	[Undefined]	_____	_____
Refresh Rate For (1600x1200)	[Undefined]	_____	_____
System Security			
Secure Hard Disk Drives and Diskette Drives			
Hard Disk Access	[Enabled]	_____	_____
Diskette Drive Access	[Enabled]	_____	_____
Power-On Password		_____	_____
Administrator Password		_____	_____
Start Options			
Keyboard Numlock State	[On]	_____	_____
Keyboard Speed	[Fast]	_____	_____
Disketteless Operation	[Disabled]	_____	_____
Monitorless Operation	[Disabled]	_____	_____
Keyboardless Operation Mode	[Disabled]	_____	_____
First Startup Device	[Diskette Drive 0]	_____	_____
Second Startup Device	[Hard Disk 0]	_____	_____
Third Startup Device	[Disabled]	_____	_____
Fourth Startup Device	[Disabled]	_____	_____
Power On Self Test	[Enhanced]	_____	_____
Power On Logos	[Enabled]	_____	_____
Power On F1/Esc Options	[Enabled]	_____	_____
Virus Detection	[Enabled]	_____	_____

Device Records

Table 5 (Page 3 of 3). Configuration/Setup Utility Program Defaults and Changes

Option	Default Value	New Value	Additional Information
Advanced Setup			
Memory Control			
Memory Access Speed	[60 ns access]	_____	_____
Parity/ECC Select	[Parity]	_____	_____
Cache Control			
Cache State	[Enabled]	_____	_____
Cache Size	[256 KB]	_____	_____
ROM Shadowing			
F0000h - FFFFh (System BIOS)	Enabled	_____	_____
E8000h - EFFFFh	Enabled	_____	_____
E0000h - E7FFFh	Enabled	_____	_____
D8000h - DFFFFh	[Disabled]	_____	_____
D0000h - D3FFFh	[Disabled]	_____	_____
C8000h - CBFFFh	[Disabled]	_____	_____
C0000h - C7FFFh (Adapter Video BIOS)	[Enabled]	_____	_____
PCI Control			
PCI Burst Mode	[Enabled]	_____	_____
Plug and Play			
Set Device Node	[Enabled]	_____	_____

Device Records

Table 6 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	640 KB	_____	_____
Extended Memory	360 KB	_____	_____
Bank 0 DIMM	_____	_____	16 MB Kit <input type="checkbox"/> 32 MB Kit <input type="checkbox"/>
Bank 0 DIMM	_____	_____	16 MB Kit <input type="checkbox"/> 32 MB Kit <input type="checkbox"/>
Bank 1 SIMM 1	8 MB Kit	_____	4 MB Kit <input type="checkbox"/> 8 MB Kit <input type="checkbox"/> 16 MB Kit <input type="checkbox"/> 32 MB <input type="checkbox"/>
Bank 1 SIMM 2	8 MB Kit	_____	4 MB Kit <input type="checkbox"/> 8 MB Kit <input type="checkbox"/> 16 MB Kit <input type="checkbox"/> 32 MB <input type="checkbox"/>
Bank 2 SIMM 3	_____	_____	4 MB Kit <input type="checkbox"/> 8 MB Kit <input type="checkbox"/> 16 MB Kit <input type="checkbox"/> 32 MB <input type="checkbox"/>
Bank 2 SIMM 4	_____	_____	4 MB Kit <input type="checkbox"/> 8 MB Kit <input type="checkbox"/> 16 MB Kit <input type="checkbox"/> 32 MB <input type="checkbox"/>
Total Memory	16 MB	_____	_____
Video Memory	1 MB	_____	<u>1 MB</u> <input type="checkbox"/> <u>2 MB</u> <input type="checkbox"/>

Table 6. Memory Default Settings and Changes

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
5	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____
1	_____	_____	_____	_____	_____

Note: Before setting values, review “Resolving Configuration Conflicts” on page 50 and follow the instructions for avoiding configuration conflicts.

Table 7. Expansion Slot Configuration Information

Device Records

Record the types and SCSI IDs for drives or devices attached to your server in Table 8.

Location	Drive or Device Description
	Internal Devices
Bay 1	_____
Bay 2	_____
Bay 3	_____
Bay 4	_____
Bay 5	_____
	External Devices
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____

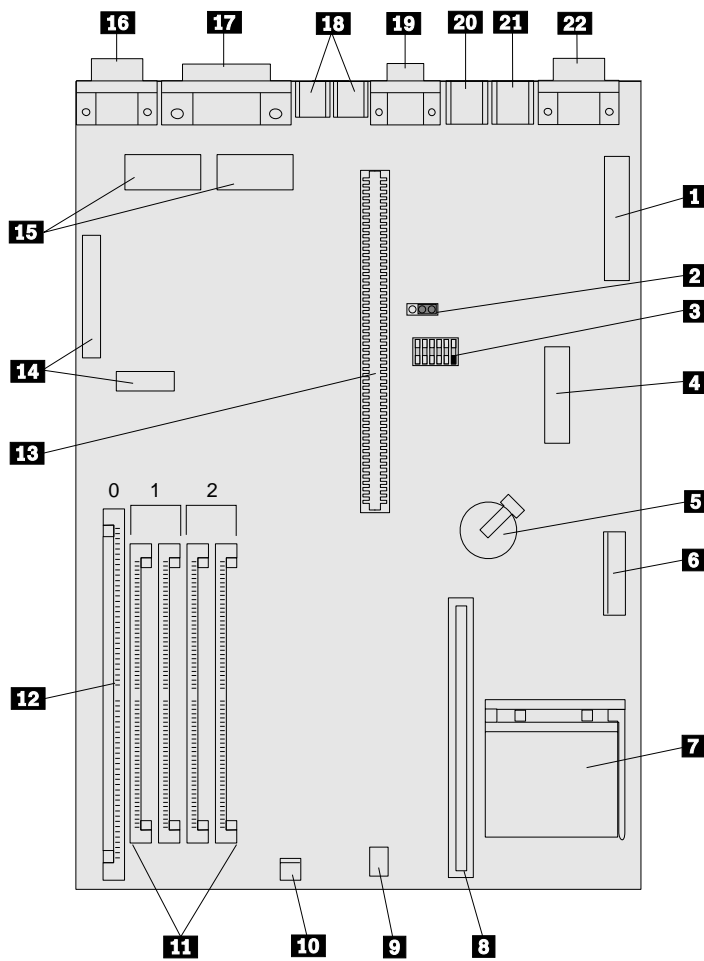
Table 8. Internal and External Drives and Devices

Note: If you attach a drive or other device to an adapter, be sure to record the descriptive information appropriately.

The System Board

The 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 230.



The System Board

The system-board components are:

1	Power connector (5 V)
2	Password jumper, normal position
3	Configuration switch set
4	Diskette connector
5	Battery
6	Power connector (3.3 V)
7	Processor socket
8	Cache memory module connector
9	Fan connector
10	Power LED ⁶ connector
11	SIMM ⁶ connectors (Banks 1 and 2)
12	DIMM ⁶ connector (Bank 0)
13	Riser connector
14	VESA ⁶ passthrough connectors
15	Video upgrade sockets
16	Video port
17	ECP/EPP ⁶ parallel port
18	USB ports (1 and 2)
19	Serial port A
20	Mouse port
21	Keyboard port
22	Infrared port

⁶ DIMM = dual-inline memory-module; ECP/EPP = extended capabilities port/enhanced parallel port; LED = light-emitting diode; SIMM = single-inline memory-module; VESA = Video Electronics Standards Association.

The System Board

Appendix D. Notices

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NetWare	Novell, Inc.
Novell	Novell, Inc.
Pentium	Intel Corporation
PRODIGY	Prodigy Service Company
QAPlus	DiagSoft, Inc.
QAPlus/PRO	DiagSoft, Inc.
S3	S3 Incorporated
SCSISelect	Adaptec, Inc.
SCO	The Santa Cruz Operation, Inc.
Trio64V+	S3 Incorporated
VESA	Video Electronics Standards Association
X/Open	X/Open Company Limited

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