



PC Server 330

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

First Edition (September 1996)

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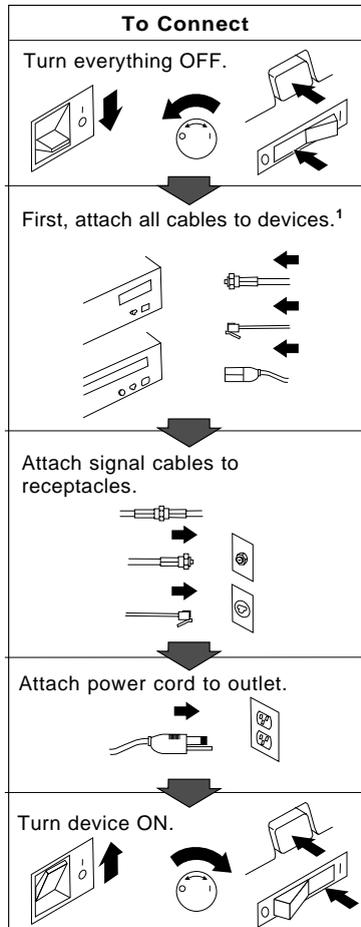
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Safety Information

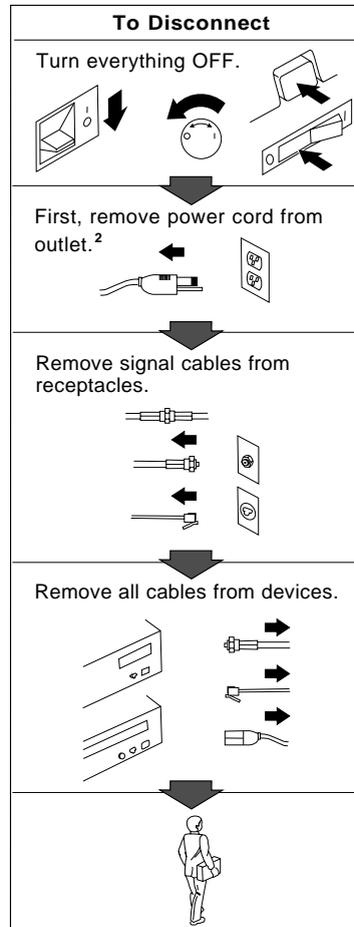


DANGER:

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.

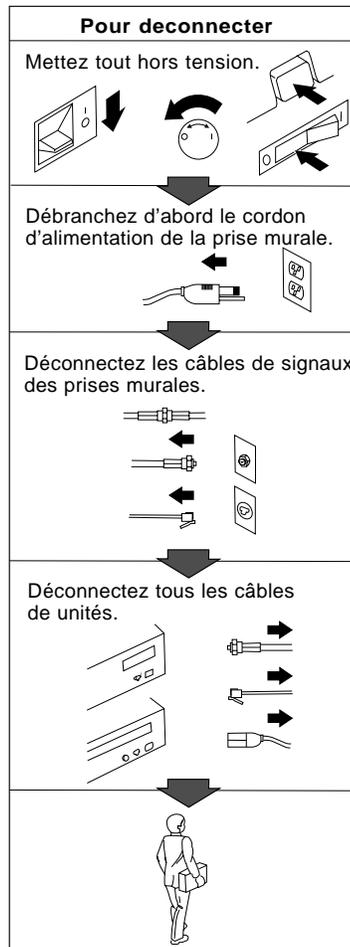
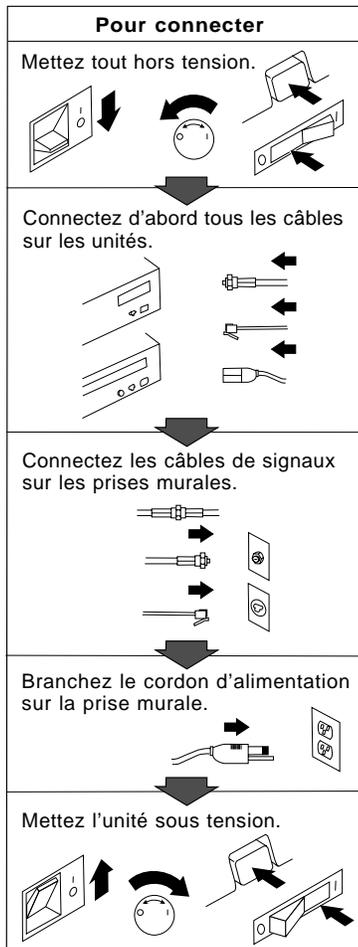


² In the U.K., by law, the power cord must be disconnected after the telephone line cable.



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

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

CAUTION:

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

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

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

DANGER

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

About This Book

This book provides instructions on how to configure your PC Server 330 and how to install and remove options. This book also provides information to help you solve many simple problems that might occur. If you have not yet set up your server, refer to the *Setup and Installation* sheet for detailed information on unpacking the server, attaching cables, and installing the operating system. Refer to the *User's Reference* for more detailed information on the features of the server.

How This Book is Organized

Chapter 1, "Getting Started with PC Server 330," provides a general introduction to using your server.

Chapter 2, "Configuring Your Disk Arrays," provides information about configuring models that come with a disk-array adapter. This chapter provides step-by-step instructions to perform the tasks necessary to configure, add, change, or delete one or more disk arrays.

Chapter 3, "Configuring Your Server," describes how to use the Configuration/Setup utility program to configure your server. This chapter also provides instructions for using various utility programs.

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. The chapter also contains information about checking the server for damage, and resolving configuration conflicts.

Chapter 6, "Getting Help, Service, and Information," provides instructions on how to obtain service and technical assistance for your PC Server 330 and other IBM products that you might plan to use. This chapter also contains information about other publications, products, warranties, and services that IBM offers.

Notices Used in This Book

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,” describes jumper locations and settings and contains instructions for changing jumpers.

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

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

Appendix D, “Notices,” contains product notices and trademarks.

An index follows the appendixes.

Notices Used in This Book

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

- **Notes**
These notices provide important tips, guidance, or advice.
- **Attention**
These notices indicate possible damage to programs, devices, or data. An attention notice is placed just *before* the instruction or situation in which damage could occur.
- **Caution**
These notices indicate situations that can be potentially hazardous to you. A caution notice is placed just *before* descriptions of potentially hazardous procedure steps or situations.

Related Publications

The following publications come with your PC Server 330:

- The PC Server 330 *Setup and Installation* sheet contains information about setting up your server.
- The PC Server 330 *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 ServerGuide documentation describes the advantages of IBM ServerGuide and describes how to use the ServerGuide software.

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

The following pertain to the server's Ethernet Controller.

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

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

- In the U.S. and Puerto Rico, call 1-800-426-7282.
- In Canada, call 1-800-465-1234.
- In other countries, contact the IBM support organization that services your area, your IBM marketing representative, or your IBM reseller.

Welcome and Thank You

Welcome and Thank You

We appreciate your decision to purchase an IBM PC Server 330. Your server offers speed, power, expandability, and compatibility.

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

You can access the World Wide Web for updates to flash BIOS and the latest information about product compatibility and configuration. You can also link to other locations for additional information. IBM gives you direct access to trained specialists who can help you set up, install, and configure your server.¹

The PC Server 330 comes with a limited three-year on-site warranty. In addition, IBM's PC Server Startup Support provides coverage to PC Server customers during the first 90 days after installation at no additional charge.

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

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

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

Chapter 1. Getting Started with PC Server 330

Your PC Server 330 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 the extended industry standard architecture (EISA) and the 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 330 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, such as stringent IBM systems assurance testing.

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

Refer to the *Setup and Installation* sheet for instructions for setting up your server. Be sure to read the publications that come with the IBM ServerGuide package before you set up your server.

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



CAUTION:

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

This chapter contains:

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Features at a Glance

The following table summarizes the features of the PC Server 330.

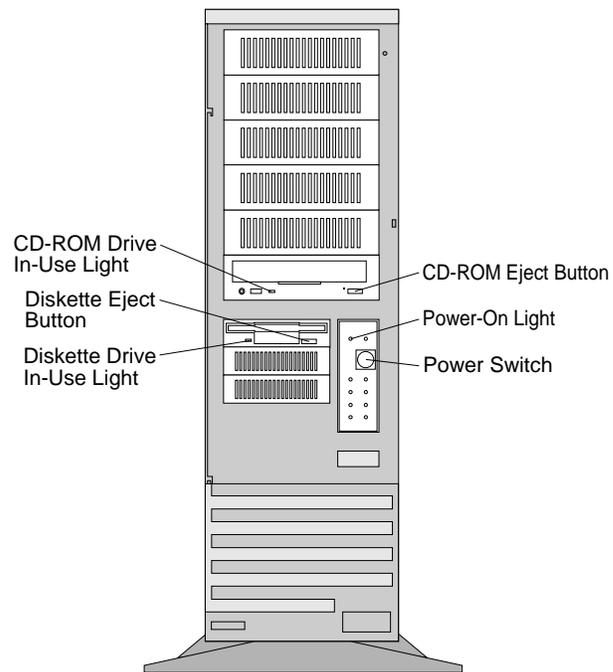
<p>Microprocessor</p> <ul style="list-style-type: none"> • Pentium Pro microprocessor • 16 KB of level-1 cache • 256 KB of level-2 cache (min.) • Clock rate varies by model <p>Memory</p> <ul style="list-style-type: none"> • Standard: 32 MB (min.), expandable to 512 MB • 60 ns, buffered Extended Data Out (EDO), Error Correcting Code (ECC) • Four dual inline memory-module sockets <p>Diskette Drives</p> <ul style="list-style-type: none"> • Up to two drives supported • Standard: One 3.5-inch, 1.44 MB • Optional (internal): <ul style="list-style-type: none"> – 3.5-inch, 1.44 MB – 3.5-inch, 2.88 MB <p>Hard Disk Drives</p> <ul style="list-style-type: none"> • Non-hot swap servers support up to six not-hot swap hard disk drives. • Hot-swap servers support up to seven hard disk drives, six of them hot-swappable. <p>CD-ROM Drive</p> <ul style="list-style-type: none"> • Standard: SCSI 	<p>Keyboard and Auxiliary Device (some models)</p> <ul style="list-style-type: none"> • Keyboard • Mouse <p>Expansion Slots</p> <p>Up to nine adapters can be installed.</p> <ul style="list-style-type: none"> • One dedicated PCI slot • Four shared PCI/EISA slots • Four dedicated EISA slots <p>Expansion Bays</p> <ul style="list-style-type: none"> • Six 5.25-inch drive bays (non-hot-swap server) • One 5.25-inch and six hot-swap drive bays (hot-swap server) • Three 3.5-inch drive bays • The number of bays available for expansion varies by model. <p>Upgradable POST and BIOS</p> <ul style="list-style-type: none"> • POST/BIOS upgrades (when available) can update EEPROM on the system board <p>Security Features</p> <ul style="list-style-type: none"> • Bolt-down capability • Door lock • LogicLock security enabled • Power-on and administrator passwords • Selectable drive-startup • Security-error indicator 	<p>Integrated Functions</p> <ul style="list-style-type: none"> • Two serial ports • One infrared port • One parallel port • Mouse port • Keyboard port • 16-bit UltraSCSI controller <ul style="list-style-type: none"> – One external connector (16-bit) – One internal connector (16-bit) • Ethernet Controller <ul style="list-style-type: none"> – 10BASE-T port – AUI port • Video controller port compatible with: <ul style="list-style-type: none"> – Super video graphics array (SVGA) – Video graphics adapter (VGA) – Color graphics adapter (CGA) – 1 MB video memory <p>Power Supply</p> <ul style="list-style-type: none"> • 350 W (110–220 V ac) • Built-in overload and surge protection • Automatic restart after a momentary loss of power
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Controls and Indicators

Controls and Indicators

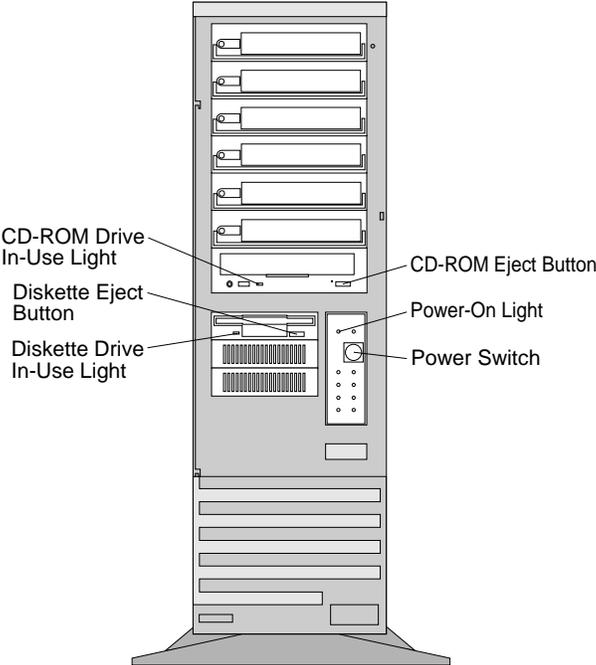
The most commonly used controls and indicators are on the front of your server.

PC Server 330 Controls (Non-Hot-Swap Server)



Controls and Indicators

PC Server 330 Controls (Hot-Swap Server)



Controls and Indicators

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

Power-On Light: This green LED lights when you turn on your server by pressing the power switch, and when the server powers on in the Unattended mode.

Power Switch: Use this switch to turn your server on manually, or return the server to *Standby mode*. The automatic restart feature, which enables the server to restart following a momentary power loss, means that the server is never completely turned off. Do not set the server to the Standby mode if any of the drive In-Use lights are on. This might damage the information stored on a hard disk or diskette.

You can configure the server to start at a specified date and time, or when it receives a signal from either serial port. (For more information on setting Unattended startup, see “Alarm/Wakeup Settings” on page 96.)

To toggle the server:

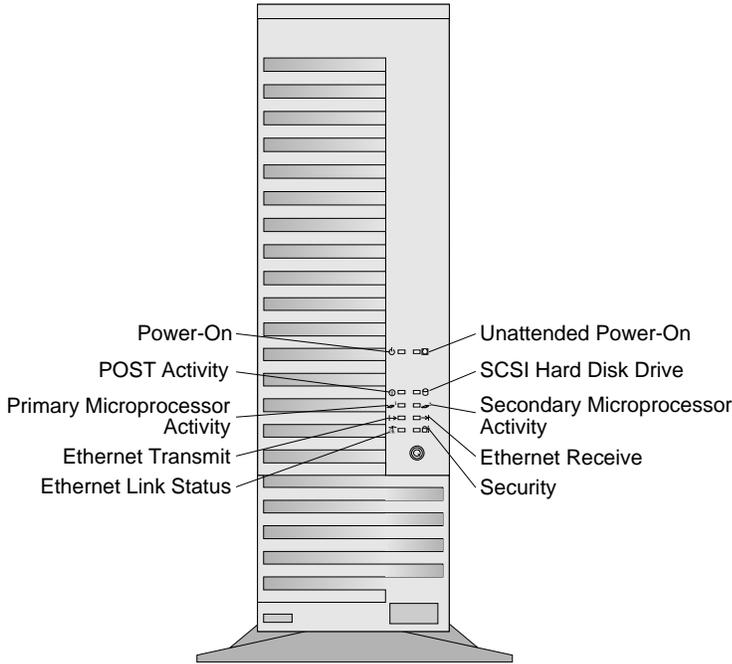
- To the Attended mode from the Standby mode, press and release the power switch.
- Attended mode to the Standby mode, press the power switch in slowly just until the power-on light goes out, and then immediately release the switch.

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

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

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

Operator Panel Status Indicators

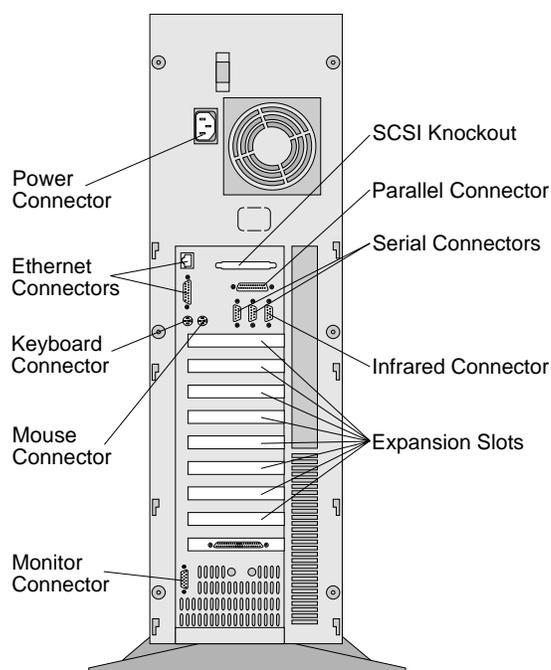


-  **Unattended Power-On Indicator:** This green LED lights when the server powers on in the Unattended mode.
-  **SCSI Hard Drive In-Use Indicator:** This amber LED lights when your server is accessing a SCSI device. If this light remains illuminated, this might indicate that either the SCSI bus or the system microprocessor has stopped.
-  **Secondary Microprocessor In-Use Indicator:** This amber LED blinks to show the activity of a microprocessor installed in the secondary microprocessor socket. The LED lights during POST to indicate the presence of the microprocessor. When you install a secondary microprocessor, it becomes the startup microprocessor.
-  **Ethernet Receive Indicator:** This amber LED shows reception activity on the network.

Controls and Indicators

-  **Security Indicator:** When tamper-detection software is installed and enabled, this amber LED shows that a security hardware or software error occurred.
-  **Ethernet Link Status Indicator:** This green LED shows an active link connection on the 10BASE-T interface.
-  **Ethernet Transmit Indicator:** This amber LED shows transmission activity on the network.
-  **1 Primary Microprocessor Activity Indicator:** This amber LED blinks to indicate the activity of the microprocessor; it also comes on during POST.
-  **POST Activity Indicator:** This amber LED lights while the power-on self test (POST) and the configuration utility programs are running. If this LED remains illuminated, either a POST error has occurred, or the system microprocessor has stopped.
-  **Power-On Indicator:** This green LED lights when you turn on your server by pressing the power switch, and when the server powers on in the Unattended mode.

Input/Output Connectors



-  **SCSI Knockout:** Remove this knockout panel to install the SCSI external connector cable. For more information, see “Installing the External SCSI Cable Connector” on page 211.
-  **Parallel Connector:** A signal cable for a parallel device, such as a printer, connects here.
-  **Serial Connectors:** Serial signal cables for modems or other serial devices connect here to the two 9-pin serial connectors, port A and port B. Serial port B shares a port assignment with the infrared port. See “Devices and I/O Ports” on page 94 for port assignment information.
-  **Infrared Connector:** An infrared (IR) transceiver module option can connect here. See “Devices and I/O Ports” on page 94 for port assignment information.

Input/Output Connectors

Expansion Slots: When you install an adapter into an expansion slot, you would remove the external expansion slot cover for any external connectors on the adapter.



Monitor Connector: The monitor signal cable connects here.



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



Keyboard Connector: The keyboard cable connects here.



Ethernet Connectors: There are two Ethernet connectors: A DB-15 and an RJ-45. The DB-15 attachment unit interface (AUI) connector is for attachment of external 10BASE2, 10BASE5, or 10BASE-F medium attachment unit (MAU). The RJ-45 connector is for attachment to the integrated 10BASE-T (twisted-pair) transceiver. If your server comes with an Ethernet interface cable, you must attach it to the RJ-45 connector on the server, and the cable on the 10BASE-T device.

For more information about cables, see “Ethernet Controller Messages” on page 258.

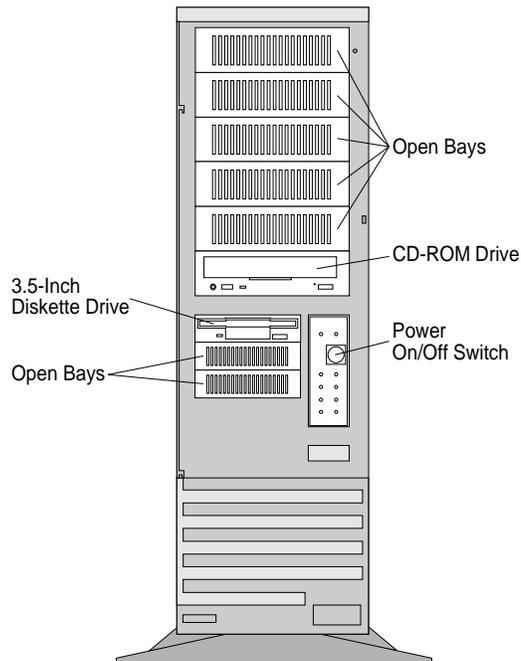
Power Connector: The server power cable connects here.

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

Expansion Bays

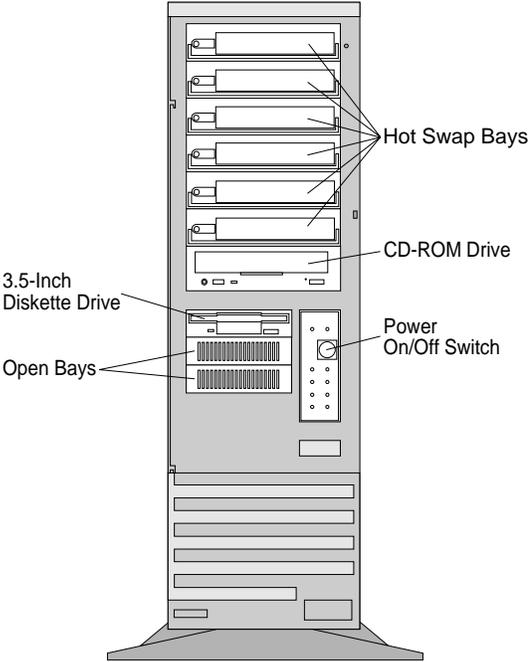
The server has the following expansion bays available.

Expansion Bays (Non-Hot Swap Server)



Expansion Bays

Expansion Bays (Hot-Swap Server)



Expansion Bays

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

For information on the supported types of drives and their installation, see "Installing Internal Drives" on page 149.

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

Diskette Drive: The 3.5-inch, 1.44 MB (MB is approximately 1 000 000 bytes) diskette drive uses 1 MB (unformatted) or 2 MB (unformatted) diskettes.

Note: See the *User's Reference* for additional information about the SCSI subsystem and SCSI hard disk drives.

Arranging Your Workspace

Arranging Your Workspace

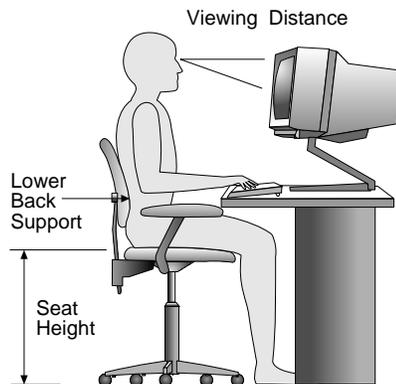
To get the most from your server, arrange both the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

Comfort

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

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

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



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

Arranging Your Workspace

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

Glare and Lighting

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

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

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

Air Circulation

Your server and monitor produce heat. Your server has one or more fans that pull in fresh air and force out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the server and monitor so that nothing blocks the air vents; usually, 51 mm (2 in.) of air space is sufficient. Also, make sure the vented air is not blowing on someone else.

Getting Help on the World Wide Web

Electrical Outlets and Cable Lengths

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

When arranging your workspace:

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

For more information about power cords, refer to the *User's Reference*.

Getting Help on the World Wide Web

You can access the latest information about 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 software.
- 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 313.

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, and ask for document number 16125.

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

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

Note: For additional information, service, or assistance, see Chapter 6, “Getting Help, Service, and Information” on page 313.

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

Chapter 2. Configuring Your Disk Arrays

The information in this chapter applies only to models that have an IBM PC ServeRAID Adapter installed. This chapter provides step-by-step procedures to perform the tasks necessary to configure, add, change, or delete one or more disk arrays. In addition, this chapter outlines procedures for some of the more common disk-array configuration and maintenance tasks.

After you complete the instructions in this chapter, you must install an operating system. Follow the instructions in your operating system-documentation to install your operating system.

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Before You Begin

- Familiarize yourself with the information contained in this chapter and the RAID (redundant array of independent disks) information in the *User's Reference*.
- Verify the disk-array configuration. The hard disk drives in your disk-array model come configured as one logical drive.
 - To view the disk-array configuration, go to “Viewing the Configuration” on page 37.
 - To create a disk array, go to “Creating a Disk Array” on page 40.
- Backup the disk-array configuration. See “Backing Up Your Disk-Array Configuration” on page 64.

After you configure the disk array, you can complete setup by installing your operating system (from the ServerGuide compact disc that comes with your server or from the diskettes that come with your operating system). Before you install an operating system, refer to the README file in **Start Here** on the ServerGuide Main CD.

Installing Your Software

The ServeRAID adapter can be used with several operating systems. With OS/2, Novell NetWare, Microsoft Windows NT 3.51, and SCO OpenServer 5.0, you can run the administration programs to monitor the drive status. The *Device Driver/Administration and Monitoring diskette* contains files that must be installed when you use OS/2, Novell NetWare, Microsoft Windows NT 3.51, and SCO OpenServer 5.0. Be sure to read the README file on the *Device Driver/Administration and Monitoring diskette* for the appropriate installation instructions for each program.

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 the most current updates.

If you intend to install an IBM operating system or network program, such as OS/2 for SMP, 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 SMP operating systems supported by your ServeRAID adapter:

- 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, your IBM marketing representative, or your IBM reseller.

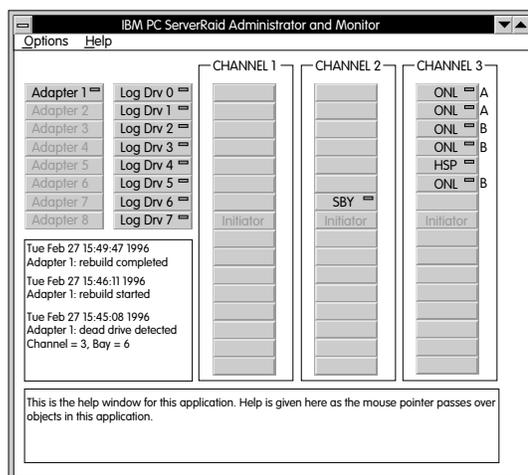
Installing Your Operating System

For installation instructions for installing OS/2, Novell NetWare, Microsoft Windows NT, SCO OpenServer 5.0, and DOS, refer to the README files on the IBM PC ServeRAID Device Driver, Administration and Monitoring Diskette.

For all other operating systems, use the installation instructions that come with the operating system.

Administration and Monitoring Utility Programs

The IBM PC ServeRAID Device Driver, Administration and Monitoring Diskette contains RAID administration and monitoring programs for several operating systems that your ServeRAID adapter supports. You can monitor your ServeRAID adapter in the local and remote mode by using these programs. The following is an example of a IBM PC ServeRAID Administration and Monitoring Program screen. Your screen might look different.



Monitoring Status of the Adapter in the Local System

You can view the configuration or monitor the ServeRAID adapter in the local system by using the Administration and Monitoring Utility. This utility supports the following operating systems.

- OS/2
- Novell NetWare
- Windows NT

Because the monitoring programs reside on top of your operating system, you can perform tasks such as the following from your active operating system Desktop:

- Select the adapter that you want to monitor
- View information about the states of drives connected to the adapter and change the drive state
- Replace a defunct hard disk drive

Refer to the README file on the IBM PC ServeRAID Device Driver, Administration and Monitoring Diskette for instructions on how to install and use these monitoring programs.

Monitoring Status of the Adapter in a Remote System

The ServeRAID adapter can be remotely monitored using the Client/Server environment which is supported by using TCP/IP. The Server part of the Client/Server environment runs on the system containing the adapter and is supported by the following operating systems.

- Novell NetWare
- Windows NT
- OS/2
- SCO OpenServer

The Client part of the Client/Server environment runs in the following Windows environments:

- Windows NT Server Version 3.51
- Windows NT Workstation Version 3.51
- Windows 95

The Client program includes many of the functions contained in the IBM PC ServeRAID configuration program, such as, adding or removing capacity dynamically when creating or deleting an array. You can start the Administration and Monitoring program from your active operating system Desktop.

This monitoring program allows you to view the ServeRAID configuration and associated devices, reassign a drive to replace a defunct drive, create a logical drive, create an array, and delete an array.

In addition, in an array that contains only one logical drive, and the total number of logical drives in all arrays is less than eight, you can change the logical drive RAID level from level 0 to level 5 (or level 5 to level 0). The logical drive is not accessible during the conversion process. Make sure that you backup your data before initializing a RAID conversion process.

Note: In the event of a power loss or a hard disk drive failure, the data in the logical drive undergoing the RAID conversion can be lost.

Refer to the README file on the IBM PC ServeRAID Device Driver, Administration and Monitoring Diskette for instructions on how to install and use this monitoring utility program.

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. The ServeRAID adapter requires the installation of device drivers.

Configuring Your Disk Arrays

The ServeRAID configuration program allows you to view the current disk-array configuration, change or delete existing arrays, create and initialize new disk arrays, and perform many other disk-array tasks.

You must configure your disk-arrays before you install your operating system. Once your disk-arrays are configured, you must run the Administration and Monitoring program appropriate for your operating system to receive messages and warnings regarding the status of the logical and physical hard disk drives.

Starting the Configuration Program

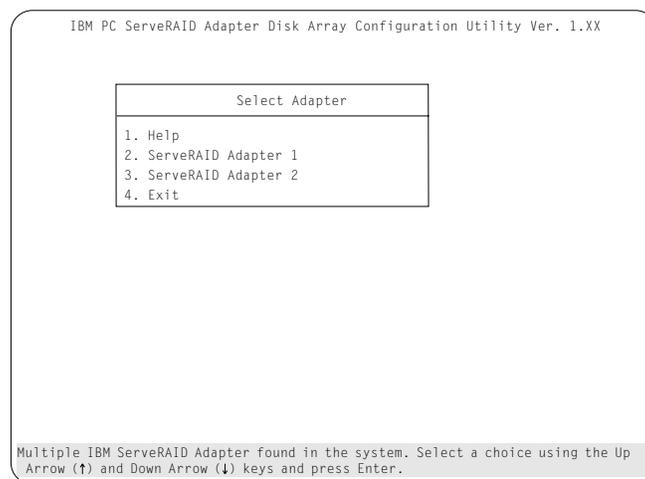
1. To start the ServeRAID configuration program, insert the ServeRAID Adapter Configuration Diskette into the primary

diskette drive and turn on the system. If the system is already turned on, press **Ctrl+Alt+Del**.

Each time your system starts, the ServeRAID adapter performs a power-on self-test (POST). The POST checks the configuration information on the adapter and on the configured hard disk drives.

- If POST does not detect changes in the adapter configuration or an adapter hardware problem, continue with step 2 on page 27.
- If POST detects changes in the adapter configuration or detects an adapter hardware problem, error messages appear on the screen. Refer to “ServeRAID Adapter POST and Setup Messages” on page 282, then return here and continue with step 2 on page 27.

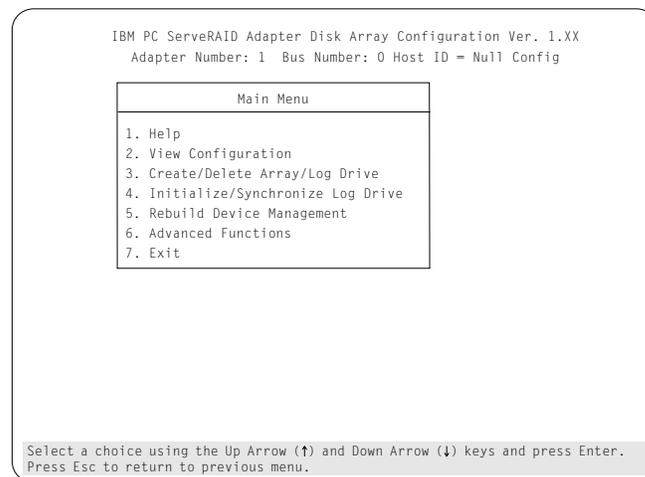
2. If you have more than one ServeRAID adapter installed in your system, the following screen appears. You can install a maximum of three ServeRAID adapters in your system and you must configure each adapter separately.



Note: The version number on your screen might be different.

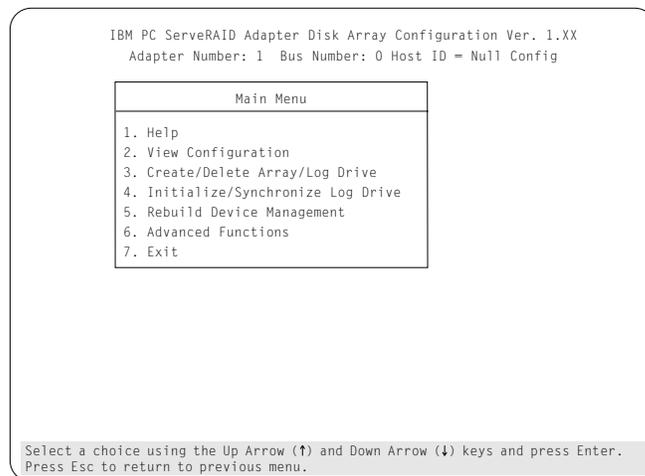
To select an adapter, use the Up Arrow (↑) key and Down Arrow (↓) key to highlight your choice and then press **Enter**. The Main Menu appears.

3. If you have only one ServeRAID adapter installed in your server, the Main Menu appears.



ServeRAID Configuration Information

The Main Menu offers the following choices.



- Select **Help** for an online explanation about the choices on the screen.
- Select **View Configuration** to see the existing disk-array configuration information.
- Select **Create/Delete Array/Log Drive** to select the drives for an array that you want to create or delete. This choice also allows you to define and delete logical drives, and define and undefine hot-spare drives.

Note: You can define a maximum of eight arrays and eight logical drives per adapter.

- Select **Initialize/Synchronize Log Drive** after creating an array:
 - **Initialize Logical Drive:** You *must* select this choice to set the logical drive to a predetermined value. Any data existing on the drive is overwritten with zeros.

You can choose to initialize more than one logical drive at a time. You can interrupt the initialization process at any time by pressing the **Esc** key. Then, you can either restart

the initialization process by pressing the **Enter** key or you can end the process by pressing the **Esc** key again.

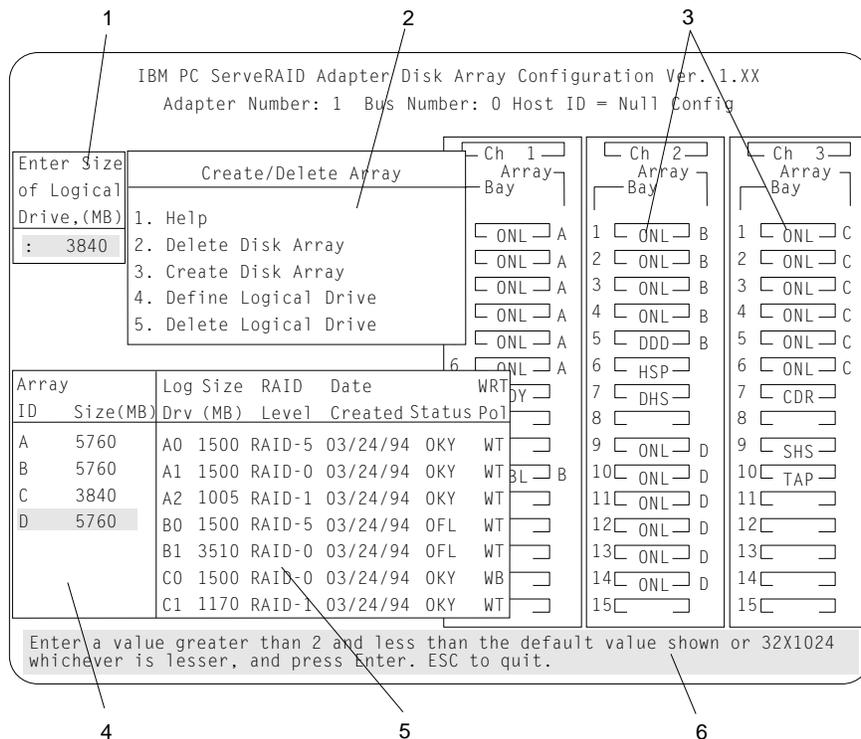
- **Synchronize Logical Drive:** You *must* select this choice to recompute and rewrite the parity data on the selected drive for RAID level 5 before storing data. This selection does not alter data on the drive. After synchronization starts, it cannot be interrupted until the operation is complete.

Note: It is good practice to synchronize logical drives with RAID levels 1 and 5 weekly.

- Select **Rebuild/Device Management** to rebuild logical drives. When you replace a defunct drive in a critical (CRT) logical drive, the data is rebuilt on the new physical drive before the state of the logical drive is changed to OKY. The rebuild operation is supported only for RAID levels 1 and 5. You also can use this option to define or redefine the state of a physical drive, display drive information, and clear the device-error table.
- Select **Advanced Functions** to change the write policy (the way data is written to the drive), to save your configuration information to a diskette, to restore your configuration from a diskette, or to change ServeRAID adapter parameters. This choice also allows you to run the RAID subsystems diagnostics, initialize the adapter configuration, reset the configuration values to the factory defaults, and synchronize the primary and backup copies of the adapter configuration information.
- Select **Exit** to leave the Main Menu.

ServeRAID Configuration Program Screens and States

When you use the IBM ServeRAID configuration program, different screens appear. The following is a compilation of many of the IBM ServeRAID Adapter Disk Array Configuration screens and an explanation of the areas labeled in the screen.



1. This area displays pop-ups that apply to the current menu. For example, you can use this pop-up window to select the logical drive size by entering the size in megabytes or to accept the default value shown. Another pop-up that appears in this area allows you to select the RAID level you want to assign to the logical drive you are defining. When you need to confirm an action, the Confirm pop-up window also appears in this area.
2. You can select any of the choices that appear on the menu.
3. The Bay/Array selection list shows 15 bays for each of the adapter's three channels. For each bay that contains a drive, the

list indicates the physical drive state and the array in which the drive is grouped. For example, in the illustration, the drive in Channel 2, Bay 1 has a drive state of **ONL** (online) and is a part of Array B. Selections are made from this list to determine which bays (hard disk drives) are in your arrays.

Notes:

- a. The Bay/Array area on the screen does not reflect the physical configuration of the server. In your server, you have one “bank” of hot-swap drive bays, bank C. The default numbering for the hot-swap drive bays is numbered 1 through 6 (from top to bottom). Refer to “Installing Internal Drives” on page 149. for the physical location of the hard disk drives.
 - b. The internal drives in your server come connected to Internal Channel 3 of the ServeRAID adapter.

To attach external devices to your server, you can use the External Channel 1 connector. You can also attach external devices to a separately purchased cable, and then connect the cable from the Internal Channel 2 connector on the adapter and out the back of your server, either through the knockout panel or by removing an expansion slot cover.
 - c. The Bay Number corresponds to the SCSI ID of the device plus 1.
4. The Array list indicates the array ID and the size (in megabytes) of the array. When a drive is being rebuilt, this area and the Logical Drive list area show the progression of the rebuild process.
 5. The Logical Drive list identifies the logical drive installed (for example, A1), including the size of the logical drive, the RAID level assigned to the logical drive, the date the logical drive was created, the status of the logical drive, and its write policy.

Note: Logical drives are numbered 0 through 7 in ascending order from top to bottom. They are position dependent, for example, logical drive 3 will always display on the fourth line (B0) even if logical drives 0, 1, and 2 are deleted.

6. The information area tells you the action you can perform on this screen or pop-up.

Logical Drive States

The state of a logical drive is determined by the state of its physical drives. Replacing a defunct drive with a good drive changes the state of the logical drive from offline (OFL) to critical (CRT) or good (OKY). When you replace a physical defunct drive in a critical (CRT) logical drive, the data is rebuilt on the new physical drive before the state of the logical drive is changed to OKY.

State	Meaning
CRT	A logical drive that is defined as RAID level 1 or 5 contains a defunct physical drive. A critical (CRT) logical drive is accessible despite a physical drive failure.
FRE	The drive is not defined.
LDM	The logical drive is undergoing a RAID level change. This state is available only in the remote system of the Administration and Monitoring program.
OKY	The drive is in a good functional state.
OFL	The logical drive is offline and not accessible. This state occurs if one or more physical drives in a nonredundant logical drive (RAID level 0) is defunct. This state also occurs when two or more physical drives in a redundant logical drive (RAID levels 1 and 5) are defunct.
SYS	Reserved state used by the ServeRAID adapter.

Note: If the logical drive is critical, you must replace and rebuild the defunct drive.

Physical Device States

The Bay/Array selection list defines the physical devices connected to each channel as follows:

State	Meaning
CDR	A CD-ROM drive is installed.

DDD A drive in the Online (ONL) or Rebuild (RBL) state has become defunct; it does not respond to commands, which means that the adapter cannot communicate properly with the drive.

A hard disk drive in the DDD state does not necessarily mean that the drive needs to be replaced. In order to determine if the drive should be replaced, you should do the following:

1. Check to ensure that all cables connected to the backplane and to the hard disk drive are connected properly. Also, check to ensure all cable inside the server are connected properly.
2. Make sure tha the hot-swap drive trays are seated properly in the drive bay.

If the hard disk drive still does not function after you have performed these steps, replace the drive.

DHS A hot-Spare or standby hot-spare drive enters the Defunct Hot-spare (DHS) state if it fails to respond to the adapter commands.

EMP No device is present in the bay. This state is represented with dashes (- - -) on the ServeRAID configuration screen, or a blank space on the Administration and Monitor screen.

HSP A hot-spare drive is a hard disk drive that is defined for automatic use when a similar drive fails. The drive capacity of the replacement HSP drive must be equal to or greater than the capacity of the drive being replaced. You must have at least four hard disk drives if you want a hot spare and RAID level 5.

ONL The drive is online and part of an array.

RBL The drive is being rebuilt. A physical hard drive can enter the RBL state if:

- A good working drive replaces a defunct (DDD) drive that is part of the critical (CRT) logical drive. At the end of a successful rebuild, the state of the physical

drive becomes online (ONL), and the state of the corresponding logical drives changes to OKY.

- The HSP or SHS drive is added to the array and the state changes from HSP or SHS to RBL. At the same time, the DDD drive is removed from the array and its state changes to DHS from DDD. The ServeRAID adapter will then automatically reconstruct data in the RBL drive. The state of the corresponding logical drive remains in CRT (if RAID level 1 or 5) or OFL (if RAID level 0) during the rebuild process. When the rebuild completes successfully, the device state changes from RBL to ONL and the logical drive state changes from CRT to OKY.
- A Ready (RDY) or Standby (SBY) drive replaces a defunct (DDD) drive that is part of the critical (CRT) logical drive. The state of the RDY or SBY drive becomes RBL. When the rebuild completes successfully, the state changes to ONL. The DDD drive is removed from the logical drive and becomes DHS.

For more information on rebuilding a drive, refer to “Important Information for Rebuilding a Logical Drive” on page 60.

- RDY** A ready drive is recognized by the adapter and is available for definition. A RDY drive becomes EMP when the drive is physically removed from the bay.
- SBY** A standby drive is a hard disk drive that has been spun down by the adapter. Devices such as tape drives and CD-ROM drives are also considered to be in a Standby state.
- SHS** A standby hot-spare is a hot-spare drive that has been spun down by the adapter. If a drive becomes defunct and no suitable hot-spare drive is available, a standby hot-spare of the appropriate size spins up, and enters the RBL state. You must have at least four hard disk drives, if you want a standby hot-spare and RAID level 5.
- TAP** A tape drive is installed.

Using the Configuration Program

The information in the remainder of this chapter explains how to use the configuration program. The information is divided into sections matching the selections on the Main Menu.

To make a selection from the Main Menu, press the number of the item or use the Up arrow (↑) key and Down arrow (↓) key to highlight the item, and then press **Enter**. Also, you can press the **Esc** key to return to the previous menu, the previous work area of a screen, or all the way back to the Main Menu.

For an explanation about the choices on the screen, you can select **Help** from any menu.

Viewing the Configuration

Before creating or changing a disk array, you can look at the current configuration.

To view the current disk-array configuration:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **View Configuration** and press **Enter**. The current disk-array configuration information appears on the screen.

IBM PC ServeRAID Adapter Disk Array Configuration Ver. 1.XX
Adapter Number: 1 Bus Number: 0 Host ID = Null Config

View Configuration						Ch 1 Array Bay	Ch 2 Array Bay	Ch 3 Array Bay
						1 ONL A	1 ONL B	1 ONL C
						2 ONL A	2 ONL B	2 ONL C
						3 ONL A	3 ONL B	3 ONL C
						4 ONL A	4 ONL B	4 ONL C
						5 ONL A	5 DDD B	5 ONL C
						6 ONL A	6 HSP	6 ONL C
						7 RDY	7 DHS	7 CDR
						8	8	8
						9 RBL B	9	9 SHS
						10	10	10 TAP
						11	11	11
						12	12	12
						13	13	13
						14	14	14
						15	15	15

Array ID	Size	Log Drv	Size (MB)	RAID Level	Date Created	Status
A	4300	AO	500	RAID-0	12/12/95	OKY WT
B	4300	BO	500	RAID-0	12/12/95	OFL WT
C	4300	CO	500	RAID-0	12/12/95	OKY WT

Press Esc to return to main menu. Select array using cursor keys and press Enter to view the stripe order.

3. Press **Enter** to see the stripe order in the Bay/Array selection list. In the above example, data for the A array is striped across Channel 1, from bay 1, then bay 2, and so on, through bay 6.
4. Press any key to return to the View Configuration screen.
5. Press **Esc** to return to the Main Menu.

Creating/Deleting Disk Arrays

This section contains the common tasks for configuring disk arrays. Procedures to complete these tasks are in this section as follows:

- “Creating a Disk Array” on page 40.
- “Defining Logical Drives” on page 41.
- “Defining a Hot-Spare Drive” on page 47.
- “Deleting a Disk Array” on page 49.
- “Deleting a Logical Drive” on page 51.
- “Redefining Space in an Array” on page 52.
- “Setting Device States” on page 54.

You can create disk arrays from your existing drives, and define and delete logical drives. Later, you can add storage capacity to your server without disturbing existing data by installing additional hard disk drives and creating additional arrays. You can use the remote mode of Administration and Monitoring program or the ServeRAID configuration program to create a disk array.

Using the remote mode of the Administration and Monitoring program, you can add a logical drive to an existing array, if the array has free space to create the logical drive. You can also create a new array to add additional logical drives. By adding additional logical drives, you can dynamically add capacity to your server, if your operating system supports it. Refer to the README file on the *Device Driver/Administration and Monitoring diskette* for instructions on using the Administration and Monitoring program.

Understanding Logical Drives

It is helpful to understand how the system manages logical drives and how many you can define.

When you create an array, you are combining several hard disk drives into one storage area. The array then can be used as a single logical drive or can be subdivided into several logical drives. A logical drive of a disk array can be any size you choose within the size limitations of the array. Each ServeRAID adapter supports up to eight independent arrays and a total of eight logical drives.

Each array can be formed from a maximum of 8 or 16 drives. An array can span all channels.

Note: When the strip unit size is 8 K or 16 K, the maximum number of physical drives in an array is 16. When the strip unit size is 32 K or 64 K, the maximum number of physical drives in an array is eight.

Understanding Hard Disk Drive Capacities

It is important to understand the implications of hard disk drive capacities and how they influence the way you create disk arrays.

Although the drives in the disk array can be of different capacities (for example 1 GB or 2 GB), they are treated in the disk array configuration as if they all have the same capacity, that is, the capacity of the smallest disk drive. Therefore, if you have four drives of 1 GB, 1 GB, 1 GB, and 2 GB grouped in one disk array, the total capacity of the array is 1 GB times 4, or 4 GB (instead of the 5 GB physically available).

Notes:

1. With RAID level 0, the total capacity of the array without protection would be 4 GB. With RAID level 1 protection, the usable data capacity would be 2 GB. With RAID level 5 protection, the usable data capacity would be 3 GB.
2. When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes; total user-accessible capacity may vary depending on operating environment.

Creating a Disk Array

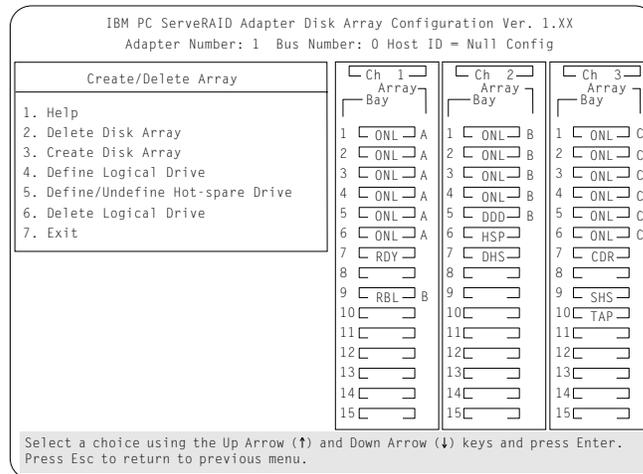
To create a disk array:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).

Note: If you want to create an array using hard disk drives in an existing array, refer to “Redefining Space in an Array” on page 52.

2. Select **Create/Delete Array/Log Drive** from the Main Menu and press **Enter**.
3. Select **Create Disk Array** from the Create/Delete Array menu.

The cursor will be active in the Bay/Array selection list.



4. Select each drive you want to include in the array by using the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the drive and then press **Enter**. As you select each drive, the state of that drive will change from **RDY** (Ready) to **ONL** (Online).

5. When you have selected all the drives you want to include in the array, press **Esc**. The cursor will become active in the menu.

Note: When the stripe unit size is 8 K or 16 K, the maximum number of drives in an array is 16. When the stripe unit size is 32 K or 64 K, the maximum number of drives in an array is eight.

6. If you have drives you did not use in the array and you want to create another array, you can do one of the following:

- Define the logical drive or drives for that array; then create another array and its logical drives. Refer to “Defining Logical Drives.”
- Create another array now by repeating steps 2 through 5 in this procedure; then define logical drives for all arrays.

Note: You must define at least one logical drive for each array created before you can exit from the ServeRAID configuration program.

7. If you change your mind after selecting the drives for an array, you can delete the array (by selecting **Delete Disk Array** from the Create/Delete Array menu) and then begin again.

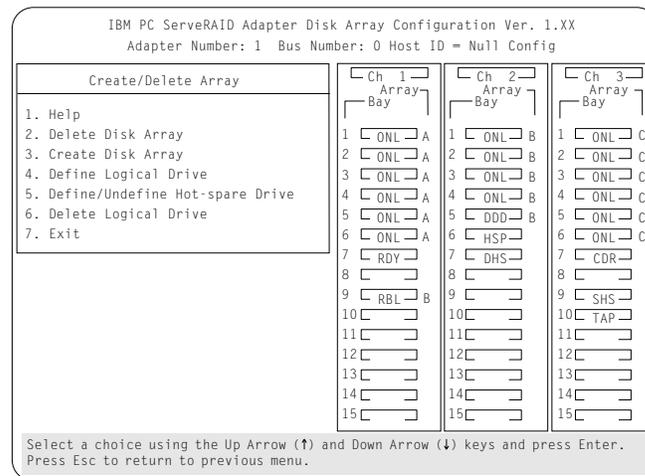
Defining Logical Drives

You cannot leave the ServeRAID configuration program until you define the logical drives for any created arrays.

To define a logical drive:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).

2. Select **Define Logical Drive** from the Create/Delete Array menu and press **Enter**. The following screen appears; the cursor is active in the Bay/Array selection list.



3. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the array you want to define; then press **Enter**. The Select RAID Level pop-up window appears, and the cursor is active in the window.
4. Select a RAID level from the pop-up window and press **Enter**.

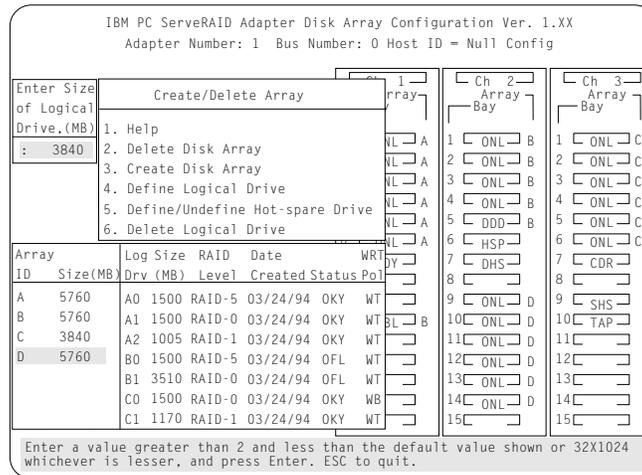
Notes:

- a. The system automatically assigns RAID level 0 to any logical drives defined in an array containing only one hard disk drive. When this is the case, the Select RAID Level pop-up window will not appear.
- b. If you have two hard disk drives in the array, the Select RAID Level pop-up window appears, but RAID level 5 is not selectable. You need at least three hard disk drives in an array to assign RAID level 5 to one of the logical drives.
- c. You can define more than one logical drive for your array. The maximum number of logical drives you can define is eight. If you plan to change RAID levels using the remote mode of the Administration and Monitoring program, the

maximum number of logical drives you can define is seven. The RAID conversion procedure requires one free logical drive.

- d. The maximum number of physical drives in an array is eight or 16, depending on the stripe unit size. When the stripe unit size is 8 K or 16 K, the maximum number of drives in an array is 16. When the stripe unit size is 32 K or 64 K, the maximum number of drives in an array is eight.
5. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the RAID level you want to assign to the logical drives, then press **Enter**.

Note: The RAID level you assign to a logical drive can influence the space needed for that drive, therefore; you must assign a RAID level before you enter the size of the logical drive.



The Logical Drive list contains the drive ID and the size (the total number of MB in the array) of the array, the size of each logical drive, the RAID level you assign to that logical drive, and the date that you created the logical drive.

The status of the logical drive also is shown. **OKY** means that the drive is in a good functional state. **CRT** means that you must replace the defunct hard disk drive and rebuild the drive.

(You will receive a message telling you the drive is in a **CRT** state if you are running the Administration and Monitoring program.) **OFL** means that the logical drive is unrecoverable; the data in that drive is lost.

If this is the first logical drive to be defined, the Logical Drive Size pop-up window shows the amount of space in the array that is available for additional logical drives.

If other logical drives have been defined, the Allocation Table appears, showing the logical drive sizes already created, and the amount of free space available.

6. Type the size, in megabytes, that you want for the logical drive; then press **Enter**. The Confirm pop-up window appears asking you to confirm your action.

The information about the new logical drive appears in the Logical Drive list.

Note: The size appearing in the Logical Drive list might be different from the size you typed. The size of a logical drive is determined by a number of factors, but basically the size must be divisible by the number of data drives in the array.

Consider the following scenarios:

Scenario 1

The array consists of three 1 GB drives. You assign RAID level 0 (which uses all the drives in the array with no parity storage), and type 1000 MB. The number in the Size (MB) field will show 999, which is the number closest to and lower than 1000 that is divisible by 3.

Scenario 2:

The array consists of three 1 GB drives. You assign RAID level 1, which provides a disk mirroring that stripes data across all drives in the array. Because the data is mirrored, the capacity of the logical drive is 50 percent of the physical capacity of the hard disk drives grouped in the array. Type 1000 MB; the number in the Size (MB) field will be 999. The physical capacity used is 2000 MB, twice that of the logical drive size. The

number that is closest to or lower than 2000 and divisible by 3 is 1998. The logical drive size is 999, which is 50% of the physical capacity.

Scenario 3

The array consists of three 1 GB drives and you assign RAID level 5. Data is striped across all three drives in the array, but the space equivalent to that of one drive is used for redundant storage. Therefore, if you type 1000 MB, the number in the Size (MB) field remains 1000 because it is divisible by 2 (drives), which is the space available for data.

If you do not use the entire array for this logical drive, you can create another by assigning either the same or a different RAID level for an additional logical drive. You can have as many as eight logical drives among eight disk arrays.

7. To define more logical drives, repeat steps 1 through 6 of this procedure.
8. To leave this screen, select **Exit** or press **Esc**.
9. To ensure that your server operates correctly, you *must* select **Initialize Logical Drive** for proper operation. This sets the drive to a predetermined state. The initialization process overwrites any data on the drive with zeros.
 - a. Select **Initialize/Synchronize Log Drive** from the Main Menu, then select **Initialize Logical Drive**.
 - b. Select the logical drives you want to initialize from the Logical Drive list by pressing the Spacebar (the selected drives will appear highlighted). To start the initialization, press **Enter**. The Confirm pop-up window appears, asking you to confirm your action.

Attention: If you select **Yes** in the Confirm pop-up window, information in the logical drive will be overwritten with zeros.

- c. Select **Yes** to confirm that you want to initialize the logical drive.

The initialization process begins. You can see its progress in the **Pct. Int.** (percent initialized) column of the Logical Drive list.

- d. To stop the initialization at any time, press **Esc**. Then, press **Esc** again to return to the previous menu, or press **Enter** to continue initializing the drive.
- e. If you defined the drive as RAID level 5, you *must* synchronize the drive before storing data.
- f. Select **Initialize/Synchronize Log Drive** from the Main Menu; then, select **Synchronize Logical Drive**.

Note: Once synchronization starts, it cannot be interrupted until the operation is complete.

Your logical drives are now created and ready for use.

10. To back up the disk-array configuration to diskette, you will need a 3.5-inch, formatted diskette. To back up the disk array configuration:
 - a. Select **Advanced Functions** from the Main Menu.
 - b. Select **Backup config. to diskette**.

Follow the instructions on the screen. A pop-up window shows the default file name of CONFIG. You can change the file name by typing over the default. The Backup program will assign a file-name extension of *.ips*.

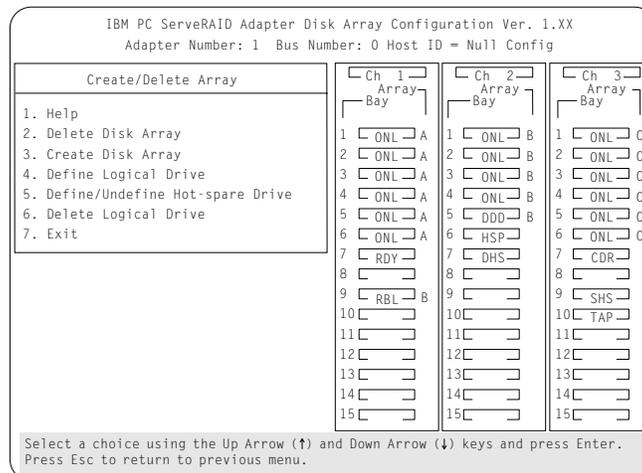
Defining a Hot-Spare Drive

You can use the Administration and Monitoring program or the ServeRAID configuration program to define a hot-spare drive. By using the Administration and Monitoring program from your active operating system Desktop, you do not have to restart the server. Refer to the README file on the *Administration and Monitoring program* for instructions for your operating system.

You can define a hot-spare drive from the Create/Delete Array/Log Drive menu or the Rebuild/Device Management menu (refer to “Setting Device States” on page 54).

To define a drive as a hot-spare drive from the Create/Delete Array/Log Drive menu:

1. Start the server using the ServeRAID configuration program (refer to “Configuring Your Disk Arrays” on page 25).
2. Select **Create/Delete Array/Log Drive** from the Main Menu. The following screen appears.



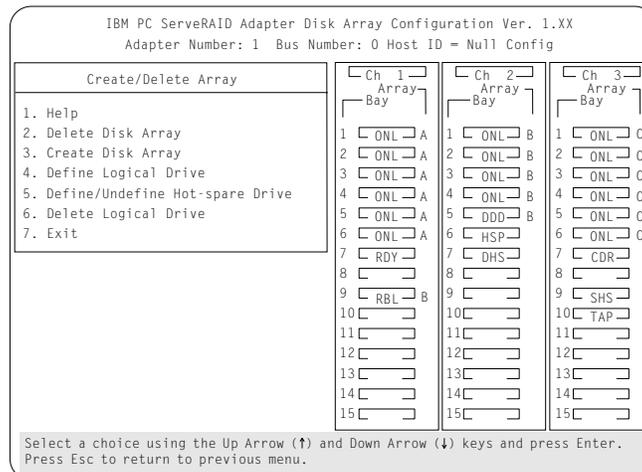
3. Select **Define/Undefine Hot-spare Drive**. The cursor will become active in the Bay/Array selection list.
4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the **RDY** (Ready) drive you want to define as the hot spare; then press **Enter**. The **RDY** state changes to **HSP** (Hot Spare). You can press **Enter** again to toggle between the **HSP** and **RDY** state.
5. Press **Esc** when you have finished. The cursor will become active in the Create/Delete Array/Log Drive menu.
6. If you want to create a disk array, go to “Creating a Disk Array” on page 40.
7. If you are finished, select **Exit** or press **Esc**.
8. Back up the disk-array configuration information to diskette. Refer to “Backing Up Your Disk-Array Configuration” on page 64 for instructions.

Deleting a Disk Array

Attention: All data and programs in the array are lost during this procedure. Before proceeding, back up any data and programs that you want to save.

To delete a disk array:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Create/Delete Array/Log Drive** from the Main Menu and press **Enter**. The following screen appears.



3. Select **Delete Disk Array** from the Create/Delete Array menu and press **Enter**. The cursor will be active in the Array list.
4. Review the Date Created column; then press the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the array you want to delete.
5. Press **Del**. The Confirm pop-up window appears.

Attention: All the data and programs in the array will be lost during this procedure.
6. Select **Yes** to delete the array. Select **No** if you do not want to delete the array.

If a defunct drive is still in a bay, the status shows a Defunct Hot-Spare (**DHS**). You can select **Rebuild/Device Management**, then reset the drive state by selecting **Set Device State** (refer to “Setting Device States” on page 54 for more information). If the drive is good, set the drive state to Hot-Spare (**HSP**); then, select the drive again and set the drive to Ready (**RDY**). If the drive is defective, replace it with a good drive; then, set the new drive state to Ready (**RDY**).

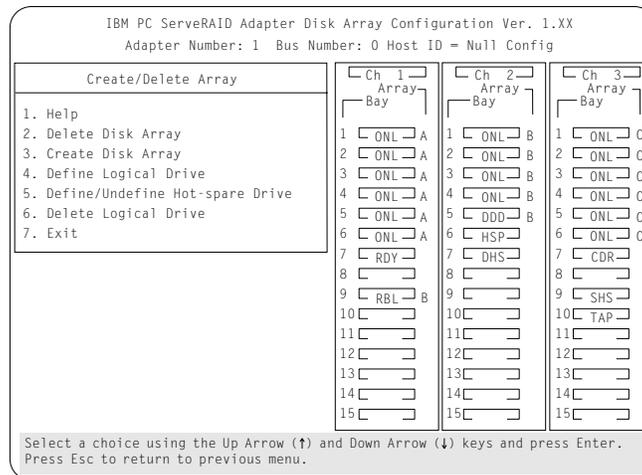
Note: In some operating systems, deleting an array and its associated logical drives might change the drive letters assigned to the existing drives.

Deleting a Logical Drive

Attention: All the data and programs in the array are lost during this procedure. Before proceeding, back up any data and programs that you want to save.

To delete a logical drive:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Create/Delete Array/Log Drive** from the Main Menu and press **Enter**. The following screen appears; the cursor is active in the Array list.



3. Select **Delete Logical Drive** from the Create/Delete Array menu and press **Enter**.
4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the array you want to delete; then press **Del** to delete it.

The Confirm pop-up window appears asking you to confirm your action.

Attention: All the data and programs in the array are lost during this procedure.

5. Select **Yes** to delete the logical drive. Select **No** to keep the logical drive.
6. Select **Exit** or **Esc** to return to the Main Menu.

Note: In some operating systems, deleting an array and associated logical drives might change the drive letters assigned to the existing drives.

Redefining Space in an Array

You can redefine space in a disk array in a number of ways. For example, you can combine a number of small logical drives to create a larger one, or you can redefine the existing logical drive into several smaller drives. Also, you can install additional hard disk drives and create a larger logical drive than was possible with the existing storage capacity.

One method to redefine space in an array is to change the RAID level assigned to a logical drive. For example, if you assigned RAID level 1 to a logical drive and then decided you needed the capacity offered with RAID level 5, you can use this procedure to replace the existing logical drive with a logical drive assigned the new RAID level.

To redefine the space in a disk array, first you must delete the existing array.

Attention: In all cases, when you delete an array, all the data and programs in the array are lost.

Note: You will need a blank 3.5-inch formatted diskette to back up the configuration file, as described in this procedure.

1. Back up all data and programs in the array.

Note: Back up the data before you delete the existing array. You might want to use a high-speed back up device, such as a tape drive, to back up large amounts of data.

2. If needed, install additional hard disk drives. Refer to “Understanding Hard Disk Drive Capacities” on page 39 for information about drive sizes.

3. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
4. To delete the existing array:
 - a. Select **Create/Delete Array/Log Drive** from the Main Menu.
 - b. Select **Delete Disk Array**. The cursor will be active in the Bay/Array selection list.
 - c. Select the array that you want to delete.
 - d. Press **Del**. The Confirm pop-up window appears.

Attention: All the data in the array is lost during this procedure. Be sure to back up all data and programs that you want to save.
 - e. Select **Yes** to delete the array. Select **No** if you do not want to delete the array.

Note: To use the hard disks from the existing array when creating a new array, you must confirm the deletion of the existing array. After you make your selection, the Confirm pop-up window disappears, and the cursor becomes active in the menu.
5. If you want to define a hot-spare drive, refer to “Setting Device States” on page 54 for step-by-step instructions.
6. To create a new disk array and define logical drives, refer to “Creating a Disk Array” on page 40 for instructions.
7. After you have established the new array and logical drive or drives, select **Initialize/Synchronize Log Drive** from the Main Menu; then, select **Initialize Logical Drive** to prepare the drives in the array to receive data. This sets the drive to a predetermined state. Any data existing in the drive is overwritten with zeros.
8. If you defined the drive as RAID level 5, you *must* synchronize the drive before storing data. Select **Initialize/Synchronize Log Drive** from the Main Menu; then, select **Synchronize Logical Drive**.

Note: After synchronization starts, you cannot interrupt it until the operation is complete.

9. When the synchronization process completes, insert a blank 3.5-inch formatted diskette in the primary diskette drive and select **Advanced Functions** from the Main Menu; then, select **Backup config. to diskette**. Follow the instructions on the screen.
10. Exit the ServeRAID configuration program by pressing **Esc** or selecting **Exit** from the Main Menu. A Confirm pop-up window appears asking you to confirm your action.
11. Reinstall your operating system and device drivers, then restore your data and programs.

Maintaining Your Disk Arrays

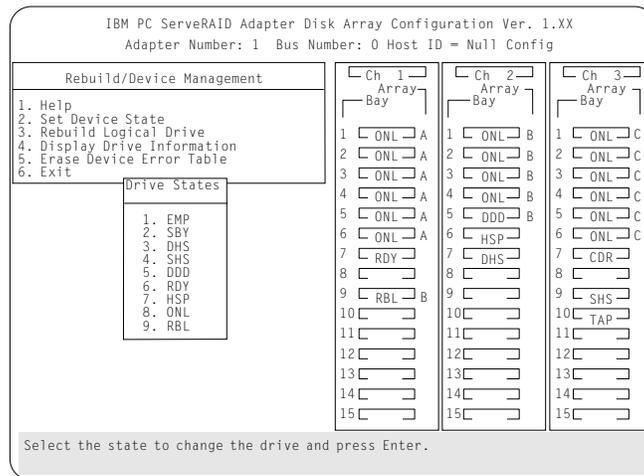
This section contains procedures for defining the state of a hard disk drive, information about the status indicators for logical and hard disk drives, and instructions for replacing defunct drives. It also contains procedures for displaying drive information and erasing the device error table. This section provides information about the status indicators for logical and hard disk drives, and the results of a hard disk drive failure. It also contains procedures for defining the state of a hard disk drive and replacing defunct drives.

Setting Device States

To define the state of a physical hard disk drive attached to the ServeRAID adapter, you can use the Administration and Monitoring program or the ServeRAID configuration program. By using the Administration and Monitoring program from your active operating system Desktop, you do not have to restart the server. Refer to the README file for instructions on using the Administration and Monitoring program for your operating system.

To define the state of a drive:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Rebuild/Device Management** from the Main Menu. The following screen appears.



3. Select **Set Device State**. The cursor becomes active in the Bay/Array selection list.
4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the appropriate drive; then, press **Enter**. The Drive States pop-up window appears, listing all hard disk drive states. The following table shows the device states and the alternate states valid for each state.

Device States	Alternate States
EMP	RDY SBY
SBY	RDY EMP HSP SHS
DHS	EMP HSP SHS
SHS	HSP DHS
DDD	ONL RBL
RDY	EMP HSP SHS SBY
HSP	RDY SHS DHS
ONL	DDD
RBL	DDD ONL

Note: Setting a DDD drive that is part of a CRT logical drive to ONL without performing a Rebuild operation might result in loss of data.

5. Highlight the appropriate drive state and press **Enter**. The new state displays.

The numbers shown on the left in the Bay/Array selection list area in the previous figure are the bay numbers. Refer to “ServeRAID Configuration Program Screens and States” on page 31 for an explanation of the bay numbers.

6. If you want to create a disk array, go to “Creating a Disk Array” on page 40.
7. If you are finished, select **Exit** or press **Esc**.
8. Back up the disk-array configuration information to diskette. Refer to “Backing Up Your Disk-Array Configuration” on page 64 for instructions.

Results of a Hard Disk Drive Failure

Depending on the circumstances, a drive failure can result in several possible situations.

Scenario 1:

- Only one hard disk drive fails.
- A hot-spare drive is defined that is the same size as the failed drive.

The hot spare will take over immediately.

Note: Any logical drives with RAID level 0 are blocked during the Rebuild process and remain blocked until the rebuild process completes. The ServeRAID configuration program unblocks all drives at the end of the rebuild operation.

All data in logical drives assigned RAID level 0 will be lost.

Scenario 2:

- Only one hard disk drive fails.
- A hot-spare drive is not defined or is smaller than the failed drive.
- The logical drives in the array are assigned RAID levels 0, 1, and 5, or a combination of these three levels.

All data in logical drives assigned RAID level 0 will be lost. In this array, the logical drives that are assigned RAID level 1 or 5 will be in Critical (CRT) state. The logical drives assigned RAID level 0 will be in the Offline (OFL) state.

Scenario 3:

If more than one drive in an array fails, all the data is lost in all of the logical drives of the array. For this reason, it is important that you replace and rebuild a DDD drive as soon as possible.

Logical and Hard Disk Drive Status Indications

The status of the hard disk drive determines the status of the logical drives in the array in which the hard disk is grouped.

- A single hard disk drive failure, (indicated by a DDD state in the Bay/Array selection list), generates a CRT state for the array's logical drives that are assigned levels 1 and 5. Data in logical drives with a CRT state is not lost, but you *must* replace the failing hard disk drive promptly and perform a Rebuild operation. If two hard disk drives fail, all of the data in the array is lost.

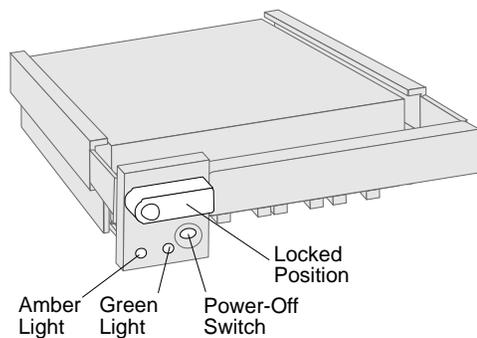
After you install a new hard disk drive, the Rebuild process changes the drive state from DDD to RBL, if the array contains a CRT logical drive. After the Rebuild process completes, the hard disk drive state changes from RBL to ONL.

- A multiple hard disk drive failure causes logical drives in that array to have an OFL state. This means that data is lost in all the logical drives in that array, regardless of which RAID level is assigned.

Replacing a Faulty Drive

If you are not using or installing a SCSI-2 Fast Hot Swap Drive Tray III or a SCSI-2 Fast/Wide Hot Swap Drive Tray III, check your manufacturer's instructions for specific details for detecting a failing hard disk drive.

Note: The LEDs on the SCSI-2 Fast Hot Swap Drive Tray III or the SCSI-2 Fast/Wide Hot Swap Drive Tray III provide information about the status of the drive.



The following table summarizes the LED states and their meanings.

Green	Amber	Description
On	Off	Drive tray is powered on. The hard disk drive is inactive; do not remove the drive.
Blinking	Off	The hard disk drive is inactive. The hot-swap drive can be removed safely.
On	On or Blinking	The hard disk drive is in use; do not remove the drive.
Off	Off	The drive is defective, or no power is being supplied to the drive. The hot-swap drive can be removed safely.

Check the drive for damage. If the drive is not damaged, check the position of the drive. If it is not inserted correctly, reposition the drive. Verify that the drive is positioned correctly.

If you are using one of the Administration and Monitoring programs provided with your ServeRAID adapter, you can use it to identify the defunct drive and designate a drive to replace the defunct drive without restarting the server. Refer to the README file on the *Device Driver/Administration and Monitoring diskette* for instructions for your operating system.

Do the following steps to replace a faulty drive using the ServeRAID configuration program:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).

If the drive failed while the system was powered down, a message appears the next time you turn on the system.

2. Physically replace the drive or assign a hot-spare or other appropriate drive as a replacement.

Attention: Removing the wrong hard disk drive can cause loss of all data in the array.

3. If you are assigning a hot-spare or another appropriate drive to replace the defunct drive, go to “Important Information for Rebuilding a Logical Drive.”

4. If you are physically replacing the hard disk drive, refer to your manufacturers installation instructions.

Important Information for Rebuilding a Logical Drive

Review this section before you rebuild a logical drive.

- If the logical drive is critical, you must rebuild the defunct hard disk drive.
- Data in a logical drive assigned or defined RAID level 0 is lost during a rebuild. If you backed up your data before the drive failed, you can restore the data to the new drive.
- If a physical hard disk drive being rebuilt is part of a logical drive defined as RAID level 0, 1 or 5, any RAID level 0 drive is blocked to external access during the rebuild.
 - If you initiated the rebuild through the Administration and Monitoring program, you must unblock the RAID level 0 drive when the rebuild is complete.
 - If you initiated the rebuild through the ServeRAID configuration program and the rebuild was interrupted, drives with RAID Level 0 can be unblocked by restarting the server.
- Only one rebuild operation can take place at a time.
- The hard disk drive being rebuilt must be the same size or larger than the failed drive.
- If multiple hot-spare drives are available, the adapter searches all bays on each Channel for a hot-spare drive of the appropriate size; the first one found enters the Rebuild state.
- An automatic hot-spare rebuild will take place if:
 - The physical drive that failed is part of a RAID level 1 or 5 logical drive.
 - A HSP or SHP drive is available the moment the drive fails and no rebuild, synchronization, or RAID level change operation is in progress.
- Under the following circumstances, a Rebuild operation can be completed quickly:

- The defunct (DDD) drive was *not* defective.
- The drive is in the same bay.
- No write operations or configuration changes have occurred that require rebuilding data in that drive.

Rebuilding a Logical Drive

If you are using one of the Administration Monitoring programs provided with your ServeRAID adapter, you can identify the defunct drive and designate a drive to replace the defunct drive without restarting the server. Refer to the README file on the *Device Driver/Administration and Monitoring diskette* for instructions on your operating system.

To replace a faulty drive using the ServeRAID configuration program:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Rebuild/Device Management** from the Main Menu.
3. Select **Rebuild Drive** from the Rebuild/Device Management menu. The cursor becomes active in the Bay/Array list.
4. Select the replacement drive that you want to use for the rebuild operation. A Confirm pop-up window appears.
 - Select **Same Location** if you physically replaced a hard disk drive in the same bay.
 - Select **New Location** to assign a hard disk drive in a new location. The ServeRAID adapter will prompt you to select the drive that you want.

Information and status messages about each stage of the rebuild process appear on the screen.

5. When the rebuild process completes, press **Esc** to return to the Main Menu. The new configuration is saved.
6. Back up the new configuration to diskette (refer to “Backing Up Your Disk-Array Configuration” on page 64).
7. Select **Exit** to leave the ServeRAID configuration program.

- Remove the diskette and press **Ctrl+Alt+Del** to restart the system.

Displaying Drive Information

To see the manufacturer or vendor ID, capacity, type of errors that occurred, and other information about each of the hard disk drives attached to the ServeRAID adapter, you can use the Administration and Monitoring program or the ServeRAID configuration program. When you use the Administration and Monitoring program from your active operating system Desktop, you do not have to restart the server. Refer to the README file for instructions on using the Administration and Monitoring program for your operating system.

To obtain drive information, do the following:

- Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
- Select **Rebuild/Device Management** from the Main Menu.
- Select **Display Drive Information** from the Rebuild/Device Management menu. The cursor becomes active in the Bay/Array selection list.
- Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight each of the drives shown in the Bay/Array selection list. As a drive is highlighted, the drive information appears.

```

IBM PC ServeRAID Adapter Disk Array Configuration Ver. 1.XX
Adapter Number: 1 Bus Number: 0 Host ID = Null Config

```

Drive Information	Ch 1 Array Bay	Ch 2 Array Bay	Ch 3 Array Bay
	1 ONL A	1 ONL B	1 ONL C
	2 ONL A	2 ONL B	2 ONL C
	3 ONL A	3 ONL B	3 ONL C
	4 ONL A	4 ONL B	4 ONL C
	5 ONL A	5 DDD B	5 ONL C
	6 ONL A	6 HSP	6 ONL C
	7 RDY	7 DHS	7 TAP
	8	8	8
	9 RBL B	9	9 SHS
	10	10	10
	11	11	11
	12	12	12
	13	13	13
	14	14	14
	15	15	15

```

Vendor ID      : IBM
Model         : 0664N1H 5 500003
Version       : 3404
Capacity      : 1920 MB
Soft Error    : 0
Hard Error    : 0
Parity Error   : 0
Misc Error    : 0

```

Select drive using the Up Arrow (↑) and Down Arrow (↓) keys, press Esc to return to the previous menu.

The Device Error Table, located in the adapter's NVRAM, collects statistics on the number and type of errors that occurred on all hard disk drives attached to the ServeRAID adapter.

- **Soft Error** displays the number of SCSI Check Condition status messages returned from the drive (except Unit Attention) since the Device Error Table was last cleared.
- **Hard Error** displays the number of SCSI I/O processor errors that occurred on the drive since the Device Error Table was last cleared. It also indicates if the drive exceeded the Predictive Failure Analysis (PFA) threshold.

Note: If the drive exceeded the PFA threshold, the hard disk reports a change in the operating conditions. Continue with operation and call for service within 24 hours. For RAID level 0, back up your logical drives.

- **Parity Error** displays the number of parity errors that occurred on the SCSI bus since the Device Error Table was last cleared.
- **Misc Error** displays the number of other errors (such as selection timeout, unexpected bus free, or SCSI phase error) that occurred on the drive since the Device Error Table was last cleared.

5. Press **Esc** to return to the previous menu.

Note: The status of the hard disk drive determines the status of the logical drives in the array in which the hard disk drive is grouped.

After correcting a problem with the disk array, you might want to clear the Device Error Table so that you can identify any subsequent errors quickly. Select **Erase Device Error Table** from the Rebuild/Device Management menu and press **Enter** to clear the table.

Additional Disk-Array Tasks

This section contains procedures for performing additional, less common, disk-array tasks. You can select and of the following:

- Back up configuration to diskette

- Restore configuration to diskette
- Change the write policy
- Change the RAID parameters
- Run Subsystem diagnostic test
- Format a drive
- Reset the adapter configuration
- Configuration Synchronization
- Display/Change the ServeRAID adapter parameters

Attention: Notices appear throughout this section to alert you about potential loss of data. Similar warning messages appear on the screens for these procedures. Read these warnings carefully before answering yes to the confirmations requested by the ServeRAID configuration program.

Backing Up Your Disk-Array Configuration

The ServeRAID adapter maintains a record of the disk-array configuration information in its nonvolatile RAM (NVRAM) and electrically erasable programmable read-only memory (EEPROM) module. The disk-array configuration is *vital information*. To protect this information, back up the information to diskette as soon as you have completed your tasks. You need a blank, 3.5-inch formatted diskette.

To back up the disk-array configuration information to diskette:

1. Label a blank diskette “Disk Array Configuration Backup” and date it.
2. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
3. Select **Advanced Functions** from the Main Menu and press **Enter**.
4. Select **Backup config. to diskette** and press **Enter**.
5. Remove the ServeRAID configuration diskette from the drive and insert the blank diskette.
6. Follow the instructions on the screen.

Restoring the Disk-Array Configuration

To restore the disk-array configuration information in the ServeRAID adapter, use the ServeRAID Adapter Configuration Diskette and an up-to-date Disk Array Configuration Backup diskette.

Note: Because dynamic changes in the configuration of your disk array occur due to hot-spare drive replacement or other drive maintenance activity, the configuration backup information on the diskette might be different from that stored in the adapter. Therefore, it is important that you back up the disk-array configuration information frequently, to keep the backup information on the diskette current.

To restore the ServeRAID configuration information:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu and press **Enter**.
3. Select **Restore config. from diskette** and press **Enter**.
4. Enter the file name of the backed-up configuration in the box at the bottom of the screen and press **Enter**.
5. The Confirm pop-up window appears.
6. Select **Yes** to restore the configuration information. Select **No** to return to the previous menu.
7. Press **Esc** to return to the Main Menu.

Changing the Write Policy

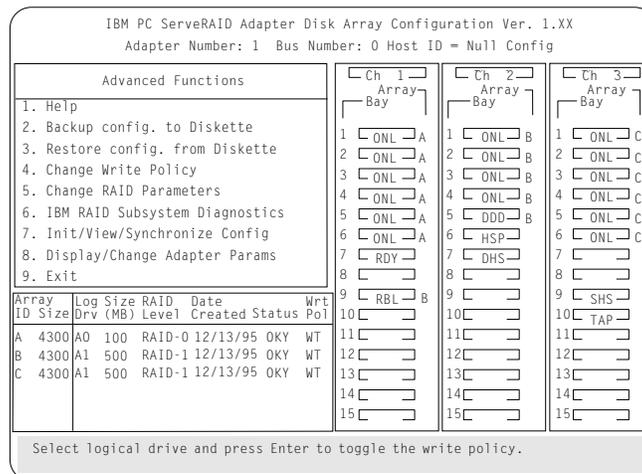
When you configure a logical drive, the ServeRAID adapter sets the write policy to *write-through* (WT) mode, where the completion status is sent *after* the data is written to the hard disk drive. Under certain workloads, you can improve performance by changing this write policy to *write-back* (WB) mode, where the completion status is sent *after* the data is copied to cache memory, but *before* the data is actually written to the storage device.

Although you might gain performance with write-back mode, it creates a greater risk of losing data due to a power failure. This is because the system gets a completion status message when the data reaches cache memory, but *before* data is actually written to the hard disk drive.

If you change the write policy to write-back, wait at least 10 seconds after your last operation before you turn off your system. It takes that long for the system to move the data from the cache memory to the storage device. Failure to follow this practice can result in lost data.

To change the write policy:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu.
3. Select **Change Write Policy** from the Advanced Functions menu. The cursor will be active in the Logical Drive list.
4. Select the logical drive whose write policy you want to change. A screen similar to the following appears:



Note: Your information might be different from that shown in this screen.

The Logical Drive list contains the logical drive ID, the size in megabytes of each logical drive, the RAID level you assigned to that logical drive, and the date you created it.

The status of the logical drive is also shown. **OKY** means that no problem conditions are associated with the drive; **CRT** means that you must replace the hard disk drive and rebuild the logical drive. (You will have received a message telling you what has happened to the drive.) **OFL** means that the logical drive is unrecoverable; the data in that drive is lost.

5. Locate the **Wrt pol** field in the Logical Drive list.

The write policy is shown as either write-through (**WT**), which is the default setting, or write-back (**WB**).

6. Select the logical drive whose write policy you want to change.

Attention: If you change the write policy to **WB**, wait at least 10 seconds after your last operation before you turn off your system. It takes that long for the system to move the data from the cache memory to the storage device. Failure to follow this practice can result in lost data.

7. Press **Enter** to change the write policy.

Notice that **WT** changes to **WB**. You can press **Enter** to toggle between **WT** and **WB**.

8. Press **Esc**. The Confirm pop-up window appears asking you to confirm your action.
9. Select **Yes** to save the changes. Select **No** to return the setting to its original state.
10. Back up the disk-array configuration information to diskette. Refer to “Backing Up Your Disk-Array Configuration” on page 64 for more information.

Changing the RAID Parameters

You can change the RAID parameters using the advanced functions.

To change the RAID parameters:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu and press **Enter**.
3. Select **Change RAID parameters** and press **Enter**. The following screen appears.

IBM PC ServeRAID Adapter Disk Array Configuration Ver. 1.XX
Adapter Number: 1 Bus Number: 0 Host ID = Null Config

Advanced Functions				Ch 1 Array Bay	Ch 2 Array Bay	Ch 3 Array Bay
1. Help	1 ONL	1 ONL	1 ONL	A	B	C
2. Backup config. to Diskette	2 ONL	2 ONL	2 ONL	A	B	C
3. Restore config. from Diskette	3 ONL	3 ONL	3 ONL	A	B	C
4. Change Write Policy	4 ONL	4 ONL	4 ONL	A	B	C
5. Change RAID Parameters	5 ONL	5 DDD	5 ONL	A	B	C
6. IBM RAID Subsystem Diagnostics	6 ONL	6 HSP	6 ONL	A	B	C
7. Init/View/Synchronize Config	7 RDY	7 DHS	7 TAP	A	B	C
8. Display/Change Adapter Params	8	8	8	A	B	C
9. Exit	9 RBL	9	9 SHS	B	B	C
Stripe Unit Size	10	10	10			
8K	11	11	11			
Rebuild Priority	12	12	12			
High	13	13	13			
Unattended	14	14	14			
Off	15	15	15			
Read Ahead						
On						
1. 8K						
2. 16K						
3. 32K						
4. 64K						
1. Medium						
2. High						
3. Low						
1. On						
2. Off						

Select a choice using the Up Arrow, (↑) Down Arrow, (↓) Left Arrow (←) and Right Arrow (→) keys.
Press Enter to change parameter. Press Esc to return to main menu.

The default settings are:

- **Stripe Unit Size — 8 K**

Attention: After the stripe-unit size is chosen and data is stored in the logical drives, the stripe-unit size cannot be changed without destroying data in the logical drives.

The stripe-unit size is the amount of data written on a given disk before writing on the next disk. To maximize the overall performance, choose the stripe-unit size such that the stripe-unit size is close to the size of the system I/O request. The default is set to 8 K data bytes. You can set the stripe-unit size to 8 K, 16 K, 32 K, or 64 K.

- When the stripe-unit size is set to 8 K or 16 K, the maximum number of drives in an array is 16.
 - When the stripe-unit size is set to 32 K or 64 K, the maximum number of drives in an array is eight.
- Rebuild Priority – High

Rebuild priority can be set to high, medium, or low. When the rebuild request is set to high, the rebuild I/O request gets high priority in the execution order.

When the rebuild request is set to medium in a heavily loaded system, the medium-priority rebuild can reduce the disk rebuild time at the expense of degraded handling of I/O requests.

When the rebuild priority is set to low in a moderate to heavily loaded system, low rebuild priority will increase the disk rebuild time but provides better system performance.

Note: You can change the rebuild priority without affecting data in the logical drives.
- Unattended Mode – Off

You can enable the adapter to accept changes in the configuration without user input. Unattended mode is useful when the server operates remotely.

When Unattended Mode is Off, the program waits for user input.

When Unattended Mode is set to On and the hard disk drive is found in a location other than the one defined in the adapter configuration, the program pauses briefly for user input, then, rearranges the configuration information to correct the logical drive configuration. Unattended mode also clears any blocked drives.

- Read Ahead — On

Normally, the ServeRAID adapter transfers data from disk to its local cache in steps of stripe-unit size. This provides excellent overall performance when workloads tend to be sequential. However, if the workload is random and system I/O requests are smaller than the stripe-unit size, reading ahead to the end of the stripe unit will result in lower performance.

When read-ahead is set to Off, the size of data transfer from the disk to local cache is equal to the system I/O request size, and no read-ahead to the end of the stripe unit is performed.

Notes:

- a. You can change the read-ahead setting without destroying data in a logical drive.
- b. When you save the configuration information on a diskette, the RAID parameters are saved also.

Unattended Mode of Operation

You can enable the adapter to accept changes in the configuration without user input. When this mode is enabled (refer to “Display/Change the ServeRAID Adapter Parameters” on page 79 for information), the adapter pauses briefly to permit a user to override the default action; then the adapter makes the necessary changes. Unattended mode, also clears any blocked drives. This mode is useful when the server operates remotely.

The adapter “chooses” an action that is equivalent to pressing one of the function keys in the following order.

F5: The server continues the startup operation after identifying the drive that is defunct. For example, a HSP drive failed to respond during POST. Startup continues without the HSP drive; its drive state will display as DHS.

F6: When a drive has been removed from the server, for example, for maintenance or security, and was returned, but in a different bay, the adapter adjusts the configuration to the drive's new location.

F7: An adapter with stored configuration information that does not match that of the configured drives present, import the configuration information from the drives. Refer to “ServeRAID Adapter Messages” on page 282 for more information.

RAID Subsystem Diagnostic Tests

The ServeRAID Subsystem Diagnostic program provides several utility programs that you can use to test the ServeRAID adapter and the devices connected to it.

To run the RAID diagnostic utility programs, do the following:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu.
3. Select **IBM RAID Subsystem Diagnostic**.
4. Select the diagnostic test that you want to run and press **Enter**.
 - **Run Adapter Self-Test** runs diagnostic tests on the ServeRAID adapter.
Note: Restart your server after the self-test is complete.
 - **SCSI Device Self-Test** runs diagnostic tests on the SCSI devices attached to the ServeRAID adapter.
 - **Drive Media Test** verifies that all sectors on the hard disk drive can be accessed. The drive must be in the RDY or HSP state.
 - **Format Drive** performs a low-level format on a hard disk drive. For more information, see “Formatting Drives” on page 74.
5. Follow the instructions on the screen.

Formatting Drives

You can perform a low-level format on drives with Ready (RDY) Empty (EMP), Standby (SBY), Standby Hot-Spare (SHS), or Hot-Spare (HSP) states.

Note: The **Format Drive** choice on the IBM ServeRAID Subsystems Diagnostics menu provides a low-level format. If you install a new hard disk drive that requires a standard format, use the Format command provided by your operating system.

To perform a low-level format:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu and press **Enter**.
3. Select **IBM RAID Subsystem Diagnostics** from the Advanced Functions menu.

Attention: A low-level format erases all data and programs from the hard disk drive. Before proceeding, back up any data and programs that you want to save.

4. Select **Format Drive** and press **Enter**.

You can perform a low-level format on more than one drive at a time.

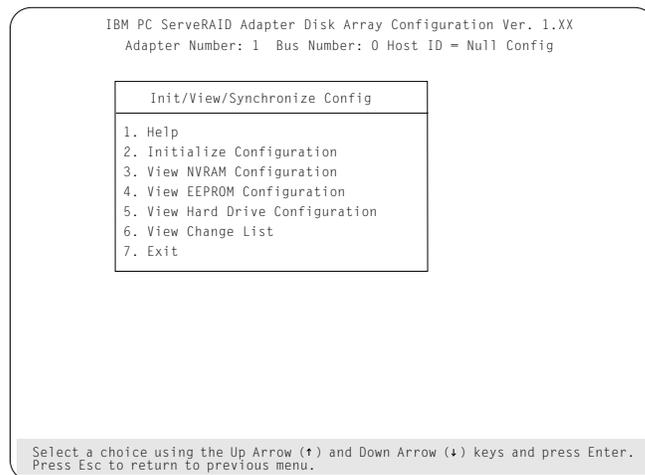
Note: If formatting is interrupted, the state of the drive being formatted might appear as Empty (EMP) on the ServeRAID configuration screen in the Bay/Array selection list. Select the drive and format it again.

Resetting the Adapter Configuration

The RAID configuration information stored in the adapter's NVRAM is critical to the reliable operation of the disk array. Therefore, to protect the integrity of the configuration information, the configuration information is also stored in the adapter EEPROM and on each hard disk drive in a RBL or ONL state defined in the adapter NVRAM configuration. Each time the configuration information is changed, all corresponding copies are updated.

During POST, if the configuration information in the adapter's NVRAM, EEPROM, or configured hard disk drives does not match, an error message appears. (Refer to “ServeRAID Adapter POST and Setup Messages” on page 282 for more information.)

The Init/View Synchronize Configuration menu enables you to view or reset parameters.



- **Initialize Configuration** allows you to restore the factory default settings and resets all functional, connected hard disk devices to the RDY state.
- **View NVRAM Configuration** displays the current configuration settings for the adapter's NVRAM.
- **View EEPROM Configuration** displays the current configuration settings for the adapter's EEPROM.

- **View Hard Drive Configuration** displays the configuration settings for the selected hard disk drive that is in the ONL or RBL state.
- **View Change List** allows you to view the device state configuration changes that the ServeRAID adapter reported since the last time the server was powered on or restarted.
 - **View Power-on Change List** displays the device state changes of any hard disk drives that changed since the last time the server was powered on or restarted.
 - **View Wrong SCSI ID List** provides a list of hard disk drives that were found at a different SCSI ID location since the last time the server was powered on or restarted.
 - **View Unidentified Drive List** provides a list of hard disk drives that have an identifier that does not match the stored configuration information.

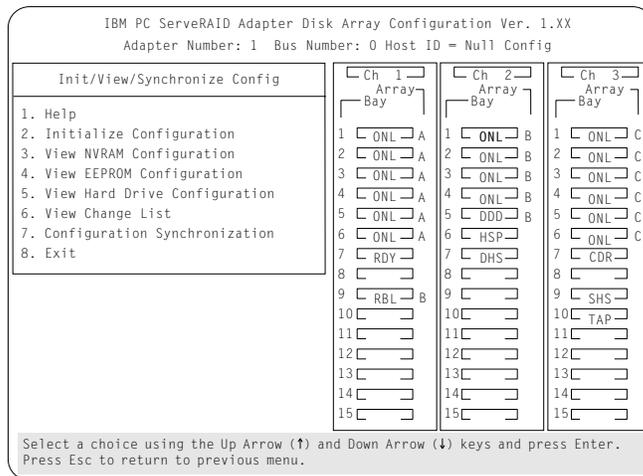
The identifier consists of both the configuration host ID and a time stamp. You can define the host ID (for example, a host ID can be the serial number of the server) as any string up to 12 characters. (Refer to “Display/Change the ServeRAID Adapter Parameters” on page 79 for more information.)

To initialize, reset, or view the adapter configuration:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu and press **Enter**.
3. Select **Init/View Synchronize Config**.
4. Select your choice from the menu and press **Enter**.
5. Follow the instructions on the screen.

Configuration Synchronization

When the configuration information in the adapter's NVRAM, EEPROM, and hard disk drives does not match, you can select one source and copy the selected configuration information to the other locations. This menu provides options to synchronize this configuration information.



Note: If you get a message stating that you have a recoverable configuration error, it indicates that you have one of the following:

- Valid NVRAM, invalid FLASH
- Valid FLASH, invalid NVRAM
- Both the NVRAM and FLASH are valid, but they do not match.

You can view the individual configurations to determine if they are valid and then select the one you want to use.

If you get a message that states that you have an unrecoverable configuration error, it indicates that you do not have a valid configuration and that you must initialize the configuration before proceeding any further.

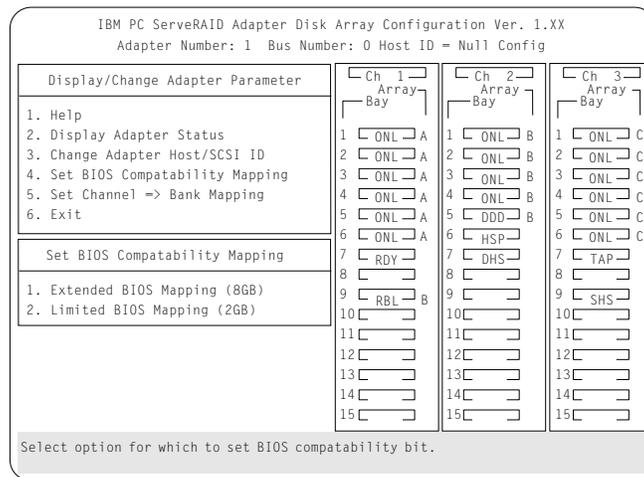
- **EEPROM as Source** copies configuration information from the adapter's EEPROM to NVRAM and to all configured hard disk drives that are in a RBL or ONL state and are defined in the adapter EEPROM configuration.
- **NVRAM as Source** copies configuration information from NVRAM to the adapter's EEPROM and to all configured hard disk drives that are in a RBL or ONL state and are defined in the NVRAM configuration.
- **NVRAM and POCL as Source** updates information from the power-on change list (drive state changes at power-on time) with the information in NVRAM. This information is then copied to the adapter's EEPROM and to all configured hard disk drives that are in a RBL or ONL state and are defined in the NVRAM configuration.
- **Hard Disk Drive as Source** retrieves configuration information from a hard disk drive. The configuration information is then copied to the adapter's NVRAM and EEPROM.
- **Identified HDD as Source** updates the adapter's configuration information with stored configuration information on a hard disk drive that matches the identifiers stored in the NVRAM. The updated configuration information is then copied to NVRAM, the adapter's EEPROM, and the configured hard disk drives in an array.
- **Specific HDD as Source** retrieves the configuration information with stored configuration information on the hard disk drive that you select. The updated configuration information is then copied to NVRAM, the adapter's EEPROM, and configured hard disk drives.

Display/Change the ServeRAID Adapter Parameters

The Display/Change Adapter Parameter menu allows you to view and change the ServeRAID adapter parameters.

To display or change the adapter parameters:

1. Start the ServeRAID configuration program (refer to “Starting the Configuration Program” on page 25).
2. Select **Advanced Functions** from the Main Menu.
3. Select **Display/Change Adapter Params** and press **Enter**. The following screen appears.



- **Display/Adapter Status** allows you to view the status of the adapter.
- **Change Adapter Host/SCSI ID** allows you to change the adapter SCSI ID and the SCSI transfer rate. You can change the default setting from 10 MHz to a maximum of 20 MHz, if you have SCSI-3 Ultra Fast/Wide drives (Ultra SCSI). If the transfer rate is set to 20 MHz with Ultra SCSI drives, the SCSI bus in the ServeRAID adapter can provide up to 40 MB per second data rate. You can also define the host configuration ID as any 12 characters. In addition, you can change the number of drives in a group that will startup

simultaneously, and set the start-up delay in seconds between groups of drives.

- **Set BIOS Compatibility Mapping** allows you to set the BIOS mapping to 2 GB or 8 GB. The factory default is set to 8 GB.
- **Set Channel - Bank Mapping** allows you to specify which DASD bank is connected to each of the internal Channels on the ServeRAID adapter. This mapping is critical for the correct operation of the Administration and Monitoring program, which uses the settings to identify drives, control power to specific drives, and operate the SCSI LEDs.

In the PC Server 330, the default mapping is set to Channel 3, sometimes referred to as Bank C.

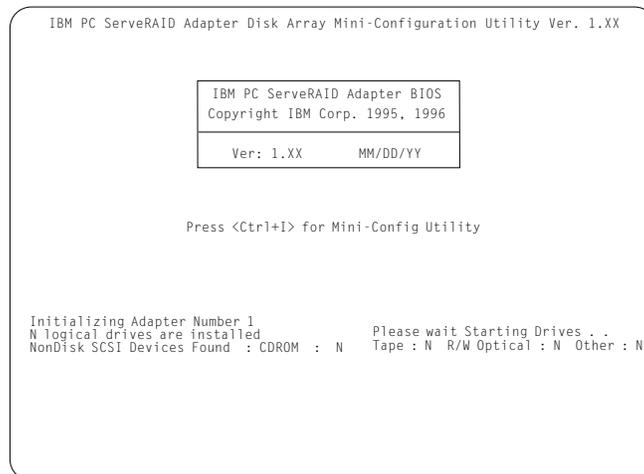
Channel →	Bank Mapping	
	Low ID	High ID
CH 1	:E	:
CH 2	:D	:
CH 3	:C	:

Using the ServeRAID Adapter Mini-Configuration Program

Using the Mini-Configuration program is a quick way to display the adapter settings and to perform a limited set of the configuration functions without using the ServeRAID Adapter Configuration diskette.

To access the ServeRAID Adapter Mini-Configuration program:

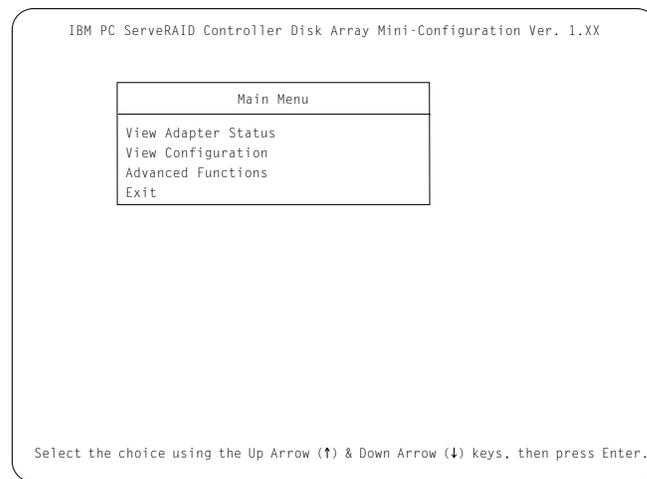
1. Turn on the server; if the system is turned on, press **Ctrl+Alt+Del**.
2. Press **Ctrl+I** immediately when the following Mini-Configuration prompt screen appears.



3. Press **Enter**.

Note: If you have more than one ServeRAID adapter installed, you will get an adapter selection screen; otherwise, the Main Menu appears.

4. Select your choice from the next menu, then press **Enter**.

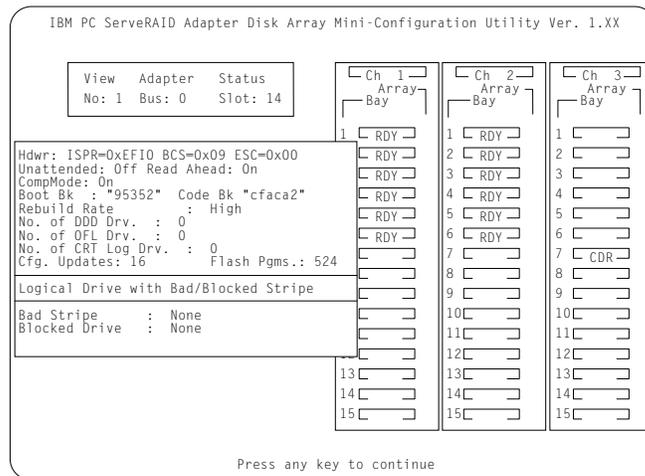


The Main Menu offers the following choices:

- **View Adapter Status** displays the current status of the ServeRAID adapter. (Refer to “Viewing the Adapter Status.”)
 - **View Configuration** displays the current configuration information for the ServeRAID adapter. (Refer to “Viewing the Configuration” on page 84.)
 - **Advanced Functions** resets the adapter, initializes the configuration, and imports the configuration from drives. (Refer to “Using the Advanced Configuration Functions” on page 85.)
5. Select a menu item (press the number of the item or use the Up Arrow (↑) key or Down Arrow (↓) key to highlight the item), then press **Enter**.
 6. Follow the instructions on the screen.
 7. Select **Exit** to leave the Main Menu.

Viewing the Adapter Status

The **View Adapter Status** allows you to view the status of the adapter's disk array.



The menu contains the following fields:

- **Unattended** displays the on/off state of Unattended Mode.
- **Boot Block Version** displays the current version number of the Boot Block.
- **Code Block Version** displays the current version number of the microcode loaded on the adapter.
- **Rebuild Rate** displays the speed of the rebuild. (Refer to “Changing the RAID Parameters” on page 69.)
- **No. of DDD Drv.** displays the number of defunct drives.
- **No. of OFL Drv.** displays the number of offline logical drives.
- **No. of CRT Drv.** displays the number of critical logical drives.
- **Cfg. Updates** displays the number of times that the configuration has been updated.

- **Flash Pgms** displays the number of times that the microcode EEPROM has been updated.
- **Logical Drive with Bad Stripe/Blocked Drive** identifies any logical drive that has bad stripes, as well as logical drives that are in the blocked state.

Viewing the Configuration

The **View Configuration** choice allows you to view the number and size of logical drives installed. It also displays the RAID level, current state, stripe-unit size, write policy, read-ahead status, and the date the logical drive was created.

IBM PC ServeRAID Adapter Disk Array Mini-Configuration Ver. 1.XX

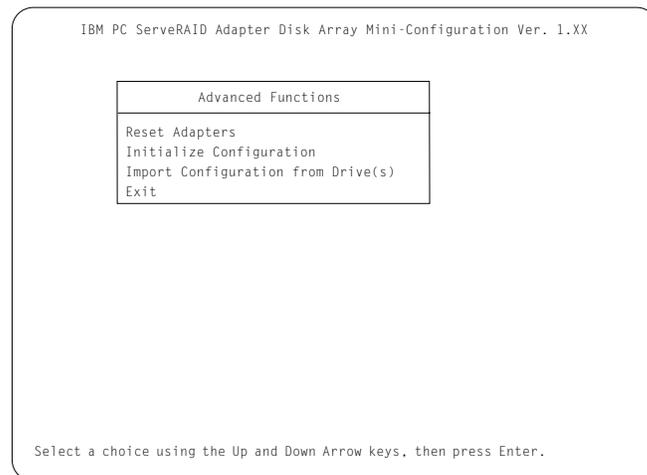
View Adapter Configuration Information
No: 1 Bus: 0 Slot: 14

Logical Drive	Size (MB)	RAID Level	Current State	Stripe Size	Wrt Pol	Read Ahead	Date Created mm/dd/xx
0	100	5	OKY	8K	WT	NO	01/18/96
1	100	5	OKY	8K	WT	NO	01/18/96
2	100	5	OKY	8K	WT	NO	01/18/96
3	100	5	OKY	8K	WB	NO	01/18/96
4	100	5	OKY	8K	WB	NO	01/18/96
5	99	1	OKY	8K	WT	NO	01/18/96
6	200	5	OKY	8K	WT	NO	01/18/96
7	300	1	OKY	8K	WT	NO	01/18/96

Press any key to continue

Using the Advanced Configuration Functions

The **Advanced Functions** choice allows you to reset the ServeRAID adapter, initialize the configuration, and import the configuration from drives.



- **Reset Adapters** resets the adapter.
Attention: The following choices may result in loss of data due to changes in the configuration.
- **Initialize Configuration** resets the adapter configuration values to the factory defaults and sets all functional hard disk drive states to RDY.
- **Import Configuration from Drive(s)** reads the configuration from the drives and copies it to NVRAM and the adapter's EEPROM module.

Chapter 3. Configuring Your Server

This chapter provides information about the Configuration/Setup 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 part of the *basic input/output system (BIOS)* that comes with your server. Using these programs, you can set the system date and time, define input and output device parameters, and define system security.

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

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

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Configuration Overview

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

Your server supports several types of adapters and SCSI devices. This flexibility lets you choose from among thousands of adapters and devices that comply with any of the following standards:

- Peripheral Component Interconnect (PCI)
- Extended Industry Standard Architecture (EISA)
- Industry Standard Architecture (ISA)
- Small Computer System Interface (SCSI)

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

Your server comes with the following hardware configuration utility programs:

- The built-in Configuration/Setup utility program lets you configure system board functions, such as serial and parallel port assignments, change interrupt requests settings, and the startup sequence for drives that you install. You also can use this utility program to set passwords for starting up the server and accessing the Configuration/Setup utility program.
- The EISA Configuration utility program on the PC Server 330 EISA Configuration Diskette, lets you configure EISA and ISA adapters.
- The built-in SCSISelect utility program lets you configure the SCSI devices that you install in your server. You can use SCSISelect to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive.

Configuration Overview

- Use the utility programs on the PC Server Utilities Diskette to back up and restore the CMOS and NVRAM configuration data.

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

1. Run the Configuration/Setup utility program and record the current configuration settings.
2. Set jumpers or switches on the server's system board.
See Appendix A, "Jumpers" on page 321.
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 121.
5. Install software programs.
See the installation instructions that come with the software.
6. Resolve configuration conflicts.
See "Resolving Configuration Conflicts" on page 112.

The Configuration/Setup Utility

For most configurations, the server will operate using the default system settings. You need to change the settings only to resolve configuration conflicts or to enable or change device functions (for example, defining diskette types).

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

After you run and exit the Configuration/Setup utility program, configuration information is stored in non-volatile RAM (NVRAM). The configuration information remains available for the next system startup while the server is powered off.

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 Appendix B, “Server Records” on page 331) before making any changes.

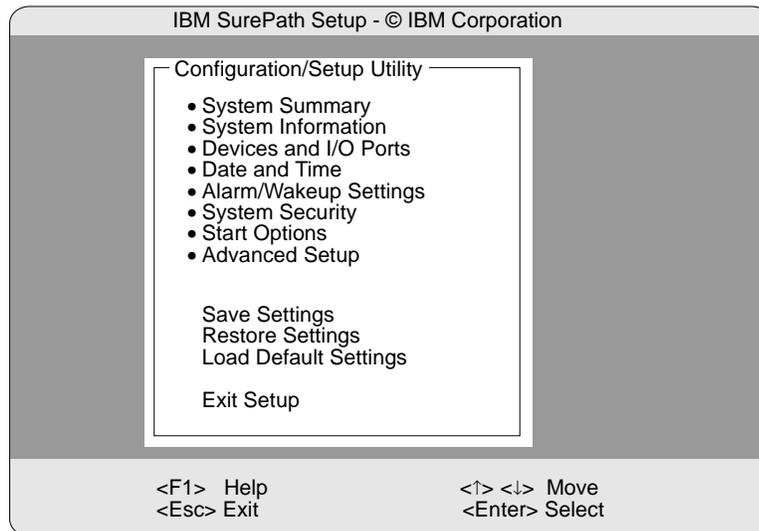
Starting the Configuration/Setup Utility Program

To start 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**.

The Configuration/Setup utility Main Menu appears. For more information about the menus, see “Using the Configuration/Setup Utility Main Menu” on page 92.

Using the Configuration/Setup Utility Main Menu



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

Using the Configuration/Setup Utility Main Menu

The Configuration/Setup utility program Main Menu lets you select settings you want to change.

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

Notes:

1. If you enter only the power-on password and an administrator (supervisor-level) password is also set, a limited version of the menu appears.
2. The choices on some menus might differ slightly, depending on the BIOS version that comes with your server.

To change configuration settings:

Using the Configuration/Setup Utility Main Menu

1. Use the Up Arrow (↑) or Down Arrow (↓) keys to select the menu item for the configuration setting you want to change. Selected items are highlighted. Press Enter.
2. Select the configuration setting you want to change. Use the Page Up (PgUp) and Page Down (PgDn) keys to scroll through the menu, if needed.
3. Use the Right Arrow (→) or Left Arrow (←) keys to select the appropriate setting for the selected item.
4. Repeat Steps 1 through 3 for each setting you want to change. Press ESC to return to the Configuration/Setup Main Menu.
5. After making changes, you can:
 - Select **Save Settings** to save the selected changes.
 - Select **Restore Settings** to delete the changes and restore the previous settings.
 - Select **Load Default Settings** to cancel the changes and restore the factory settings.
6. To exit from the Main Menu, select **Exit Setup**. The system prompts you to confirm your choice. You can save your changes and exit, exit without saving your changes, or return to the Main Menu.

System Summary

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

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 menu.

System Information

Select this choice to display information about your PC Server 330, and to view the interrupt request (IRQ) settings for the SCSI and

Using the Configuration/Setup Utility Main Menu

Ethernet controllers on the system board, and other PCI adapters that you purchase and install.

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

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

Product Data

Select this choice to view system information 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.

PCI Routing

Select this choice to view the settings for interrupt requests for PCI adapters. In addition, you can view the interrupt requests for the Ethernet and SCSI controllers on the system board.

Devices and I/O Ports

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

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

Notes:

1. The infrared connector and Serial B connector share a single port assignment. By default, the infrared connector is configured as **Disabled**.
2. The serial, parallel, and infrared ports, and the diskette drive must have the same configuration in the Configuration/Setup utility programs and the EISA Configuration Diskette. See "Using the EISA Configuration Diskette" on page 105 for more information.

Using the Configuration/Setup Utility Main Menu

3. When you configure the parallel port as bidirectional, use an IEEE 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 feet).

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.

The parallel port can be configured as *bidirectional*, that is, data can be both read from and written to a device. In bidirectional mode, the server supports Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP).

To display or change the assignments for devices, or the infrared, serial, or parallel ports:

1. Select **Devices and I/O Ports**.
2. Select a device or port; use the Left Arrow (←) and Right Arrow (→) keys to advance through the settings available.

The Devices and I/O Ports choice appears only on the full Configuration/Setup menu.

Date and Time

Select this choice to set the system date and time.

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

The system date is in standard format for your country, for example, in the United States, the format is **MM/DD/YY** (Month/Day/Year).

Select **Date and Time**, then use the Left Arrow (←) and Right Arrow (→) keys 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 Main Menu

Alarm/Wakeup Settings

You can start your server manually or at a predefined event. The server enters one of the following states.

- | | |
|------------------------|--|
| Attended mode | This is the “on” state that occurs when you press the power switch from the Standby or Unattended mode. The Power-On Light comes on whenever the server is on. |
| Unattended mode | The server starts at a specified date and time, or when it receives a signal from either serial port. When the server powers on in the Unattended mode, the Unattended Power-On light and the Power-On Light come on. |
| Standby mode | The server is powered down. The automatic restart feature, which enables the server to restart following a momentary power loss, means that the server is never completely turned off.

The server must be in the Standby mode (off) for the Alarm/Wakeup Settings features that you define to take effect. |

Select the **Alarm/Wakeup Settings** choice to enable and disable features that turn on your server automatically.

The result of pressing the power switch varies, depending on which mode the server is in. To toggle from:

- Standby mode to Attended mode, press and release power switch.
- Attended mode to Standby mode, press the power switch in slowly just until the power-on light goes out and then immediately release the switch.
- Unattended mode to Attended mode, press and release the power switch. The server restarts in Attended mode.
- Unattended mode to the Standby mode, press the power switch just until the power LEDs go out.

Using the Configuration/Setup Utility Main Menu

Notes:

1. For proper operation of the **Alarm/Wakeup Settings** options, set the **Password Prompt** choice to **Off**. On receiving a signal for an unattended startup, the server bypasses the password prompt and continues the startup.
2. Set the Wakeup features immediately before you plan to turn off the server. The server locks and cannot be used after you exit, saving the settings. When the server restarts, in either Attended or Unattended mode, the Wakeup features return to the default, disabled, setting.
3. When both features are enabled, the server starts when the first condition (time or signal) occurs.

The **Alarm/Wakeup Settings** choice appears only on the full Configuration/Setup menu.

Wake Up Timer

With this option, you can specify a date and time at which the server will be turned on automatically.

To set the Unattended mode, select **Alarm/Wakeup Settings**, then select **Wakeup Timer**. Then, set or change the settings. Select **Wakeup Date** to specify a date up to 31 days away. Select **Wakeup Time** to specify a time, using a 24-hour clock format.

Wake Up on Ring

When this option is enabled, the server turns on automatically when it receives a signal from Serial port A or B.

System Security

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

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

To set, change, or delete a password:

Using the Configuration/Setup Utility Main Menu

1. Select **System Security**.
2. Select the password that you want to change.

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

After you set a power-on or administrator password, you must enter the password when you turn on the server. (The passwords do not appear on the screen as you type them.)

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 complete the system startup.• Administrator password provides access to all choices on the Configuration/Setup utility program menu.
Administrator <i>and</i> power-on password	<ul style="list-style-type: none">• User can enter either password to complete the system startup.<ul style="list-style-type: none">– Administrator password provides access to all choices on the Configuration/Setup utility program menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.– Power-on password provides access to a limited set of choices on the Configuration/Setup utility program menu. This might include changing or deleting the power-on password.

Using the Administrator Password Menu

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

Using the Configuration/Setup Utility Main Menu

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

To set an administrator password:

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

The **Administrator Password** menu appears.

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

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

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

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

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

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

To delete an administrator password:

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

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 Main Menu

To enable a user to change the power-on password:

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

The **Administrator Password** screen appears.

2. Select **Power-on password changeable by user**. Press the Left Arrow (←) or Right Arrow (→) key to toggle the entry to **Yes**.

When this choice is enabled, **System Security** appears on the limited Configuration/Setup menu. The System Security menu contains the **Power-on Password** choice.

Using the Power-on Password Menu

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. If no administrator

Using the Configuration/Setup Utility Main Menu

password has been set, you can bypass the power-on password prompt during POST and set a new password. For instructions, see “Bypassing an Unknown Power-on Password” on page 326.

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.

To turn off the prompt for the power-on password:

1. Select **Power-on Password** on the System Security menu; then press **Enter**.
The **Power-on Password** screen appears.
2. Select **Password Prompt**. Press the Left Arrow (←) key or Right Arrow (→) key to toggle the entry to **Off**.

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 device from which the operating system loads. 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, and then checks a network adapter.

You can enable a virus-detection test that checks for changes in the master boot record at start up. You can also choose to run POST in an enhanced mode or a quick mode.

Using the Configuration/Setup Utility Main Menu

Select **Start Options**, then use the Left Arrow (←) and Right Arrow (→) keys to advance through each data field.

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

Advanced Setup

Select **Advanced Setup** to change values for advanced hardware features such as cache control and ROM shadowing.

A warning message displays above the choices on this menu, to alert you that the system may malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

Use the Left Arrow (←) and Right Arrow (→) keys to advance through each data field.

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

Cache Control

Select this choice to enable or disable the microprocessor cache state. In addition, you can define the microprocessor cache type as write-back or write-through.

You can also enable or disable video BIOS caching, and define buffers for video and option ROM caching.

ROM Shadowing

Select this choice to enable ROM shadowing in specified areas. When these areas are enabled, the contents can be cached, using **Cache Control** option.

PCI Bus Control

Select this choice to manually assign the interrupt requests (IRQs) for PCI adapters installed in the server, and for the SCSI and Ethernet controllers on the system board.

Using the Configuration/Setup Utility Main Menu

You can also enable the generation of a non-maskable interrupt (NMI) when a PIC data parity error occurs.

If you install an adapter that requires a memory address in the C8000 to DFFFF (hexadecimal) range, you must change the memory address of the server's SCSI ROM. Select **SCSI ROM address** to assign an alternate address.

To enable or disable the CPU to PCI write posting, select **CPU-PCI Write Buffers**.

Exiting from the Configuration/Setup Utility Program

Select **Exit Setup** to exit from the Configuration/Setup utility programs Main Menu; then, press Enter.

The system prompts you to confirm your choice. If you want to make additional changes, you can return to the Configuration/Setup Utility. If you made any changes and did not save them with the **Save Settings** choice, the system prompts you to save or discard the changes before exiting the Configuration/Setup utility programs.

When you finish configuring your server, you can save the CMOS and NVRAM configuration data to a diskette. This is useful in case you have to clear CMOS or replace the system board, and you want to restore the existing configuration.

Refer to the README file on the PC Server Utilities Diskette for specific procedures on backing up and restoring CMOS and NVRAM configuration data.

Configuring Options

Before installing a new device or program, read the documentation that comes with it. Reading the instructions helps you to determine the steps that are required for installation and configuration. The following list 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.

See “Starting the Configuration/Setup Utility Program” on page 91.

2. Start the EISA Configuration Diskette and:

- a. Record the current settings.
- b. Install configuration files (.CFG) and overlay files (.OVL).

Note: If a .CFG file did not come with the adapter, see “Configuration Files” on page 109.

See “Recording EISA Configuration Settings” on page 106 and “Starting the EISA Configuration Diskette” on page 107.

3. Set jumpers or switches on the server system board.

See Appendix A, “Jumpers” on page 321.

4. Set jumpers or switches on the device.

See the instructions that came with the adapter.

5. Install the adapter in the server.

See “Working with Adapters” on page 133.

6. Install software programs.

See the installation instructions that came with the software.

7. Resolve configuration conflicts.

See “Resolving Configuration Conflicts” on page 112.

Using the EISA Configuration Diskette

You must use the EISA Configuration Diskette anytime you want to add, move, or remove EISA or ISA adapters. In addition, you might need to use the diskette to resolve configuration conflicts.

Also, if you disable the serial, parallel, infrared, or diskette drive in the Configuration/Setup utility programs, you might need to run the EISA Configuration Diskette, and make the same change. Refer to the README file on the EISA Configuration Diskette for more information.

Each time you use the EISA Configuration Diskette to configure your server, the configuration information is saved in a *System Configuration Information (SCI)* file and in the NVRAM configuration. Only devices that you install and configure correctly appear on the EISA Configuration screens.

Making Menu Selections

When you start the backup copy of the EISA Configuration Diskette, an introductory screen appears. Press **Y**. The Main Menu, **Steps in configuring your computer**, appears. The EISA Configuration program main menu contains five steps:

1. **Important EISA configuration information:** This step provides information about the differences between the ISA configuration process and the EISA configuration process.
2. **Add or remove boards:** If the server is configured correctly, this step provides a list of the devices installed in the expansion slots. The **Add** choice allows you to add ISA devices to the configuration. If EISA adapters are installed in your server, and you have not copied the *.CFG* file to the EISA Configuration Diskette, you are prompted to insert the adapter configuration diskette into the diskette drive. The *.CFG* file is copied to your diskette. If the adapter *.CFG* file is copied to the EISA Configuration Diskette before starting the diskette, and the adapter is installed in your server, EISA devices are added automatically.

EISA Configuration Diskette

3. **View or edit details:** After adding EISA or ISA adapters in Step 2, use the **Edit** selection of this step to configure them. Use the **Edit Resources** selection of this step for complex configurations. If you change a setting in this step, you might have to change a switch or jumper setting on the system board or on a device.

Note: You can view the settings for PCI devices, but you cannot change them through the EISA Configuration utility program. To change settings for PCI devices, see “PCI Bus Control” on page 102.

4. **Examine switches or print report:** After Steps 1 and 2 have been completed correctly, this step displays the correct switch and jumper settings for the installed devices that have switches and jumpers. Also, you can choose to print a system configuration report.

5. **Save and exit:** This step allows you to save your configuration or to discard the changes before you exit from the program.

Use the Up Arrow (↑) or Down Arrow (↓) key to highlight your selection; then press **Enter** to make your selection. To help you track your progress, a checkmark (✓) appears on the main menu next to the completed steps.

You can access help information through:

- Help windows, which remain active.
- Information windows, which appear automatically as a result of some configuration activities.
- The Help=F1 prompt, which allows you to access the Help Menu for screens displaying the prompt. To remove the Help Menu, press **Esc**.

Recording EISA Configuration Settings

Record the configuration settings you made in Step 3, **View or edit details** and Step 4, **Examine switches or print report** on a separate sheet and store it in a safe place for future reference. If you have a printer attached to your server, you can use the **Print Screen** key to print these settings. The settings are helpful when you install additional options, or if you need to have your system serviced.

EISA Configuration Diskette

Also, record the new settings each time you make changes. Be sure to record the current configuration settings in the tables in “Installed Device Records” on page 332.

If you have more than one server, make a backup copy of each server’s configuration.

Starting the EISA Configuration Diskette

To start the EISA Configuration Diskette:

1. Insert the backup copy of the EISA Configuration Diskette into the diskette drive.
2. Turn on the server, or if it is already on, shut down the operating system and restart the server.
3. When the first screen appears, press **Y**. Follow the instructions on the screen until the Main Menu, **Steps in configuring your computer**, appears.
4. Use the Up Arrow (↑) or Down Arrow (↓) key to advance through the items on the screen. Use the Tab key to select choices on the bottom of the screen. Press the Esc key to return to a previous menu.
5. Press **Enter** to make a selection.
6. Follow the instructions on the screen to view or change (edit) the configuration information.

Note: Adapters that are installed in your server appear automatically on the EISA Configuration screens *after* you copy the adapter configuration file (file with an extension of *.CFG*) to the EISA Configuration Diskette. If you want to manually add an EISA adapter that you have not yet installed in your server, add it using Step 2 from the menu. (see “Making Menu Selections” on page 105). To configure ISA adapters, follow the instructions on the screen.

ISA/EISA Configuration

Using the Advanced Functions

Locking an ISA adapter reserves the selected resources and prevents the system from using them to resolve resource conflicts. Use the **Advanced** function to *lock* ISA boards. An exclamation mark (!) appears next to locked adapters.

To use the Advanced functions:

1. Start the backup copy of the EISA Configuration Diskette (see “Starting the EISA Configuration Diskette” on page 107).
2. At the main menu, select Step 3, **View or edit details**.
3. Press **F7**. The Advanced functions screen appears.
4. Follow the instructions on the screen to:
 - Lock or unlock boards
 - View additional system information
 - Set verification mode
 - Maintain SCI files

Configuring EISA, ISA, and PCI Adapters

Always use the backup copy of the EISA Configuration Diskette when assigning interrupts for EISA and ISA adapters. You cannot assign an EISA or ISA adapter the same interrupt that you have assigned to a PCI adapter. This is because the PC Server 330 does not support interrupt sharing among PCI, EISA, and ISA adapters.

If a situation occurs where you need an additional interrupt, you can use an interrupt from another function that you might not need, such as COM2 (Interrupt 3).

Configuring ISA or EISA Features and Options

Some ISA and most EISA devices come with option diskettes. These diskettes can contain any or all of the following types of information:

- Configuration files (.CFG)
- Device drivers
- Sample applications (mini-applications)

Configuration Files

A configuration file is required to configure the server for ISA or EISA adapters. You have to copy this configuration file, which has a file-name extension of *.CFG*, from the device diskette to the EISA Configuration Diskette before installing the device in the server. The configuration file reserves the system resources that the adapter needs to function properly.

Some ISA adapters come with a diskette that contains the *.CFG* file for the adapter. If you want to install ISA adapters that do not come with their own *.CFG* files, you must create a *.CFG* file for each adapter.

To create a unique *.CFG* file for an ISA adapter:

1. Insert the IBM PC Server EISA Configuration Diskette into diskette drive A.
2. Start the configuration utility program. See "Starting the Configuration/Setup Utility Program" on page 91 if necessary.
3. At the main menu, select Step 2, **Add or remove boards**.
4. At the next menu, select the slot in which you installed the adapter.
5. At the next screen, select **OK**.
6. At the next screen, press **F5**; then, select **Create .CFG file**.
7. Press **Enter**.
8. At the Create a Board *.CFG* File screen, type in the adapter manufacturer and description (for example, IBM Token Ring); then press **Enter**.
9. Refer to the adapter documentation for information about specific configuration parameters (such as IRQ or DMA channel) required for the adapter. Then, follow the instructions on the screen to enter the appropriate parameters on the menu.
Note: Normally, ISA adapters do not use every parameter. Most adapters require only a port address.
10. The controllers on your server requires specific memory and I/O address assignments to function properly. To avoid

PCI Configuration

configuration conflicts, do not assign the following memory and I/O addresses to other adapters or:

A000 – C7FF

11. After you type in all of the appropriate parameters, press **F10**.
12. At the next screen, carefully verify that the information is correct; then, press **Enter**.
13. At the Add Confirmation window, press **Enter** again.
14. In the next window (add), press **Enter**.
The adapter description appears in the selected slot.
15. Verify the installation; then press **F10**.
16. At the next menu, select **Save and exit the configuration utility**.

Device Drivers

Device drivers are programs designed to support a specific type of hardware device. They provide instructions that enable the computer to interact with the device, or to take advantage of a device's special feature. The device driver might come with the operating system, the application program, or on the option diskette. Not all devices require device drivers. Refer to the documentation that comes with the option for additional information.

Sample Applications

Some optional devices provide small applications or sampler files. These applications demonstrate the capabilities of the device and serve as software examples for programming the device. Refer to the documentation that comes with the option for additional information.

Configuring PCI Features and Options

PCI devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI device. If a conflict does occur, see “Resolving Configuration Conflicts” on page 112.

PCI Configuration

Multiple-function PCI adapters use more than one interrupt. When you install one of these adapters, review the IRQ assignments in the Configuration/Setup utility programs (see “PCI Bus Control” on page 102). Verify that the IRQ assignments are correct.

Your PC Server 330 uses a rotational interrupt technique to configure PCI adapters. This technique enables you to install a variety of PCI adapters that currently do not support sharing of PCI interrupts. For information on manually overriding the interrupt, see “PCI Bus Control” on page 102.

Resolving Configuration Conflicts

Resolving Configuration Conflicts

The resources used by your server consist of IRQs, DMA, I/O ports addresses, 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 *COM1* to two serial ports).
- A software program is installed that requires the same resource as a hardware device.

The steps required to resolve a configuration error are determined by the number and variety of hardware devices and software programs 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 the system hardware and PCI interrupt requests. The program does not consider the requirements of the operating system or the application programs. See “Resolving Software Configuration Conflicts” on page 114 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 and the PCI interrupt requests (IRQs), if necessary. Record the current settings before making any changes. (See “Starting the Configuration/Setup Utility Program” on page 91 for instructions.)
2. Determine which adapter or device is causing the error.
3. Change configuration resource allocations. Use the EISA Configuration 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. Change system board jumpers or switches. See “Preparing to Add Options” on page 126, for instructions on removing the cover. Then, refer to the system-board diagram inside your server.
6. Remove the device or adapter. Some configurations are not supported. If you must remove an adapter, see “Removing Adapters” on page 139.
7. Assign EISA memory addresses starting with DFFFF (in hexadecimal), and work downward to address C8000 (in hexadecimal). Configure PCI devices starting from C8000 (hexadecimal), the default PCI assignments.

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.

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.

Configuring the Ethernet Controller

The Ethernet controller on the system board provides an efficient, high-speed interface to a 10-Mbps Ethernet network, with automatic configuration.

The controller provides full-duplex operation (FDX), which allows simultaneous transmission and reception of data on the Ethernet LAN.

The controller also provides an automatic sensing function. The server automatically detects which of the two Ethernet ports is connected to the network, and then uses that port for communication. This function, always active, eliminates the need for a media type parameter and facilitates changing from one media type to another.

If you need additional Ethernet connectors, you can install an Ethernet adapter, such as the IBM PCI Ethernet adapter.

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

Using the SCSISelect Utility Program

Using the SCSISelect Utility Program

Your server comes with a menu-driven configuration utility program, called SCSISelect, that allows you to view and change SCSI settings.

You can use the SCSISelect Utility program to:

- View and change the default values
- Verify and change configuration conflicts
- Perform a low-level format on a SCSI hard disk

Starting the SCSISelect Utility Program

You can access this program when you start the server. The SCSISelect prompt appears after the IBM PC Server screen appears briefly and then disappears. Press **Ctrl+A** immediately after the SCSISelect prompt appears.

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

SCSISelect Utility Program Options

The following options appear on the SCSISelect Utility program menu:

- Configure/View Host Adapter Settings
- SCSI Disk Utilities

Configure/View Host Adapter Settings

To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings** and follow the directions on the screen. This menu has the following selections:

- Host Adapter SCSI ID

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

Using the SCSISelect Utility Program

- **SCSI Parity Checking**
The default value is *Enabled*. This value should not be changed.
- **Host Adapter SCSI Termination**
Select this choice to configure SCSI controller termination. The default value is *Low On/High On*.
- **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 large hard disk drives and support for drives with Ultra SCSI speed.

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.

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

Using the SCSISelect Utility Program

```
Unexpected SCSI Command Failure

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

Press 'Esc' to continue.
```

Performing a Low-Level Disk Format

You can perform a low-level format on a hard disk drive using the *Format Disk* 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 all of 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. To install an operating system after the hard disk drive is formatted, refer to the README file in Start Here on the ServerGuide Main CD.

Saving Configuration Settings

When you finish configuring your server, you can save the CMOS and NVRAM configuration data to a diskette. This is useful in case you have to clear CMOS or replace the system board, and you want to restore the existing configuration.

Refer to the README file on the PC Server Utilities Diskette for specific procedures on backing up and restoring CMOS and NVRAM configuration data.

Note: You will need to have a formatted diskette for each server configuration that you back up.

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

- Become familiar with the safety and handling guidelines specified under “Safety Information” on page vii, “Electrical Safety” on page 124, and “Handling Static-Sensitive Devices” on page 125. These guidelines will help you work safely while working with your server and options.
- Make sure you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options you intend to install.
- Place your server in a location that is dry. Rain or spilled liquids might damage your server.
- 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.

Be sure to leave space around the server to allow the server cooling system to work properly. Acceptable clearance is about 51 mm (2 in.) of space around the front and rear of the server.

Electrical Safety



CAUTION:

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

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

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

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

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

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



CAUTION:

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

Handling Static-Sensitive Devices

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

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters, the processor board, and memory-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

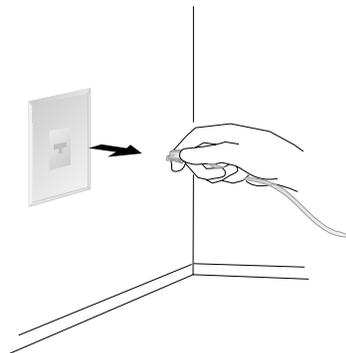
Preparing to Add Options

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 124 and “Handling Static-Sensitive Devices” on page 125.

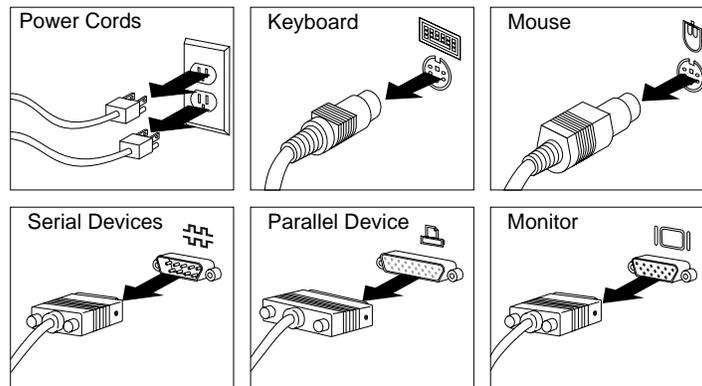
1. Unlock and open the server door.
2. Remove any media (diskettes or CDs) from the drives, and then turn off all attached devices and the server.
3. If you have a modem or fax machine attached to the server, disconnect the telephone line from the wall outlet and the server.

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

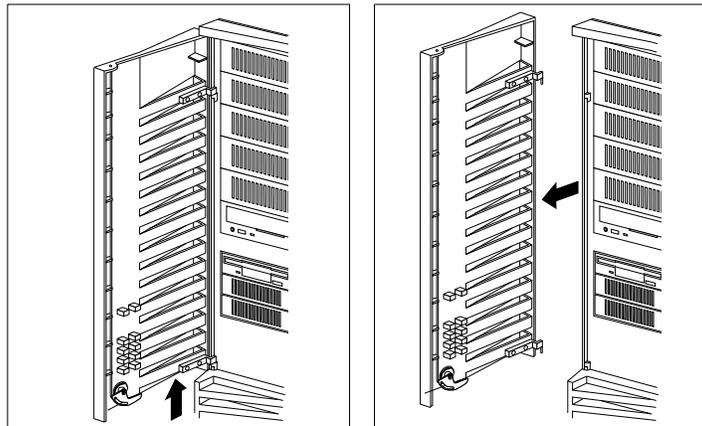


Preparing to Add Options

4. Unplug all power cords (cables) from electrical outlets, and then disconnect all other cables from the back of the server.



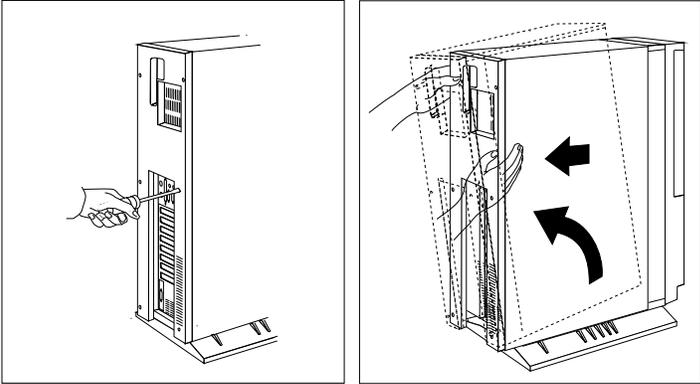
5. Remove the front door by carefully lifting it up and off of the hinges. Set the door aside.



6. Loosen the six screws in the recessed holes on the back of the cover.
Note: The screws stay in place; do not attempt to remove them.
7. Grasp the sides of the cover and slide it back an inch.
8. Grasp the cover at the top edge with one hand, and just above the expansion slots with the other hand.

Preparing to Add Options

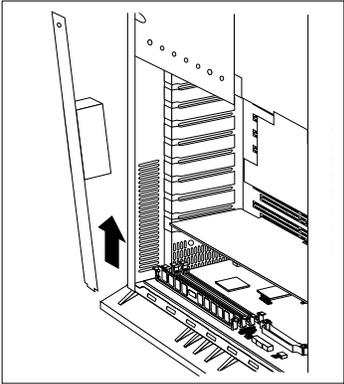
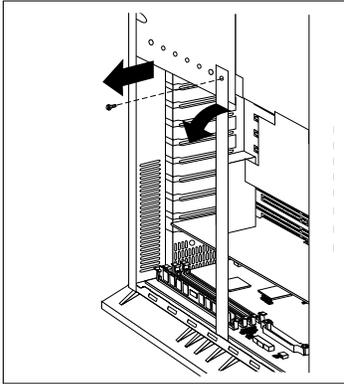
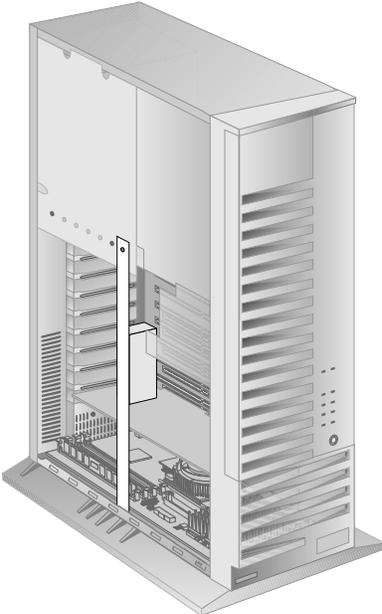
9. Remove the cover gently, lifting it up, as shown.



10. Store the cover in a safe place.

Preparing to Add Options

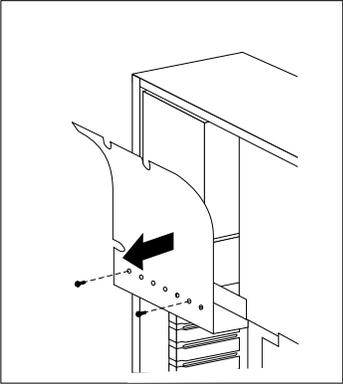
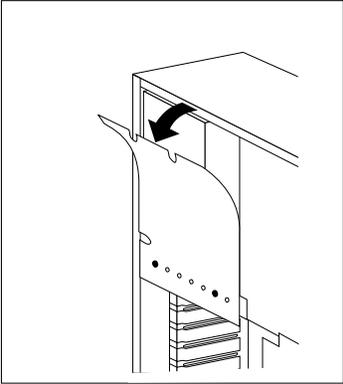
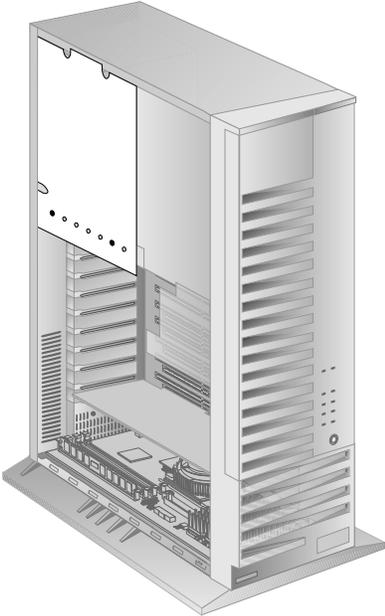
11. Remove the adapter retention bracket.



Preparing to Add Options

Note: Perform the next step only if you need to work with the drives or cables in the upper portion of the server.

- 12. Remove the air baffle.



Preparing to Add Options

Where to go next

To install or remove:

- An adapter, go to “Working with Adapters” on page 133
- A memory-module kit, go to “Working with Memory-Module Kits” on page 142
- An internal drive, go to “Installing Internal Drives” on page 149
- A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 202

Installing Video Memory

Installing Video Memory

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 additional high resolution graphics modes. You can increase the memory buffer size to 2 MB by installing two, 256 KB-by-16, 60ns, EDO, 40-pin SOJ, complementary metal oxide semiconductor (CMOS) dynamic random-access memory (DRAM) modules, such as IBM kit, P/N 76H0238. This kit contains two memory modules.

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

Working with Adapters

Adding an adapter, such as a communication or audio adapter, extends the capabilities and power of your server. For example, you can add a RAID (redundant array of independent disks) adapter that can enhance logical-drive capacity and performance, and continue operation after a hard-disk drive failure. You can install up to nine adapters in the expansion connectors, called slots, on the system board of your server.

Adapter Considerations

Three types of adapters are available for your PC Server 330:

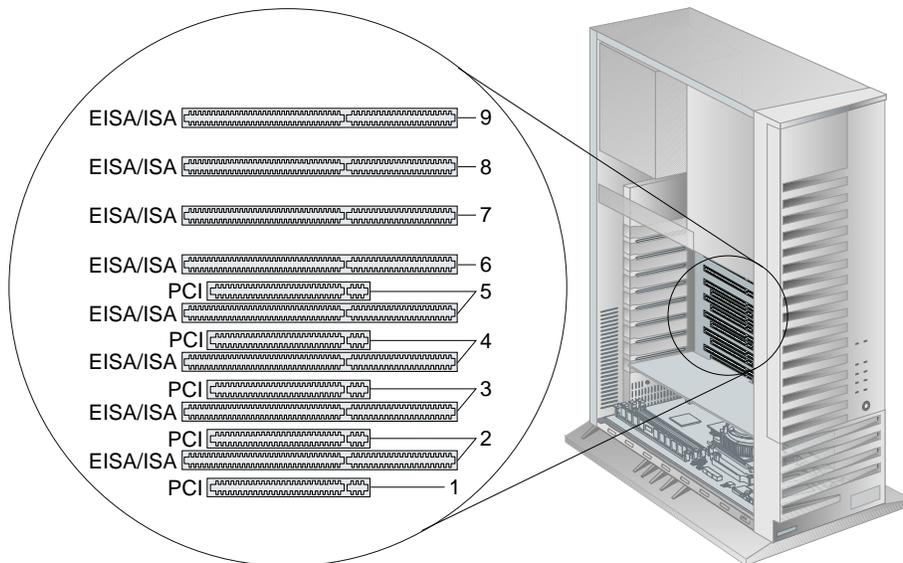
- PCI adapters
- EISA adapters
- ISA adapters

The system board in your server contains three 32-bit, EISA/ISA-bus expansion slots and one PCI-bus expansion slot. The remaining slots are shared PCI/EISA slots. Your server supports 5.0-volt PCI adapters.

- You can install PCI adapters in slots 1-5 only.
- If you have high-performance adapters, such as RAID adapters, install them in the two PCI slots closest to the processor board.
- You can install EISA or ISA adapters in slots 2-9. You can install full-length adapters only in the three shared PCI/EISA slots closest to the processor board.

Working with Adapters

The following figure shows the location of the PCI and EISA expansion slots.



Expansion slots 2-5 are shared slots. That is, the shared slots use the same expansion-slot opening on the back of the server. Only one connector in the shared-slot pairs can be used at a time.

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

Installing Adapters

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Read the instructions that come with the adapter.
- Turn off the server.
- Disconnect all external cables and power cords (see “Preparing to Add Options” on page 126).
- Remove the server cover (see page 127).

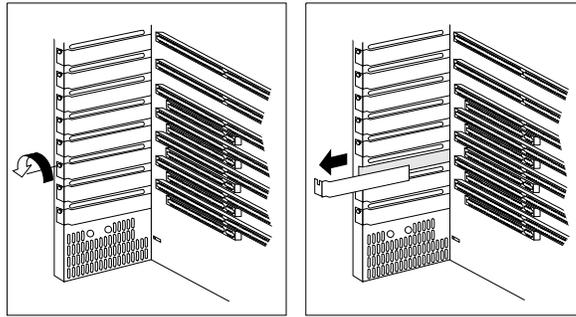
1. Review the instructions that come with the adapter to determine if the adapter must be installed in a certain slot; otherwise, use any empty, bus-compatible slot.



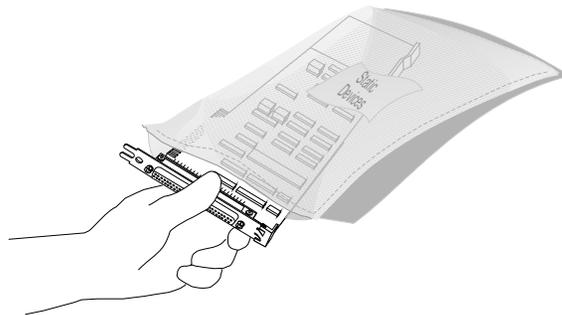
2. If you are installing a video adapter, you might have to change a jumper position on the system board. See Appendix A, “Jumpers” on page 321 for detailed information on changing jumper positions.

Working with Adapters

3. Remove the expansion-slot cover.
 - 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.

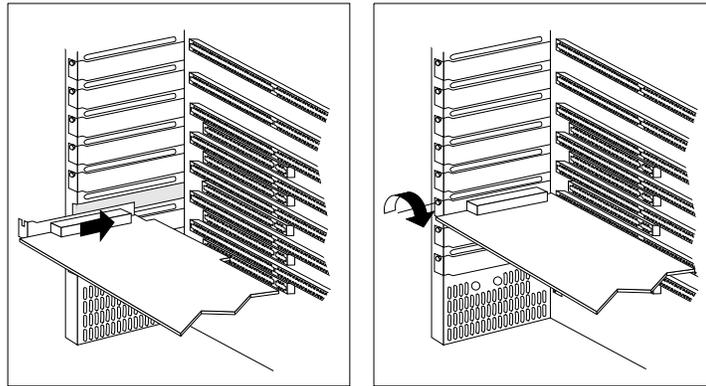


4. Touch the static-protective package to any *unpainted* metal surface on the server; then remove the adapter from the package.



Working with Adapters

5. Install the adapter.
 - a. Carefully grasp the adapter and align it with the expansion slot. On long adapters, align the end of the adapter with the card guide on the fan.
 - b. Press the adapter *firmly* into the expansion slot.
 - c. Tighten the expansion-slot screw on the top of the adapter bracket.



6. Go to Appendix B, “Server Records” on page 331 and write the adapter name next to the slot into which it is installed.



Working with Adapters

Where to go next

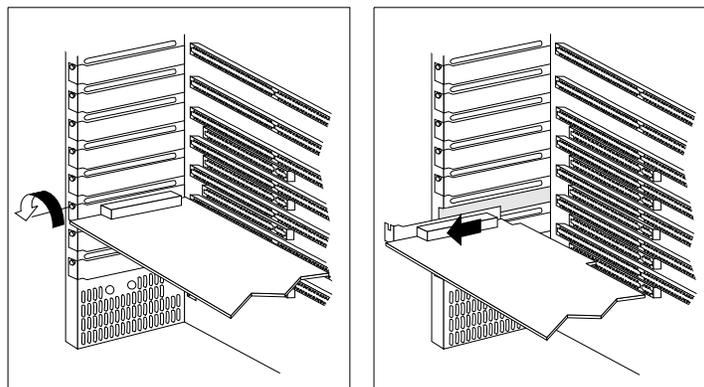
- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 142
 - An internal drive, go to “Installing Internal Drives” on page 149
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 202
 - A security option, go to “Adding Security Options” on page 215
- To complete the installation, go to “Completing the Installation” on page 218.

Removing Adapters

Before you begin

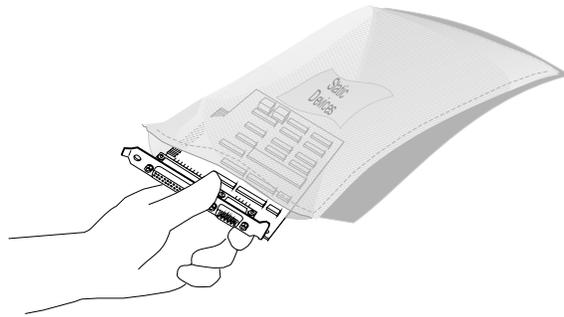
- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Turn off the server.
- Disconnect all external cables and power cords.
- Remove the server cover (see “Preparing to Add Options” on page 126).

1. Note the expansion-slot position of the adapter that you want to remove.
2. Loosen and remove the screw on top of the adapter bracket.
3. If there are any internal cables attached to the adapter, disconnect them.
4. Carefully pull the adapter out of the slot.

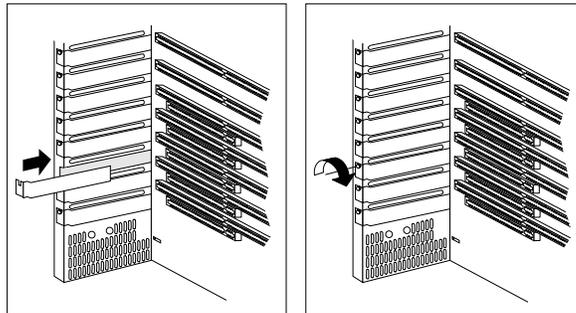


Working with Adapters

5. Insert the adapter you removed into a static-protective package.



6. Install an expansion-slot cover in the empty expansion slot.



Working with Adapters

7. Go to the device-record form in Appendix B, “Server Records” on page 331, and delete the name of the adapter you removed.



Where to go next

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 142
 - An internal drive, go to “Installing Internal Drives” on page 149
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 202
 - A security option, go to “Adding Security Options” on page 215
- To complete the installation, go to “Completing the Installation” on page 218.

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*, or by installing memory-module kits with larger capacity memory. The kit contains one industry-standard, 168-pin, 60 ns, buffered extended data output (EDO), Error Correcting Code (ECC), dual inline memory module (DIMM). The server uses a noninterleaved memory configuration, with Error Correcting Code (ECC) data protection.

When you are instructed to install the kits (in step 2 on page 143), install them in adjacent connectors, with no vacant memory connectors in between. Your server comes with one memory-module kit installed in connector J2, the connector closest to the edge of the processor board. Install additional memory-module kits in connector J3, and then continue with connectors J4 and J5, in that order.

Notes:

1. Install only buffered EDO, ECC DIMMs.
2. If you are installing DIMMs of different sizes, install DIMMs with greater memory capacity starting with the connector closest to the edge of the processor board (J2).
3. After installing or removing a DIMM, you must save the new configuration information in the Configuration/Setup Utility program. See "Using the Configuration/Setup Utility Main Menu" on page 92.
4. The server supports 60 ns, 32 MB, 64 MB, and 128 MB memory-module kits.

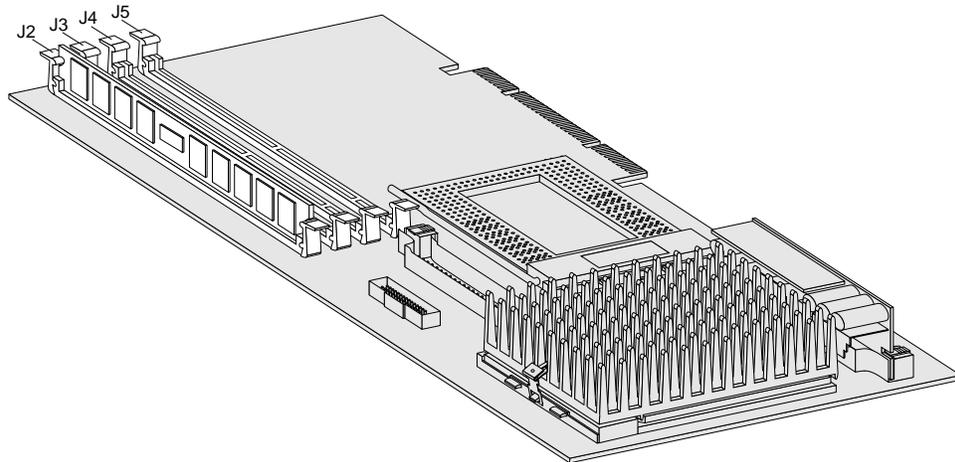
Installing Memory-Module Kits

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Turn off the server.
- Disconnect all external cables and power cords, and then remove the server cover (see “Preparing to Add Options” on page 126).

To install a dual inline memory module (DIMM):

1. Locate the memory connectors on the processor board.

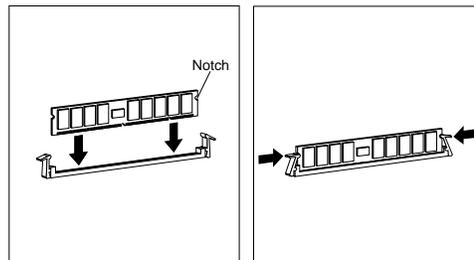


Notes:

- a. Each connector slot contains two keys (dividers), which are used to assure that a memory-module kit can be installed only in the correct position.
 - b. A retaining clip at each end of the connector locks the memory-module kit in place.
2. Press the retaining clips at the ends of the connector outward, to the open position.

Working with Memory-Module Kits

3. Touch the static-protective package containing the dual inline memory module to any *unpainted* metal surface on the server; then, remove the memory-module kit from the package.
4. Position the DIMM so that the two key slots (openings in the connector pins) on the bottom edge align with the corresponding sections in the connector.
5. After aligning the DIMM, push the DIMM firmly straight down into the connector. (The retaining clips on both sides of the connector automatically come up into the notches on the sides of the DIMM.)



Note: Adding or removing memory-module kits changes the configuration information in the server. When you restart the server, the system displays a POST error 164. Start the Configuration/Setup utility program and select **Save Settings**.

6. Go to Table 11 on page 336 and update the current configuration of the memory-module kits.

Working with Memory-Module Kits

Where to go next

- To install or remove:
 - An internal drive, go to “Installing Internal Drives” on page 149
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 202
 - A security option, go to “Adding Security Options” on page 215
- To complete the installation, go to “Completing the Installation” on page 218.

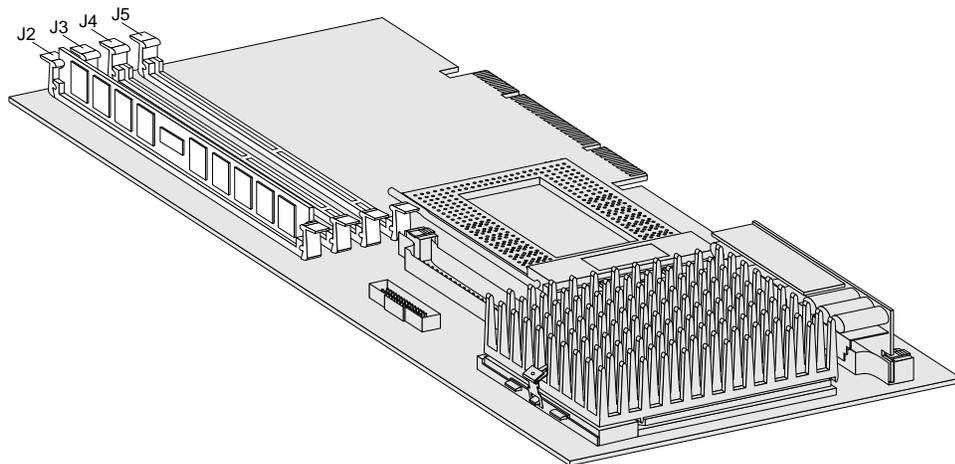
Removing Memory-Module Kits

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Turn off the server.
- Disconnect all external cables and power cords, and then remove the server cover (see “Preparing to Add Options” on page 126).

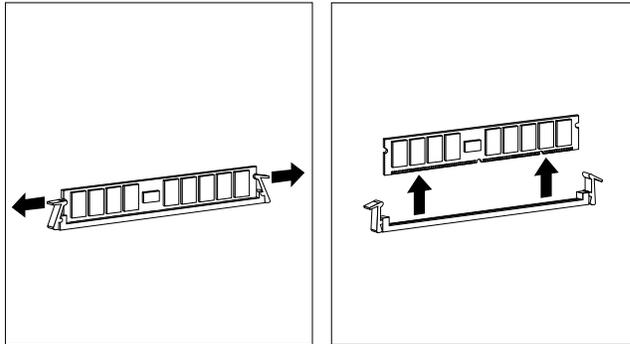
To remove a dual inline memory module.

1. Locate the memory-module kit connectors on the processor board. Note the retaining clips at the ends of the connector. The clips are used to lock the memory-module kits into place, and to eject them from the slot.



2. Firmly push downward on the retaining clips at both ends of the dual inline memory module connector. This ejects the dual inline memory module from the connector.
3. Lift the dual inline memory module out of the connector.

Working with Memory-Module Kits



4. Store any memory-module kits you are no longer using in a static-protective package. Make a note of the kit size, type, and speed for future reference.



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

Working with Memory-Module Kits

5. Go to the device-record form in Table 11 on page 336, and update the current configuration of the memory-module kits.



Where to go next

- To install or remove:
 - An internal drive, go to “Installing Internal Drives” on page 149
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 202
 - A security option, go to “Adding Security Options” on page 215
- To complete the installation, go to “Completing the Installation” on page 218.

Installing Internal Drives

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Read the instructions that come with the internal drive.
- Turn off the server.
- Disconnect all external cables and power cords, and then remove the server cover (see “Preparing to Add Options” on page 126).

If you add different types of drives, your system can read multiple types of media and store more data. Several types of drives are available, such as:

- Diskette
- Hard disk
- Rewritable optical disc
- Tape

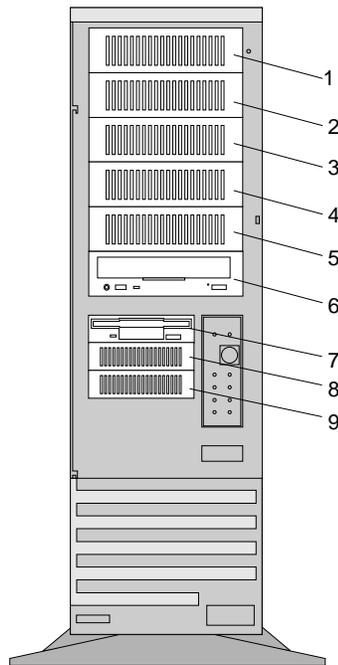
Before you install internal drives in your server, see “Internal Drive Bays (Non-Hot-Swap Servers)” on page 150 and “Internal Drive Bays (Hot-Swap Servers)” on page 153 for information on the non-hot-swap and hot-swap models, respectively, for the following:

- Types of drives
- Preinstalled drives
- Numbering of bays
- Cabling information
- Basic installation information

Installing Internal Drives

Internal Drive Bays (Non-Hot-Swap Servers)

Internal drives are installed in *bays*. The bays are numbered 1 through 9, top to bottom, in non-hot-swap servers.



Cover plates (sometimes called *bezels*) cover the front of some installed drives. If you install a drive that uses removable media (diskette, optical disc, or tape), you might need to remove or change the cover plate.

- Bays 1–6 are for 3.5-inch or 5.25-inch disk drives. Bays 1–5 are open bays, while bay 6 comes standard with a CD-ROM drive. The open bays contain trays for housing 3.5-inch drives. If you want to install a 5.25-inch drive in one of these bays, you must remove screws and the tray before attempting to install the drive.
- Bays 7–9 are for 3.5-inch diskette-interface devices or 3.5-inch SCSI interface devices such as a diskette drive, hard disk drive,

Installing Internal Drives

or tape backup unit that uses the diskette cable. All models come with a diskette drive preinstalled in bay 7.

- The system board in your server supports a maximum of two diskette-interface devices. You can install a second 3.5-inch diskette-interface device in bay 8. Be sure the screw holes in the device line up with the screw holes in bay 8.
- You can install a full-high drive in bays 3 and 4 and bays 5 and 6 by removing the trays from these bays. You cannot install full-high drives in bays 1 and 2.
- Your server comes with a 7-drop internal SCSI cable (depending on the server model that you purchased).

If you install 16-bit devices, you must use the 16-bit cable that comes with your system. In some cases, you may want to install an additional 8-bit CD-ROM drive to a 16-bit cable. To do this, you must purchase and install the 8-bit to 16-bit SCSI Internal Converter. To order cables and a converter, contact your IBM marketing representative or your IBM reseller. See “SCSI Drives” on page 157 for additional information.

- The IBM 3.5-inch rewritable optical disc drive requires a special mounting bracket. Contact your IBM marketing representative or your IBM reseller for more information.

Attention: Before you remove a drive, back up all data.

Installing Internal Drives

Drives come in a variety of sizes and types. The following table shows the widths, types, and maximum heights for the drives that you can install in each bay.

Table 1. Maximum Allowable Drive Sizes (Non-Hot-Swap Models)

Bay	Drive Width	Drive Type	Maximum Drive Height
1-5	3.5-inch or 5.25-inch	Hard disk, removable media ^{See Note}	41.3 mm (1.6 inches)
6	5.25-inch	CD-ROM	41.3 mm (1.6 inches)
7	3.5-inch	Diskette drive	41.3 mm (1.6 inches)
8-9	3.5-inch	Hard disk, diskette, or 1/4-inch SCSI tape backup drive	25.4 mm (1 inch)

Notes: Removable media include 3.5-inch diskettes, optical discs, and tapes.

Table 2 summarizes the additional hardware that is needed to install some PC Server 330 options.

Table 2. Required Hardware for Server Options on a Non-Hot-Swap Model

Option	Required hardware
3.5-inch drive rewritable optical disc drive	Special mounting bracket
Internal drives, 3.5-inch	<ul style="list-style-type: none"> • 8-bit or 16-bit drive • Drive tray
16-bit devices (bays 1-5)	16-bit cable (comes with the system)
8-bit devices	8-to-16 bit converter

Internal Drive Bays (Hot-Swap Servers)

The PC Server 330 comes in two hot-swap versions:

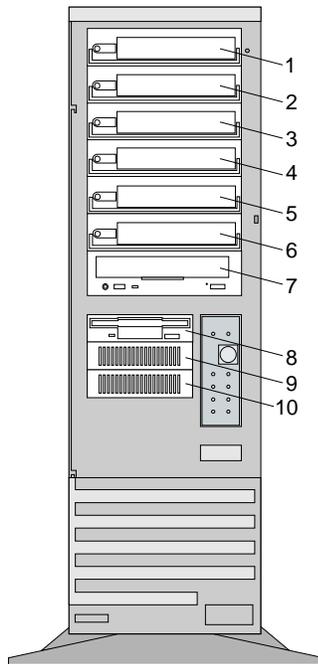
- Hot-Swap Server without RAID
- Hot-Swap Server with RAID

Both of the hot-swap servers contain hardware that lets you replace a failed hard disk drive without turning off the server. This gives you the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are also known as *hot-swappable* drives.

In these server models, you can install up to six hot-swappable drives. Hot-swappable drives have a green LED near the locking-lever on the tray containing the drive. If the drive has a good electrical connection upon installation, the LED illuminates. The LED blinks briefly during power-up. For hot-swap models, the LED also blinks if the drive malfunctions.

Installing Internal Drives

Internal drives are installed in *bays*. The bays are numbered 1 through 10.



The Hot-Swap Server without RAID comes with a SCSI-2 interface built into the system board that is connected to the backplane using a single-drop cable. A three-drop cable then connects the backplane to the CD-ROM drive. One of the other two connectors on the three-drop cable can be used to connect an additional 3.5-inch device that you install in bay 9 or 10.

The Hot-Swap Server with RAID comes with an IBM ServerRAID adapter in slot 1, which is connected to the backplane using a single-drop cable. A three-drop cable then connects the backplane to the CD-ROM drive. One of the other two connectors on the three-drop cable can be used to connect an additional 3.5-inch device that you install in bay 9 or 10.

Installing Internal Drives

Cover plates (sometimes called *bezels*) cover the front of some installed drives. If you install a drive that uses removable media (diskette, optical disc, or tape), you might need to remove or change the cover plate.

- Bays 1–6 are for 3.5-inch hot-swappable hard disk drives.
To install a hard disk drive in a hot-swap bay, see “Installing Hard Disk Drives (Hot-Swap Servers)” on page 185.
- Bay 7 has a preinstalled SCSI CD-ROM drive.
- Bay 8 contains a 3.5-inch diskette drive.
- Bay 9 and 10 are for 3.5-inch diskette-interface devices, or 3.5-inch SCSI interface devices, such as a hard disk drive or tape backup unit that uses the diskette cable.
- The system board in your server supports a maximum of two diskette-interface devices. You can install a second 3.5-inch diskette-interface device in bay 9.
- Bay 9 comes without a device. You can install a 3.5-inch diskette, 1/4-inch SCSI tape backup drive, or hard disk drive in bay 9.
Note: You cannot install a hot-swappable hard disk drive in Bay 9 or 10.
- The IBM 3.5-inch rewritable optical disc drive requires a special mounting bracket. Contact your IBM marketing representative or your IBM reseller for more information.

Attention: Before you remove a drive, back up all data.

Installing Internal Drives

Drives come in a variety of sizes and types. The following table shows the widths, types, and maximum heights for the drives that you can install in each bay.

Bay	Drive Width	Drive Type	Maximum Drive Height
1-6	3.5-inch	Hard disk, hot-swappable	25.4 mm (1 inch)
7	5.25-inch	CD-ROM	41.3 mm (1.6 inches)
8	3.5-inch	Diskette	25.4 mm (1 inch)
9-10	3.5-inch	Hard disk, optical disc, SCSI diskette, 1/4-inch SCSI tape backup	41.3 mm (1.6 inches)

Table 4 summarizes the additional hardware that is needed to install some options in a disk-array system.

Option	Required hardware
3.5-inch drive rewritable optical disc drive	<ul style="list-style-type: none">• Special mounting bracket
16-bit devices (bays 1 to 6)	<ul style="list-style-type: none">• Hot-swap drive tray III• 16-bit cable
Storage enclosure or external drives.	External SCSI-2 cable
8-bit device	68-to-50 pin converter

SCSI Drives

Some drives have a special design called *small computer system interface*, or “SCSI.” This design allows you to attach multiple drives to a single SCSI-2 connector.

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

All PC Server 330 systems come with two SCSI-2 connectors integrated on the system board; one for attaching internal drives and one for attaching external drives. Refer to “System Board Component Locations” on page 337 for the location of the connectors. The hot-swap server with RAID also comes with an IBM PC ServeRAID Adapter and two preinstalled SCSI hard disk drives.

If you install additional SCSI devices you must have a unique identification (ID) for each SCSI device that you connect to the integrated SCSI-2 connector. This enables the SCSI-2 controller to identify the devices and ensure that different devices do not attempt to transfer data at the same time.

In hot-swap servers, the SCSI IDs are hard-coded in the backplane of the hot-swap bay and preset for the CD-ROM drive.

Attention: Do not attempt to change the SCSI IDs for hot-swap SCSI devices.

Refer to Table 5 on page 158 before setting SCSI IDs. Do not set the SCSI IDs for other devices to these values.

Installing Internal Drives

SCSI IDs

For all hot-swap servers:

- Fast/Wide (16-bit) devices support SCSI IDs 0 to 15
- Narrow (8-bit) devices support SCSI IDs 0 to 7

SCSI ID	Bay	Device
Non-Hot-Swap Servers		
6	6	CD-ROM Drive
7	N/A	SCSI-2 Controller
Hot-Swap Servers without RAID		
0-5See Note	1-6	Hot-Swappable Hard Disk Drives
6	7	CD-ROM Drive
7	N/A	SCSI-2 Controller
Hot-Swap Servers with RAID		
0-5See Note	1-6	Hot-Swappable Hard Disk Drives
6	7	CD-ROM Drive
7	N/A	IBM PC ServeRAID Adapter
<i>Note:</i> SCSI IDs are preset by the hot-swap bay backplane.		

The processing sequence for SCSI devices proceeds from the lowest SCSI ID to the highest (0 to 6, then 8 to 15).

Refer to the instructions that come with the SCSI devices for information about setting a SCSI ID.

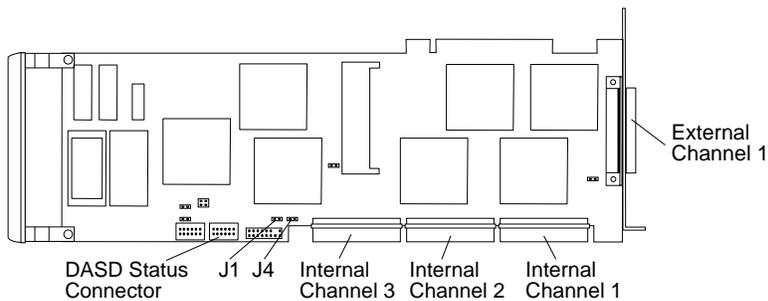
Installing Internal Drives

IBM PC ServeRAID Adapter

With the hot-swap servers with RAID, the IBM PC ServeRAID Adapter provides three internal connectors for 16-bit cables, and one external connector: Internal Channel 1, Internal Channel 2, Internal Channel 3, and External Channel 1.

Notes:

1. To keep External Channel 1 available for use on the RAID adapter, use Internal Channel 2 and Internal Channel 3 for connecting internal SCSI devices.
2. Internal Channel 3 comes cabled to the backplane.
3. Internal Channel 1 and External Channel 1 cannot be used at the same time. For example, if you attach an external storage device to External Channel 1, then you cannot attach any internal devices to Internal Channel 1.



On all servers, the external connector is for a 16-bit cable.

Installing Internal Drives

Notes:

1. If you plan to install both internal and external SCSI devices, you must follow the instructions given in “Installing the External SCSI Cable Connector” on page 211 and. “Connecting External Options” on page 222 in addition to the instructions in this section.
2. If you connect devices to the internal or external integrated SCSI connectors in a hot-swap server, the server might attempt to start from these non-hot-swap devices. Refer to your operating system documentation.

Installing Internal Drives

Termination Requirements

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

Refer to the instructions that come with the SCSI devices for information about setting a SCSI ID.

If you have only internal SCSI devices connected to the internal SCSI controller *and* the external SCSI cable has not been installed, the controller becomes the termination at one end of the cable.

If you attach internal SCSI devices to the SCSI controller 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 SCSI connector. The SCSI bus on the system board is already terminated.

If you use the internal SCSI connector *and* the external SCSI connector on the system board, both ends of the bus must be terminated. In addition, if you connect an 8-bit device to the external connector, you must change the position of the external SCSI termination jumper (J38). See Appendix A, "Jumpers" on page 321 for the location and default jumper position of this jumper.

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

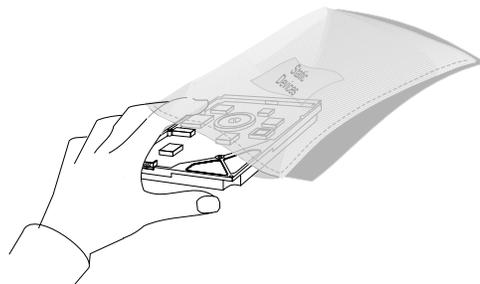
Preinstallation Steps (All Bays)

Before you begin, be sure you have:

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Read the documentation that comes with the internal drive.
- Verified that you have all of the cables, drive trays, and any other equipment specified in the documentation that comes with the internal drive.
- Removed the server cover (see “Preparing to Add Options” on page 126).

Before you can install drives in your PC Server 330, you might need to perform certain preinstallation activities. Some of the steps are required only during the initial installation of an option.

1. Choose the bay in which you want to install the drive. (Refer to Table 1 on page 152 for the drive types and sizes available for each bay in non-disk-array system systems, or to Table 3 on page 156 for the drive types and sizes available for each bay in disk-array systems.)
2. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag.



Installing Internal Drives

3. Check the instructions that come with the drive, or contact your IBM marketing representative or your IBM reseller to see if you need to set any switches or jumpers on the drive, or if you need to attach a tray to the drive.

Notes:

- a. The SCSI ID is preset to 6 on the CD-ROM in all PC Server 330 models. If you upgrade your server by installing a Hot Swap Bay Option, make sure that the SCSI ID on the CD-ROM drive does not conflict with a hard disk drive installed in any of the hot-swap bays. (Hard disk drives that are installed in hot-swap bays are automatically assigned SCSI IDs of 0–5.) Your server will not recognize either device if they are assigned the same SCSI ID and are connected to the same channel of the SCSI controller.
- b. Automatic SCSI ID settings apply only to hot-swappable hard disk drives installed in a hot-swap bay. Therefore, if you install a SCSI drive in a non-hot-swappable 3.5-inch bay of a hot-swap server, you must set a SCSI ID for that drive.
- c. Remove the terminators from the drive you plan to install in bay 1 (non-disk-array models) or bay 9 (disk-array models). The cable that connects to the SCSI device in those bays already has a terminator.

Where to go next?

- Installing a drive in bays 8–9? — Go to “Installing Drives in Lower Bays” on page 164.
- Installing a non-hot-swappable drive in bays 1–5? — Go to “Installing Hard Disk Drives (Non-Hot-Swap Servers)” on page 175.
- Installing a hot-swappable drive in bays 1–5? — Go to “Installing Hard Disk Drives (Hot-Swap Servers)” on page 185.

Installing Internal Drives

Installing Drives in Lower Bays

This procedure applies to drives installed in the bottom two bays in your PC Server 330, either non-hot-swap model or the hot-swap model.

The following information is important. Read the information completely before you install any drives.

- Your server comes with a 1.44 MB diskette drive installed in the upper most bay. The system board supports two diskette-interface devices. Therefore, you can install an additional 3.5-inch diskette-interface device in either of the other two 3.5-inch lower bays. Each diskette-interface device connects to one cable (already attached to the preinstalled diskette drive).
- Before installing drives, make sure you have enough cables to accommodate all of the drives. If you need additional cables, contact your IBM marketing representative or your IBM reseller.
- If your server did not come with a preinstalled hard disk drive, and you plan to have more than seven SCSI drives (including the CD-ROM drive), you might need additional cables.

If you install 16-bit devices, you must use a 16-bit cable. If you connect the CD-ROM drive to a 16-bit cable, you must purchase and use the 16-bit to 8-bit SCSI Internal Converter. To order the cable and converter, contact your IBM marketing representative or your IBM reseller.

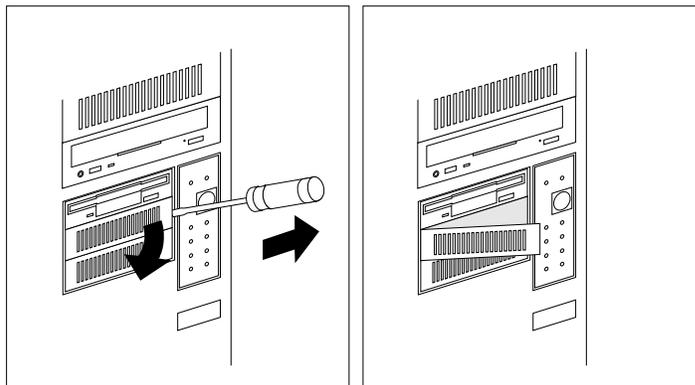
- In your non-hot-swap server, you can install the first hard disk drive (3.5-inch only) in bay 7 or 8. Additional hard disk drives can be installed in the 5.25-inch bays.
- When you install a device in one of the 5.25-inch bays in your non-hot-swap server, you must terminate the drive in the lowest numbered bay. For example, if you install a drive in bay 1, disconnect the cable connector attached to the CD-ROM drive and connect it to the drive in bay 1. Then, connect one of the other connectors to the CD-ROM drive. Finally, put a terminator on the drive in bay 1.

Installing Internal Drives

- Non-hot-swap servers come with a 16-bit SCSI cable. Use this cable to install additional 8-bit devices. You must use a 68-to-50 pin converter to connect 8-bit devices to a 16-bit SCSI cable.

Note: You cannot install 16-bit devices on an 8-bit cable.

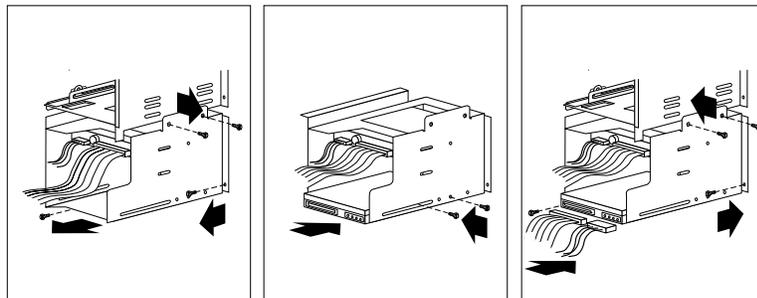
- Follow the instructions in the documentation that comes with the drives. Pay particular attention to the information about setting jumpers and switches, and removing termination.
- If a tray is attached to a drive that you intend to install, you must remove the tray before installing the drive. Follow the instructions in the documentation that comes with the drive.
 - a. Insert a small flat-blade screwdriver under the side of the cover plate.
 - b. Lift the cover plate and remove it from the server front panel. (Save the cover plate for future use.)



Installing Internal Drives

1. Remove the screws from the drive housing containing the bottom two bays.

Note: Three screws are shown in the following illustration. The fourth screw is located under the housing, on the left-hand side.

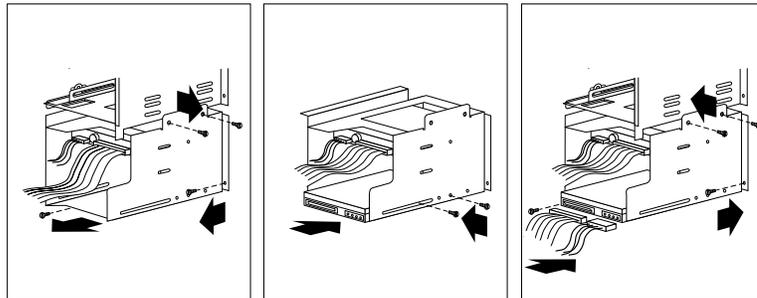


Installing Internal Drives

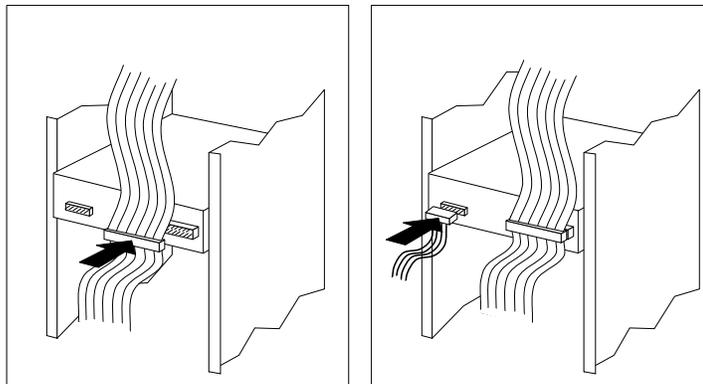
2. To install a drive in the lower 3.5-inch bays of your server:
 - a. Locate the cable connector that you will attach to the drive.
 - b. Position the drive so the drive connector is facing the rear of the server.
 - c. Align the drive with the guides on the bottom of the bay and slide it into the bay.

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

- d. Attach the drive to the housing, using the screws supplied with the drive kit.



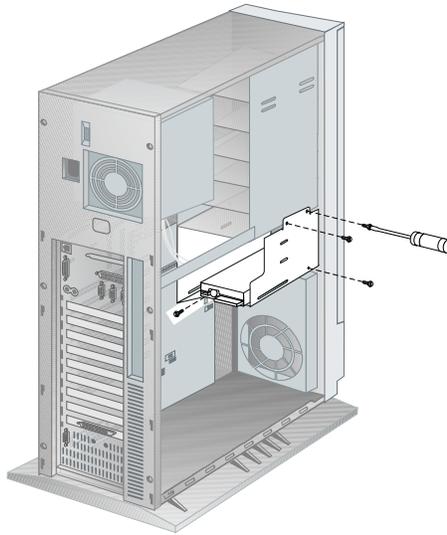
- e. Connect the drive to one end of the signal cable.
- f. Connect the other end of the cable to the SCSI-2 adapter.
- g. Connect one of the 4-pin power cables to the drive.



- h. Reinstall the drive housing, making sure to align the far side properly over the two brackets located under bay 7 (non-hot-swap models) or bay 8 (hot-swap models).

Installing Internal Drives

- i. Reinstall and tighten the four screws that you removed in step 1 on page 166.



3. Go to Table 9 on page 333 to record the drive location, and if applicable, the SCSI ID you assigned to the drive (diskette drives do not require a SCSI ID); then, return here to determine your next step.



Installing Internal Drives

Where to go next?

- Installing another internal drive? — Go to step 1 on page 162.
- Installing memory-module kits? — Go to “Installing Memory-Module Kits” on page 143.
- Removing memory-module kits? — Go to “Removing Memory-Module Kits” on page 146.
- Installing an adapter? — Go to “Installing Adapters” on page 135.
- Removing an adapter? — Go to “Removing Adapters” on page 139.
- Installing a CD ROM? — Go to “CD-ROM Drive Considerations” on page 200.
- Installing an optical drive? — Go to “Installing Optical Disc Drives and Tape Drives” on page 200.
- Removing an diskette drive? — Go to “Removing Diskette Drives” on page 170.
- Removing a hard disk drive? — Go to “Removing Hard Disk Drives (Non-Hot-Swap Servers)” on page 190 or “Removing Hard Disk Drives (Hot-Swap Servers)” on page 195.
- Changing a jumper setting? — Go to Appendix A, “Jumpers” on page 321.
- Installing a microprocessor? — Go to “Working with Microprocessor Upgrades” on page 202.
- Installing a security feature? — Go to “Adding Security Options” on page 215.
- No internal devices to install or remove? — Go to “Completing the Installation” on page 218.
- Installing an external option? — Go to “Connecting External Options” on page 222.

Installing Internal Drives

Removing Diskette Drives

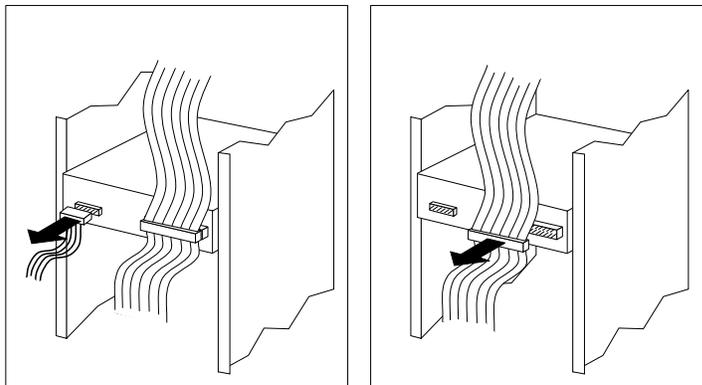
Note: The procedure for removing hard disk drives from the bottom bay of your server is the same as the procedure for removing diskette drives.

Before you begin, be sure you have:

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Removed the server cover (see “Preparing to Add Options” on page 126).
- Determined the correct location of a failed hard disk, if your server is a disk-array model, and your system indicates that a drive is defective (bays 1–6 only).

To remove a drive from the lower 3.5-inch bays:

1. Disconnect the SCSI and power cables from the drive.

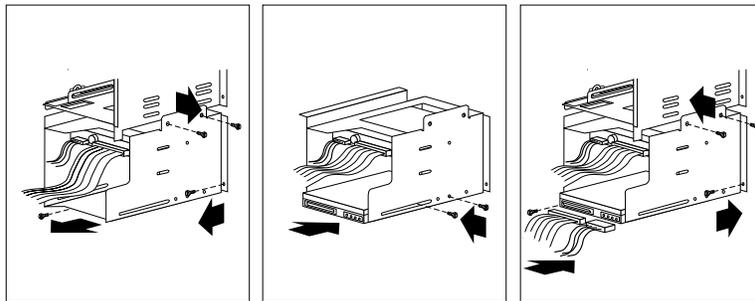


Installing Internal Drives

2. Remove the screws from the drive housing containing the bottom two bays.

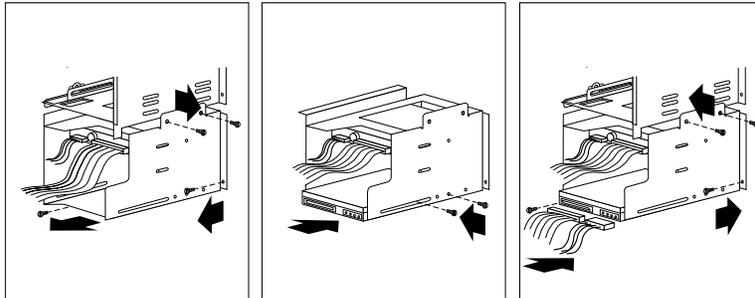
Note: Three screws are shown in the following illustration. The fourth screw is located under the housing, on the left-hand side.

3. Gently pull the housing away from the bracket that holds its other side in place.



Installing Internal Drives

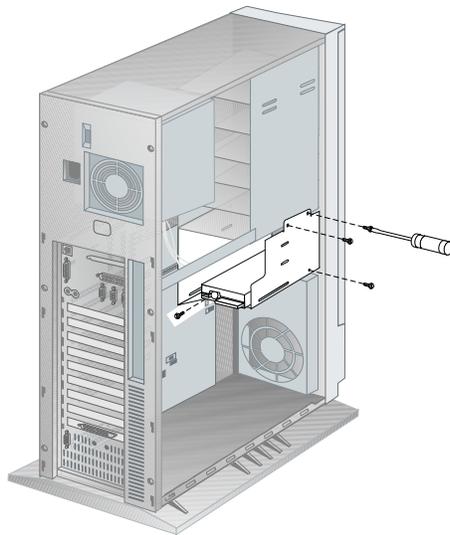
4. Remove the diskette drive:
 - a. Determine which drive you plan to remove.
 - b. Disconnect the cables (flat and power) from the rear of the drive.
 - c. Remove the screws that hold the drive in the housing.
 - d. Slide the drive out of the bay and store it in a safe place.



5. Reinstall the drive housing, making sure to align it properly over the two brackets located under the bay containing the CD-ROM drive.

Installing Internal Drives

6. Reinstall and tighten the four screws that you removed in step 2 on page 171.



7. If you are installing another internal drive, go to step 1 on page 162.
If you are removing another diskette drive, return to “Removing Diskette Drives” on page 170.
If you are not installing or removing another internal drive, continue with the next step.
8. Replace the cover plate (bottom bay only).

Installing Internal Drives

9. Update your records in Table 9 on page 333; then, return here to determine your next step.



Where to go next?

- Installing memory-module kits? — Go to “Installing Memory-Module Kits” on page 143.
- Removing memory-module kits? — Go to “Working with Memory-Module Kits” on page 142.
- Installing an adapter? — Go to “Installing Adapters” on page 135.
- Removing an adapter? — Go to “Removing Adapters” on page 139.
- Changing a jumper setting? — Go to Appendix A, “Jumpers” on page 321.
- Installing a microprocessor? — Go to “Working with Microprocessor Upgrades” on page 202.
- Installing a security feature? — Go to “Adding Security Options” on page 215.
- No internal devices to install or remove? — Go to “Completing the Installation” on page 218.
- Installing an external option? — Go to “Connecting External Options” on page 222.

Installing Hard Disk Drives (Non-Hot-Swap Servers)

Note: To install hard disk drives in a hot-swap bay, see “Installing Hard Disk Drives (Hot-Swap Servers)” on page 185.

By adding different hardware trays to the 5.25-inch bays in your server, you can install various types of drives that optimize your operating environment.

The following information is important. Read the information completely before you install any drive.

- Before installing drives, make sure you have the necessary cables to accommodate all of the drives. If you need additional cables, contact your IBM marketing representative or your IBM reseller.

Note: If you install any 8-bit devices, you need the 16-bit to 8-bit SCSI Internal Converter.

To order the cable and converter, contact your IBM marketing representative or your IBM reseller.

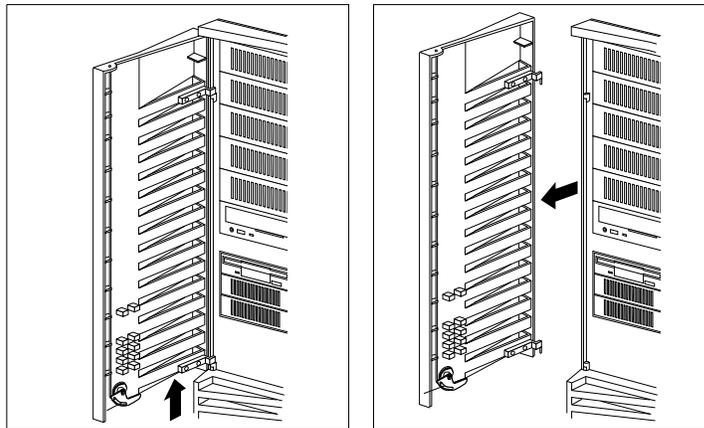
- See step 13 on page 180 for an illustration of SCSI cable-routing.
- Follow the instructions in the documentation that comes with the drives, including those that describe how to set jumpers and switches, and how to remove termination.
- If a tray is attached to a drive that you intend to install, you must remove the tray before installing the drive. Follow the instructions in the documentation that comes with the drive.

Installing Internal Drives

Before you begin, be sure you have:

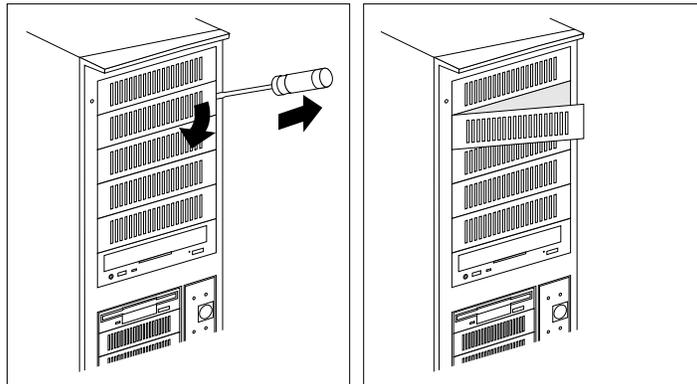
- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Removed the server cover (see “Preparing to Add Options” on page 126).

1. Unlock and open the door.
2. Remove the door:
 - a. Lift the door up and off its hinges.
 - b. Store the door in a safe place.



Installing Internal Drives

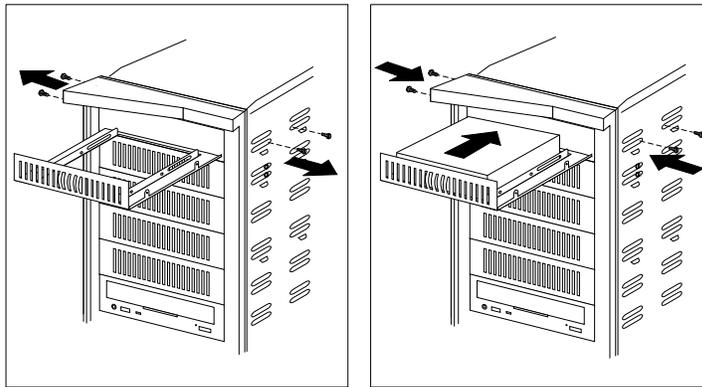
3. Remove the cover plate from the target bay:
 - a. Insert a small flat-blade screwdriver under the side of the cover plate.
 - b. Lift the cover plate and remove it from the server front panel. (Save the cover plate for future use.)



4. Remove the screws that secure the tray (from both sides of the tray housing) in the target bay, as shown in the figure on the next page. Then, slide the tray out of the bay.
5. Install the appropriate drive:
 - If you are installing a 5.25-inch drive, go to step 11 on page 179.
 - If you are installing a 3.5-inch drive, go to 6 on page 178.

Installing Internal Drives

6. Place the drive on the tray, with the connectors facing the rear of the tray.
7. Insert the screws that come with the drive into the holes on the tray. Then, tighten the screws.
Attention: To ensure that the drive functions properly, do not overtighten the screws.
8. Slide the drive and tray into the target bay.
9. Reinstall and tighten the four screws that you removed in step 4 on page 177.



10. Go to step 12 on page 180.

Installing Internal Drives

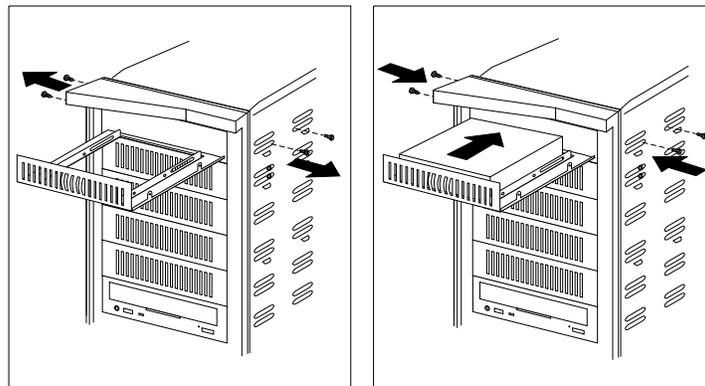
11. If you are installing a 5.25-inch drive, complete the following steps:

Note: Do not use the tray, but store it for future use. If this is a rewritable optical disc drive, a special tray kit is required. (Contact your IBM marketing representative or your IBM reseller for additional information.)

- a. Position the drive with the connectors facing the rear of the server.
- b. Slide the drive to the rear until it stops.
- c. Loosely reinstall the four screws that you removed from the tray housing in step 4 on page 177.

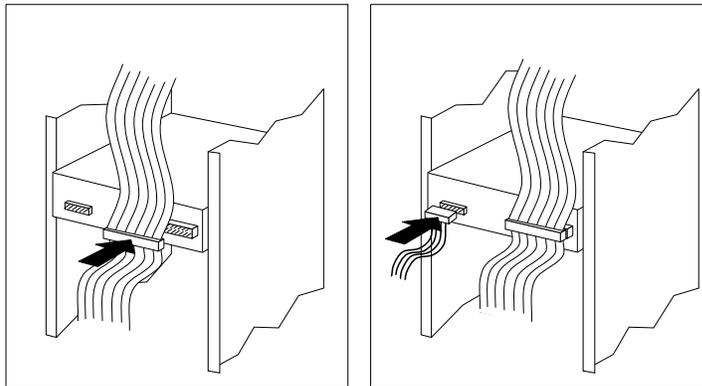
Attention: To ensure that the drive functions properly, do not overtighten the screws.

- d. Align the drive and tighten the screws.



Installing Internal Drives

12. Connect the drive to a connector on the 16-bit cable.
13. Connect the 16-bit cable to the 16-bit SCSI-2 internal connector.
14. Attach one of the 4-pin power cable connectors to the drive.

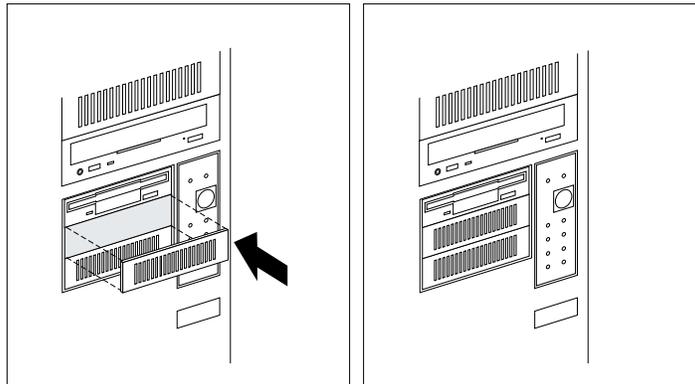


15. If you are installing another internal drive, return to step 1 on page 162.

If you are not installing another internal drive, continue with the next step.

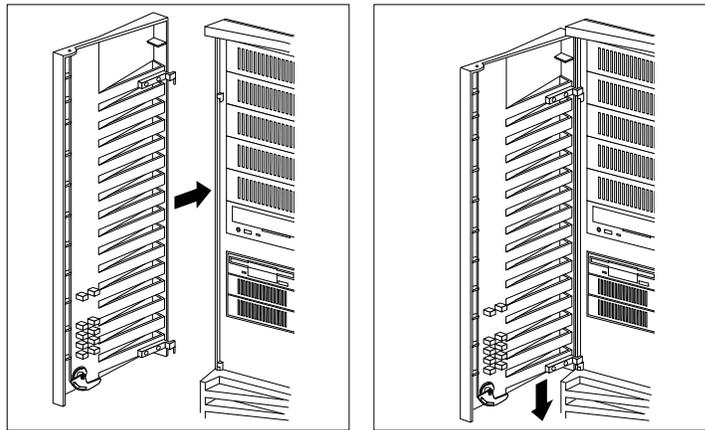
Installing Internal Drives

16. If necessary, replace the cover plate at the front of the bay:
 - a. If you installed a nonremovable-media drive, use the cover plate that you removed in step 3 on page 177.
 - b. If you installed a removable-media drive, do not install a cover plate.



Installing Internal Drives

17. Reinstall the door at the front of the server by aligning the pins over the hinges and sliding the door down.



18. Close and lock the door.

Installing Internal Drives

19. Go to Table 9 on page 333 to record the drive location, and if applicable, the SCSI ID you assigned to the drive; then, return here to determine your next step.



Note: If your server is a disk-array model, you must configure the disk-arrays after installing hard disk drives.

Installing Internal Drives

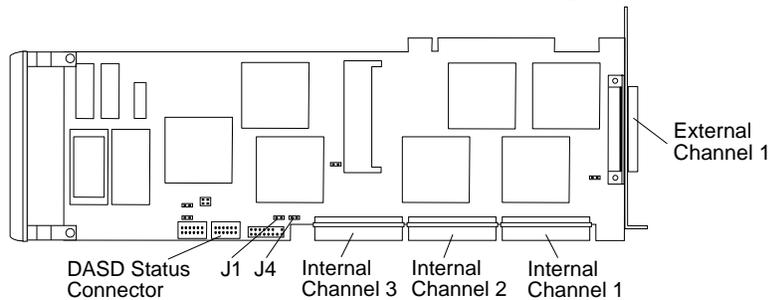
Where to go next?

- Installing memory-module kits? — Go to “Installing Memory-Module Kits” on page 143.
- Removing memory-module kits? — Go to “Working with Memory-Module Kits” on page 142.
- Installing an adapter? — Go to “Installing Adapters” on page 135.
- Removing an adapter? — Go to “Removing Adapters” on page 139.
- Removing a diskette drive? — Go to “Removing Diskette Drives” on page 170.
- Removing a hard disk drive? — Go to “Removing Hard Disk Drives (Non-Hot-Swap Servers)” on page 190 or “Removing Hard Disk Drives (Hot-Swap Servers)” on page 195.
- Changing a jumper setting? — Go to Appendix A, “Jumpers” on page 321.
- Installing a microprocessor? — Go to “Working with Microprocessor Upgrades” on page 202.
- Installing a security feature? — Go to “Adding Security Options” on page 215.
- No internal devices to install or remove? — Go to “Completing the Installation” on page 218.
- Installing an external option? — Go to “Connecting External Options” on page 222.

Installing Hard Disk Drives (Hot-Swap Servers)

Some models come with the Hot-Swap Bay Option installed. This option provides space for up to six 1-inch hot-swappable hard disk drives or three half-high (1.6-inch) hot-swappable hard disk drives. The Hot-Swap Bay option can be added as an upgrade. Contact your IBM marketing representative or your IBM reseller for additional information.

If your server is a hot-swap server, an IBM PC ServeRAID Adapter is installed in your server. Internal drives are connected to Channel 3. You can expand your server's storage capacity by adding additional external devices to your server, such as an IBM Enterprise Expansion Tower. To do that, you would have to use a cable to connect the external storage device to either the external Channel 1 or Channel 2 connector on the hot-swap server.



Each hot-swappable drive that you plan to install in the hot-swap bay must have a hot-swappable drive tray attached to it. If your drive comes with a different tray, remove it and install a hot-swappable drive tray. Follow the instructions given in the kit that contains the hot-swappable drive tray.

You do not need to turn off the server to install additional hot-swappable drives in the hot-swap bays.

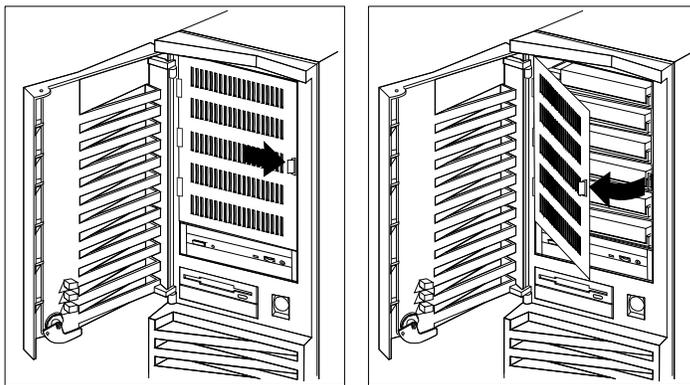
Installing Internal Drives

Before you begin, be sure you have:

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Configured your server, if it is a hot-swap server. You must configure your server before installing any options.
- Reviewed Chapter 2, “Configuring Your Disk Arrays” on page 19 for information about the RAID adapter; then, see “Configuring Your Disk Arrays” on page 25 for additional details about configuration.

Attention: Before you remove a defective hot-swap drive that is part of an array, make sure it is defective. If you partially or completely remove a good drive instead of a defective one, all of the data in your array might be lost.

1. Unlock and open the door.
2. Open the interior door.
 - a. Press the tab to the right.
 - b. Pull the tab outward.

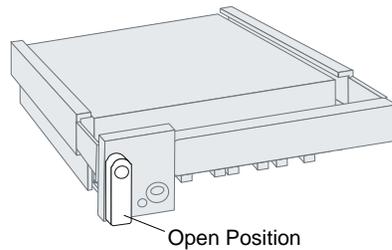


3. Each drive that you plan to install in a hot-swap bay must have a hot-swappable-drive tray attached. If your drive has a different tray, remove it and install a hot-swappable-drive tray before installing the drive. Follow the instructions given in the kit that contains the hot-swappable-drive tray.

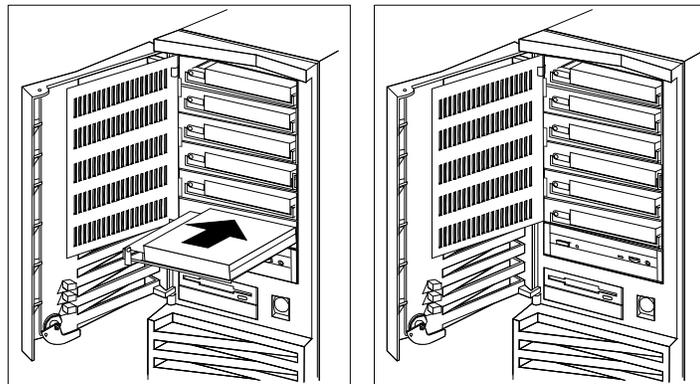
Installing Internal Drives

Note: Preinstalled hot-swap hard disk drives come with the hot-swappable-drive tray already attached.

4. Install the hot-swappable disk drive:
 - a. Move the locking-lever to the open position.

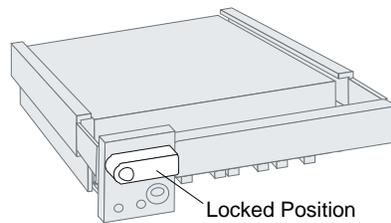


- b. Position the drive tray assembly horizontally, with the connector facing the rear of the server.
 - c. Align the side of the tray with the raised guides on the bottom of the bay.
 - d. Slide the drive tray to the rear of the bay until it connects to the backplane. When the drive is properly connected to the backplane, the handle is flush with the metal housing.

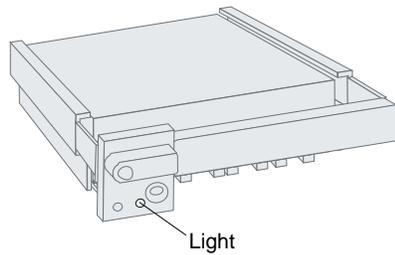


Installing Internal Drives

- e. Move the tray locking-lever to the locked position.



Note: If you did not turn off your server before installing the drive, the green light on the locking-lever of the drive tray illuminates, indicating that the drive was installed correctly.



5. Select the appropriate action from the following list:
 - If you are installing another hot-swappable drive, return to step 4 on page 187.
 - If you are removing a hot-swappable drive, go to step 3 on page 197.
 - If you are not installing or removing another hot-swappable drive, close the interior door, and then continue with the next step.

Installing Internal Drives

6. Go to Table 9 on page 333 to record the drive location; then, return here to determine your next step.



Note: If your server is a disk-array model, you must reconfigure your disk arrays after installing hard disk drives.

Where to go next?

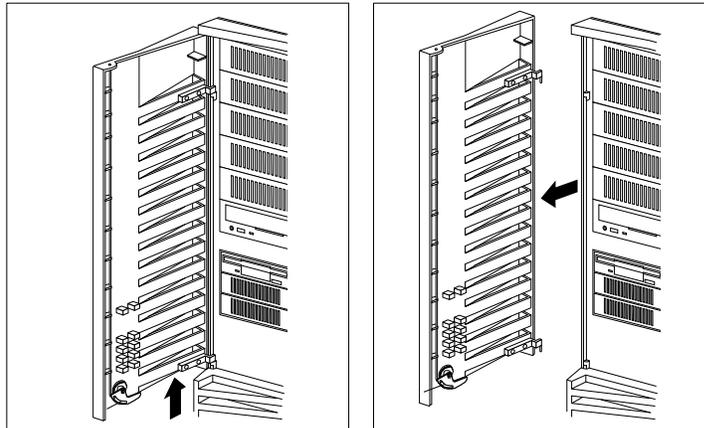
- Installing memory-module kits? — Go to “Installing Memory-Module Kits” on page 143.
- Removing memory-module kits? — Go to “Working with Memory-Module Kits” on page 142.
- Installing an adapter? — Go to “Installing Adapters” on page 135.
- Removing an adapter? — Go to “Removing Adapters” on page 139.
- Removing a diskette drive? — Go to “Removing Diskette Drives” on page 170.
- Removing a hard disk drive? — Go to “Removing Hard Disk Drives (Non-Hot-Swap Servers)” on page 190 or “Removing Hard Disk Drives (Hot-Swap Servers)” on page 195.
- Changing a jumper setting? — Go to Appendix A, “Jumpers” on page 321.
- Installing a microprocessor? — Go to “Working with Microprocessor Upgrades” on page 202.
- Installing a security feature? — Go to “Adding Security Options” on page 215.
- No internal devices to install or remove? — Go to “Completing the Installation” on page 218.
- Installing an external option? — Go to “Connecting External Options” on page 222.

Installing Internal Drives

Removing Hard Disk Drives (Non-Hot-Swap Servers)

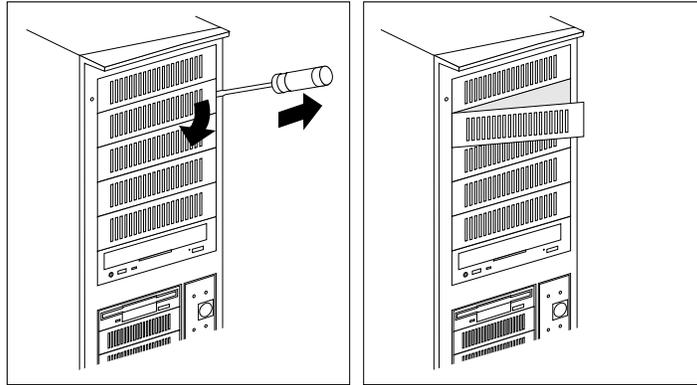
To remove a drive from bays 1-5:

1. Unlock and open the door.
2. Remove the door:
 - a. Lift the door up and off its hinges.
 - b. Store the door in a safe place.



Installing Internal Drives

3. Remove the cover plate from the target bay:
 - a. Insert a small flat-blade screwdriver under the side of the cover plate.
 - b. Lift the cover plate and remove it from the server front panel.



Installing Internal Drives

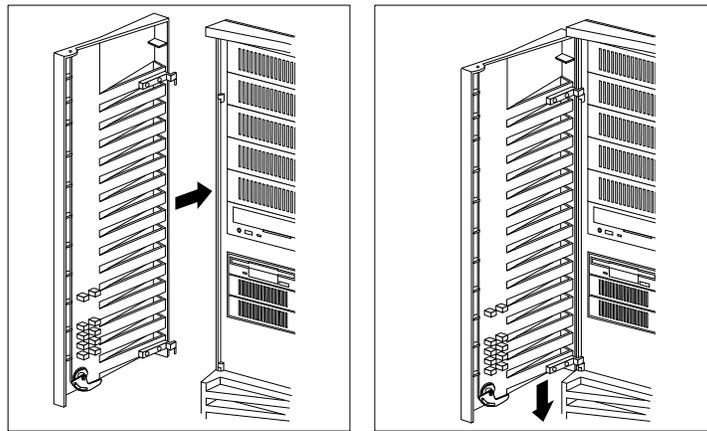
4. Remove the drive:
 - a. Determine which drive you intend to remove.
 - b. Disconnect the cables (flat and power) from the rear of the drive.
 - c. If you are removing a 3.5-inch drive, remove the screws that hold the drive tray in place. Then remove the drive from the tray and store it in a safe place.
 - d. Reinstall the tray into the server.
 - e. If you are removing a 5.25-inch drive, slide the drive out of the bay and store it in a safe place.
 - f. If you are removing a rewritable optical disc drive, also remove the special mounting bracket you installed when you installed the drive.
5. Update your records in Table 9 on page 333; then, return here to determine your next step.



6. If you are installing an internal drive, go to step 1 on page 162.
If you are removing another hard disk drive return to step 3 on page 191.
If you are not installing or removing another internal drive, continue with the next step.

Installing Internal Drives

7. Replace the cover plate:
 - a. Locate the original blank cover plate that comes with your server.
 - b. Insert the tabs on the right end of the cover plate into the slots on the right side of the server front panel in front of the newly empty drive bay.
 - c. Pivot the plate and press it into place.
8. Reinstall the door at the front of the server by aligning the pins over the hinges, and sliding the door down.



9. Close and lock the door.

Installing Internal Drives

Where to go next?

- Installing memory-module kits? — Go to “Installing Memory-Module Kits” on page 143.
- Removing memory-module kits? — Go to “Working with Memory-Module Kits” on page 142.
- Installing an adapter? — Go to “Installing Adapters” on page 135.
- Removing an adapter? — Go to “Removing Adapters” on page 139.
- Installing an internal drive? — Go to “Installing Internal Drives” on page 149.
- Changing a jumper setting? — Go to Appendix A, “Jumpers” on page 321.
- Installing a microprocessor? — Go to “Working with Microprocessor Upgrades” on page 202.
- Installing a security feature? — Go to “Adding Security Options” on page 215.
- No internal devices to install or remove? — Go to “Completing the Installation” on page 218.
- Installing an external option? — Go to “Connecting External Options” on page 222.

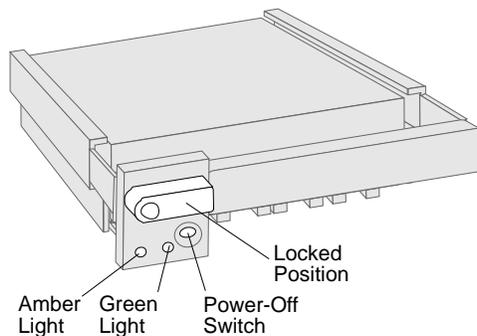
Removing Hard Disk Drives (Hot-Swap Servers)

Attention: Before you remove a hard disk drive that is not defective from a hot-swap bay, back up all important data.

If you remove a hard disk drive that is not defective from an array that already has a defective hard disk drive, all data in the array will be lost. This situation is especially relevant if you assigned RAID level 1 or 5 to the logical drives in your disk array. However, the RAID controller can rebuild the data you need, provided that certain conditions are met. See “Replacing a Faulty Drive” on page 58 for further details.

Before you attempt to remove a defective drive, thoroughly review the information displayed on your server screen to determine the location of the failed drive. “Logical and Hard Disk Drive Status Indications” on page 57 explains the codes that disk-array models use to indicate a defective drive. If you are removing a failed hard disk drive that is part of a disk array, do not accidentally remove a good drive, or all data in the array could be lost.

The tray that the hard disk drive is mounted is also a source of information about your hard disk drives. The tray has two lights, (one green and one amber) to indicate the current state of the drive and tray.



The following table summarizes the light states on your hot-swap drive tray and their meanings.

Installing Internal Drives

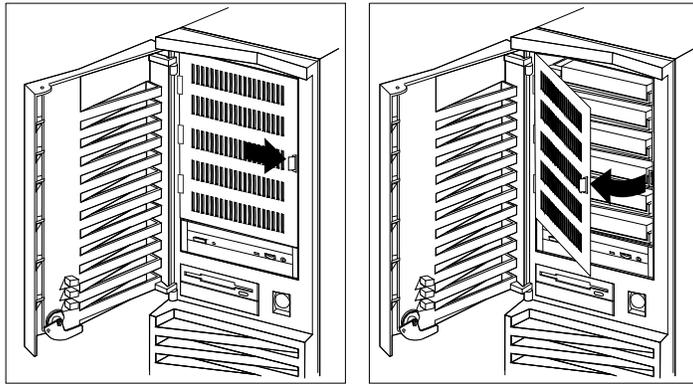
Green	Amber	Description
On	Off	Drive tray is powered on; the hard disk drive is inactive; and the drive should <i>not</i> be removed.
Blinking	Off	The hard disk drive is inactive. The hot-swap drive can be removed safely.
On	On or Blinking	The hard disk drive is in use, and should <i>not</i> be removed.
Off	Off	The drive is defective, or no power is being supplied to the drive. The hot-swap drive can be removed safely.

Each hot-swap drive that you plan to install must have a hot-swap tray III attached. Trays are available for two drive types: narrow and wide. The narrow tray supports 8-bit drives; the wide tray supports 16-bit drives. Select the appropriate drive trays for your hot-swap drives. If necessary, contact your IBM reseller or IBM marketing representative to purchase the types of drive trays that you need.

Installing Internal Drives

To remove a hard disk drive from a hot-swap bay:

1. Unlock and open the door.
2. Open the interior door:
 - a. Press the tab to the right.
 - b. Pull the tab outward.

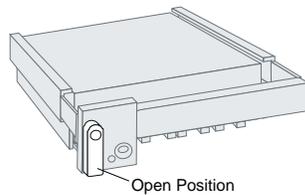


3. Identify the drive that you want to remove.

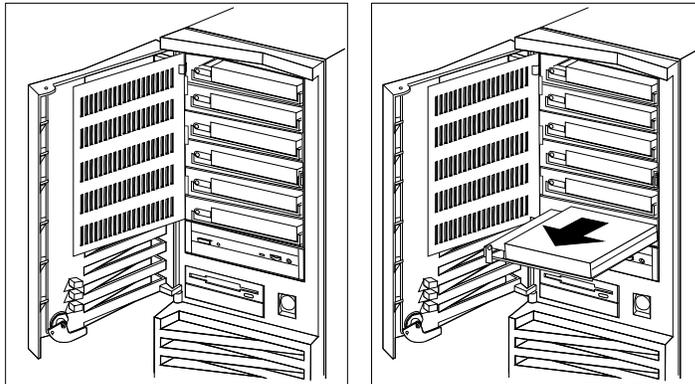
If your server is a hot-swap server and a hard disk drive has failed, ensure that you have selected the correct drive for removal by verifying that the green indicator light on the locking-lever on the tray is blinking or off.

Installing Internal Drives

4. Unlock the drive by turning the locking-lever on the left down 90 degrees to the open position.



5. Disconnect the drive from the connector on the backplane by grasping the handle on the tray and pulling the drive out of the server. Store the drive in a safe place.



Note: If your server is a disk-array model, you may need to reconfigure the disk array associated with the hard disk drive that you removed. See “Configuring Your Disk Arrays” on page 25 for details.

Installing Internal Drives

6. Select the appropriate action from the following list:
 - If you are removing another hot-swappable drive, return to step 3 on page 197.
 - If you are installing another hot-swappable drive, go to “Installing Hard Disk Drives (Hot-Swap Servers)” on page 185.
 - If you are not installing or removing another hot-swappable drive, close the interior door, and then continue with the next step.
7. Update your records in Table 9 on page 333; then, return here to determine your next step.



Where to go next

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 142
 - A microprocessor upgrade, go to “Working with Microprocessor Upgrades” on page 202
 - A security option, go to “Adding Security Options” on page 215
- To complete the installation, go to “Completing the Installation” on page 218.

Installing Internal Drives

Installing Optical Disc Drives and Tape Drives

To install rewritable optical disc drives or tape drives, follow the procedure for installing hard disk drives in non-disk-array models in the following section.

CD-ROM Drive Considerations

Your server comes with a CD-ROM drive preinstalled in bay 6.

The following information is important. Read the information completely before you install any SCSI drive.

- Only a CD-ROM drive can be installed in bay 6 (non-hot-swap server) or bay 7 (hot-swap server).
- Before installing drives, make sure you have enough cables to accommodate all of the drives. If you need additional cables, contact your IBM marketing representative or your IBM reseller.
- If you install 16-bit devices, you must use a 16-bit cable. To connect an 8-bit device to a 16-bit cable, you must purchase and use the 8-bit to 16-bit SCSI Internal Converter. The CD-ROM drive in your server comes with this internal converter.
- Follow the instructions in the documentation that comes with the drives, including those that describe how to set jumpers and switches, and how to remove termination.
- If a tray is attached to a drive that you intend to install, you might have to remove the tray before installing the drive. Follow the instructions in the documentation that comes with the drive.

Changing the Termination on the CD-ROM Drive

1. If you are installing a new CD-ROM into a bay that already contains a storage device in your server, go to “Removing Hard Disk Drives (Non-Hot-Swap Servers)” on page 190 and remove the CD-ROM drive. After you remove the device, return to this section.

Installing Internal Drives

2. Locate the termination jumper. Refer to the documentation that comes with your CD-ROM for the location of the jumper.
3. Remove any termination jumper from the CD-ROM.
4. Go to “Installing Hard Disk Drives (Non-Hot-Swap Servers)” on page 175 and reinstall the CD-ROM drive. (The procedure for installing CD-ROM drives is the same as the procedure for installing hard disk drives in non-disk-array models without the hot-swap bay option.)

Where to go next?

- Installing memory-module kits? — Go to “Installing Memory-Module Kits” on page 143.
- Removing memory-module kits? — Go to “Working with Memory-Module Kits” on page 142.
- Installing an adapter? — Go to “Installing Adapters” on page 135.
- Removing an adapter? — Go to “Removing Adapters” on page 139.
- Removing a diskette drive? — Go to “Removing Diskette Drives” on page 170.
- Removing a hard disk drive? — Go to “Removing Hard Disk Drives (Non-Hot-Swap Servers)” on page 190 or “Removing Hard Disk Drives (Hot-Swap Servers)” on page 195.
- Installing hard disk drives? — Go to “Installing Hard Disk Drives (Non-Hot-Swap Servers)” on page 175.
- Installing a microprocessor? — Go to “Working with Microprocessor Upgrades” on page 202.
- Installing a security feature? — Go to “Adding Security Options” on page 215.
- No internal devices to install or remove? — Go to “Completing the Installation” on page 218.
- Installing an external option? — Go to “Connecting External Options” on page 222.

Working with Microprocessor Upgrades

When you install an additional microprocessor, your PC Server 330 can operate as a Symmetric Multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications that use multiple, simultaneous threads.

Installing Microprocessor Upgrades

The microprocessor upgrade comes with a voltage regulator module (VRM) and a heat sink with an integrated fan (fan sink). The VRM plugs into a connector on the processor board. Because each microprocessor has specific power and voltage requirements, be sure to use the VRM that comes with the microprocessor.

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Read the instructions that came with the microprocessor upgrade.
- Turn off the server.
- Disconnect all external cables and power cords, and then remove the server cover (see “Preparing to Add Options” on page 126).
- Obtain an SMP operating system (optional). For a list of supported operating systems, see:
<http://www.pc.ibm.com/servers/> on the World Wide Web.

Attention:

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

Working with Microprocessor Upgrades

- To avoid damaging the microprocessor or socket during installation, make sure that the socket latch is fully opened to the vertical position before you insert the microprocessor.
- The fan sink retention clip is under tension. Be careful when installing or removing the microprocessor assembly. Do not let the clip scrape against the processor board, sockets, or other components.
- If you select a setting for the frequency jumper (J17/J18) that is greater than the actual frequency of the microprocessor, you might damage the microprocessor.

Notes:

1. The illustrations in this section might differ slightly from your hardware.
2. To avoid damage and ensure proper server operation when you install a new or additional microprocessor, use the same speed and voltage requirements as those of the currently installed microprocessor. Microprocessor internal and external clock frequencies must be identical.
3. To order additional microprocessors, contact your IBM marketing representative or your IBM reseller.
4. When you install a second microprocessor, it becomes the startup (boot) microprocessor.
5. The pins on the microprocessor are delicate and susceptible to damage from static electricity and physical mishandling. Do not touch or bend the exposed pins on a microprocessor. Protect the pins while carrying the microprocessor and during installation.

Working with Microprocessor Upgrades

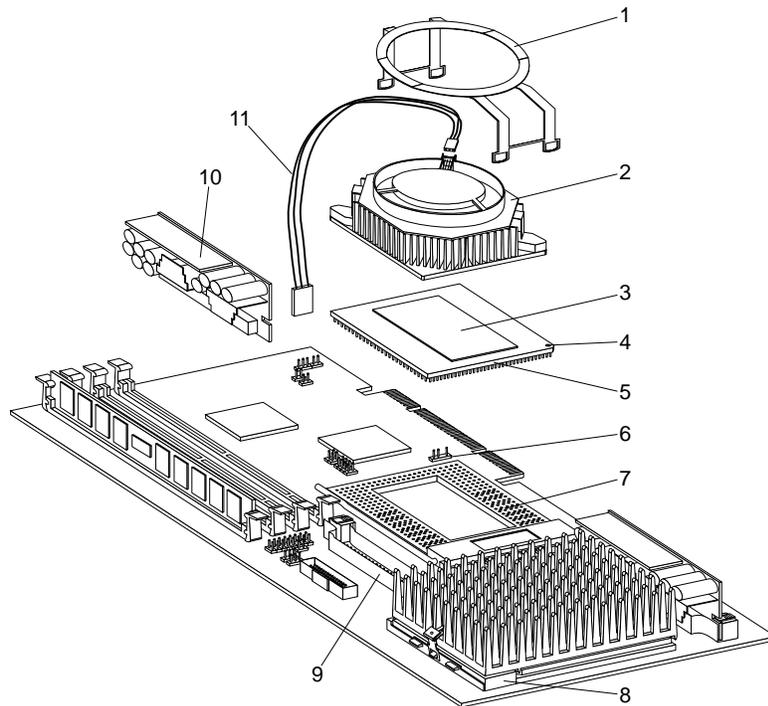


CAUTION:

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

The following figure identifies components that you will work with while performing the steps in this section.

Working with Microprocessor Upgrades



- 1** Fan sink retention clip
- 2** Fan sink
- 3** Heat spreader
- 4** Pin 1 location
- 5** Microprocessor
- 6** Fan power cable connector (J21)
- 7** Secondary processor board socket, empty, with lever in closed, locked position.
- 8** Primary processor board socket, with lever in closed position
- 9** Secondary VRM connector
- 10** Voltage regulator module (VRM)
- 11** Fan power cable

Working with Microprocessor Upgrades

1. Locate the secondary microprocessor socket on the processor board.

Note: When you install a microprocessor that is the same clock speed as the microprocessor that comes with your server, you do not need to change any jumper positions. If you install microprocessors that have a different clock speed from the one that comes with the server, you must change the microprocessor jumper positions on the processor board.

See “Processor Board Jumpers” on page 328 for detailed information on changing jumper positions.

2. Lift the latch on the socket.

Attention: The pins on the microprocessor are delicate and susceptible to damage from static electricity and physical mishandling. Do not touch or bend the exposed pins. Protect the pins while carrying the microprocessor and while installing the microprocessor and the fan sink.

3. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then remove the microprocessor from the package. Place it pin-side down on a grounded, static-protective or conductive-foam surface.
4. Both microprocessors on a processor board must have the same internal and external clock speed and cache size to ensure proper server operation.
5. Open the thermal grease packet. Use the wooden stick to spread the thermal grease evenly across the heat-spreader (the gold area on the top of the microprocessor).

Note: If thermal grease touches your skin, wash your hands with soap and water.
6. Position the fan sink above the microprocessor, aligning the heat-spreaders; then, place the fan sink on microprocessor.
7. Slide the fan-sink back and forth across the microprocessor several times to ensure that the thermal grease fully covers both heat-spreaders.

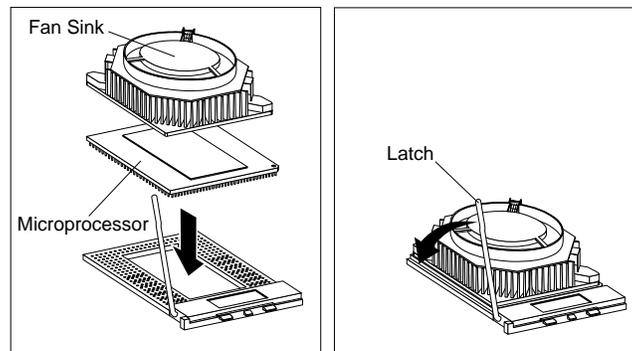
Working with Microprocessor Upgrades

- Align the edges of the microprocessor and fan sink, and press firmly.

Note: When you move the microprocessor/fan sink assembly to the socket on the processor board, be sure to hold both the fan sink and the microprocessor edges. This maintains the alignment and helps to reduce the risk of dropping the assembly.

- Center the microprocessor over the socket. Note the pattern of the pins on the microprocessor; align the pins with the corresponding holes on the socket.
- Carefully insert the microprocessor into the socket. Ensure that the pins on the microprocessor align with the holes in the socket.

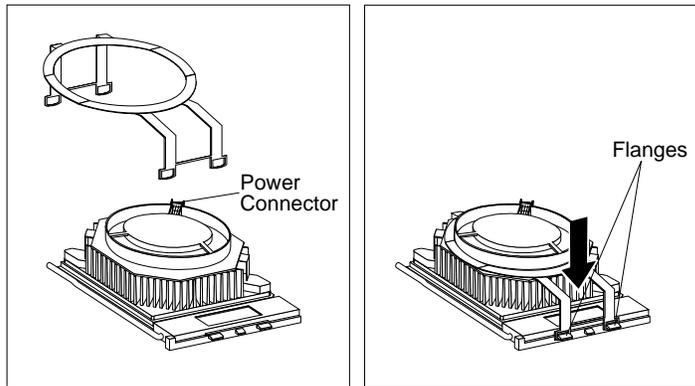
Attention: Do not force the pins into the socket. If you feel any resistance, remove the microprocessor and check the orientation and alignment.



- Press the microprocessor firmly into the socket to ensure proper seating. Continue to press down firmly while moving the latch downward until the microprocessor is completely locked into the socket. Make sure the latch is in the fully closed position.

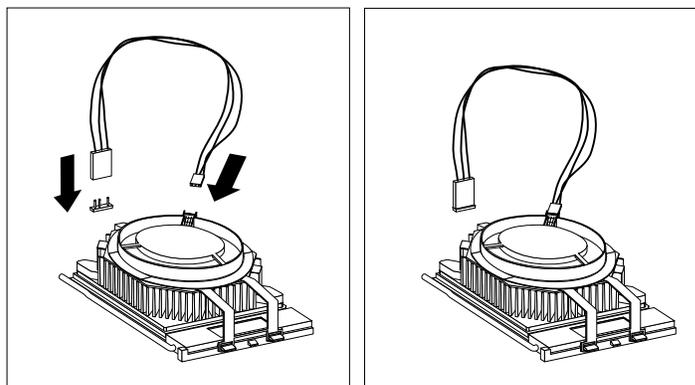
Working with Microprocessor Upgrades

- Clip the straight side of the fan-sink clip over the flange.
- Slide the fan-sink clip under the fan's power connector. Then, center the clip over the fan sink, pressing gently on the top of the arched side of the clip.



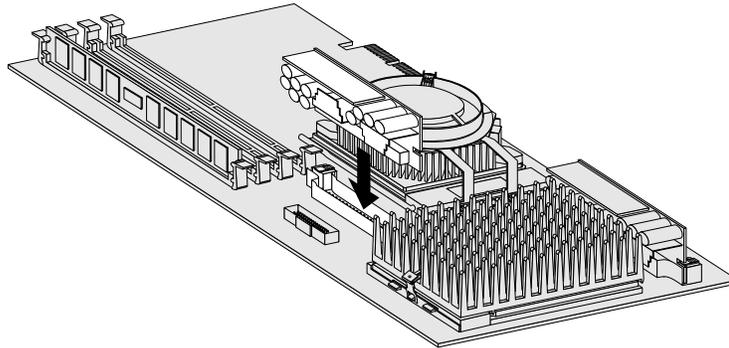
- Press on the arched legs of the clips, until each snaps over the flange.
- Attach the smaller connector on the power cable to the fan sink.

Note: If you have difficulty connecting a cable, turn the cable connector over and try again; cable connectors are keyed and connect only one way.



Working with Microprocessor Upgrades

16. Connect the other end of the power cable to the secondary microprocessor fan connector (J21) on the processor board. (Refer to the system service label for the location of the fan connector.)
17. Install the voltage regulator module (VRM) in the secondary VRM connector:
 - a. Position the VRM above the processor board connector as shown in the illustration.
 - b. Press the VRM firmly into the connector until it snaps into place.



18. Go to Appendix B, “Server Records” on page 331 and update the processor-upgrade information.



Working with Microprocessor Upgrades

19. Because you installed a new microprocessor in your server, you might need to make changes to your operating system.
 - If your operating system does not support SMP, install one of the SMP operating systems supported on your server. See <http://www.pc.ibm.com/servers/> on the World Wide Web.
 - If your operating system does support SMP, refer to your operating system documentation. You might need to make changes so that the operating system recognizes the new microprocessor.

Where to go next

- To install or remove:
 - A memory-module kit, go to “Working with Memory-Module Kits” on page 142
 - An internal drive, go to “Installing Internal Drives” on page 149
 - A security option, go to “Adding Security Options” on page 215
- To complete the installation, go to “Completing the Installation” on page 218.

Installing the External SCSI Cable Connector

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Read the instructions that come with the option.
- Turn off the server.
- Disconnect all external cables and power cords, and then remove the server cover (see “Preparing to Add Options” on page 126).

Your server comes with a SCSI cable that you can use to connect external SCSI devices. You must remove the SCSI knockout on the rear of the server; then, you can connect the cable from a SCSI connector on the system board to the rear of the server.

Attention: After you install the SCSI cable, you *must* connect a terminator or a properly terminated SCSI device to the external connector.

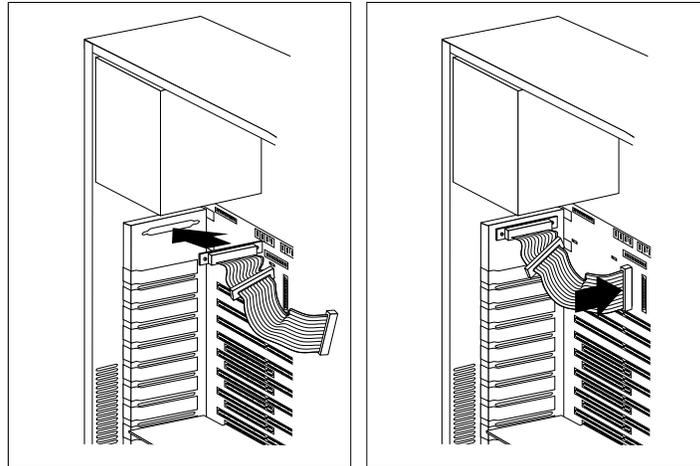
In this procedure, you will remove the SCSI knockout panel. Two narrow metal strips hold the panel in place. This procedure requires a screwdriver.

To install the SCSI cable connector:

1. Locate the center of the SCSI knockout panel.
2. Use the screwdriver to carefully tap on the middle of the knockout panel, near the bottom edge. The panel will bend toward the interior of the server.
3. Working from the inside of the server, bend the knockout back and forth several times until it comes off.
4. If you are installing the external SCSI connector in a non-hot-swap server, go to step 5 on page 212. If you are installing the external SCSI connector in a hot-swap server, go to step 6 on page 213.

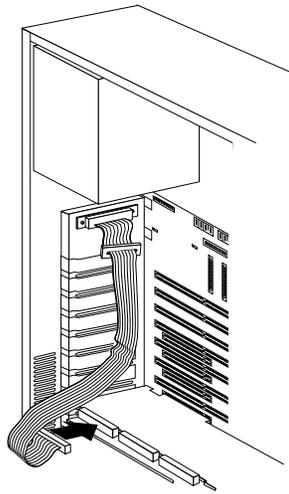
Install External SCSI Cable Connector

5. In non-hot-swap servers, do the following:
 - a. Remove the screws from the connector end of the external SCSI cable. Set the screws aside.
 - b. Insert the other end of the cable to the external SCSI connector on the system board.
 - c. Insert the connector end of the cable through the opening on the rear of the server.



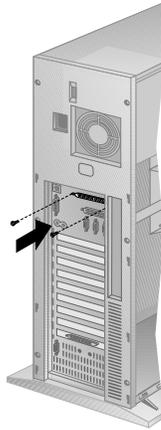
Install External SCSI Cable Connector

6. In hot-swap servers, do the following:
 - a. Remove the screws from the connector end of the external SCSI cable. Set the screws aside.
 - b. Insert the other end of the cable to the RAID adapter.
 - c. Insert the connector end of the cable through the opening on the rear of the server.



Install External SCSI Cable Connector

7. Insert the screws through the holes on the cable connector; then, tighten the screws.



8. Complete the installation (see “Completing the Installation” on page 218.)

Adding Security Options

You can add options to your server to protect the machine itself from theft and tampering, and to protect the data and programs stored in the server from unauthorized use.

Installing a U-Bolt and Security Cable

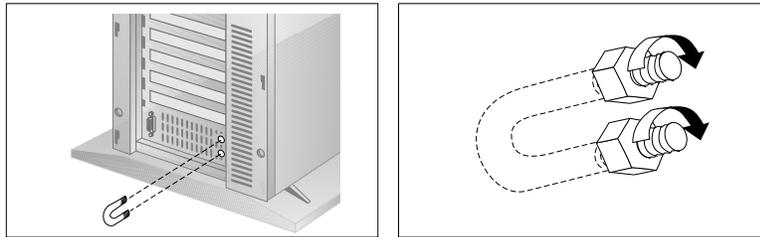
You can deter unauthorized removal of your PC Server 330 by installing a U-bolt and security cable on the rear of your server.

Before you begin

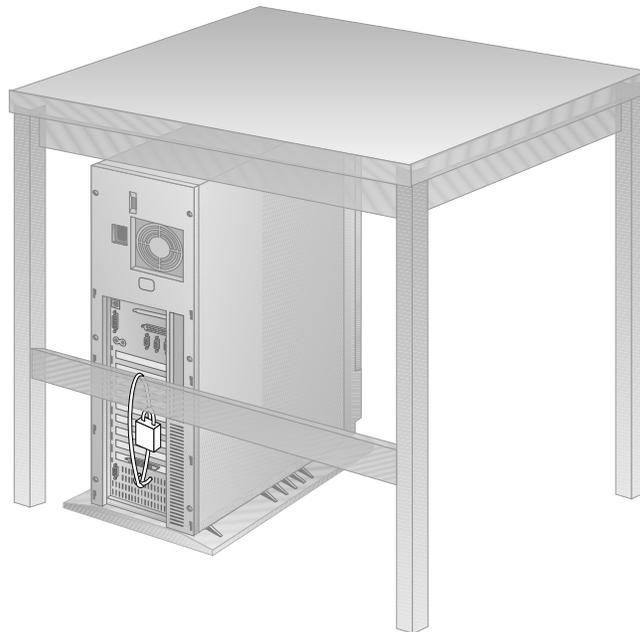
- Obtain the following:
 - A flat-blade screwdriver
 - An adjustable wrench
 - A 19 mm (3/4 in.) U-bolt or wire rope (similar to National Manufacturing No. 3230, Stock No. 176-735)
 - Threaded nuts that fit the U-bolt
 - A security cable
 - A lock, such as a combination lock or padlock
- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Turn off the server.
- Disconnect all external cables and power cords, and then remove the server cover (see “Preparing to Add Options” on page 126).

Adding Security Options

1. Insert the U-bolt through the holes and secure it in place with the nuts.



2. Thread the cable through the U-bolt and around an object from which it cannot be removed; then, fasten the cable ends together with a lock.

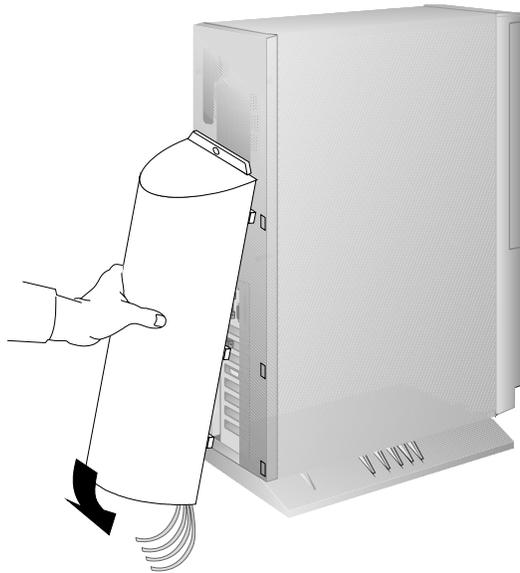


Adding Security Options

3. 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 218 if you need additional information).

Security-Cover Option

For additional security, you might want to control access to the cables and cable connectors on your server. The optional PC Server Security Cover restricts cable access while creating a sleek, streamlined profile. Your *User's Reference* describes this optional feature. Installation instructions are in a separate booklet that comes with the security cover. If you want to purchase this option, contact your IBM marketing representative or your IBM reseller for additional information.



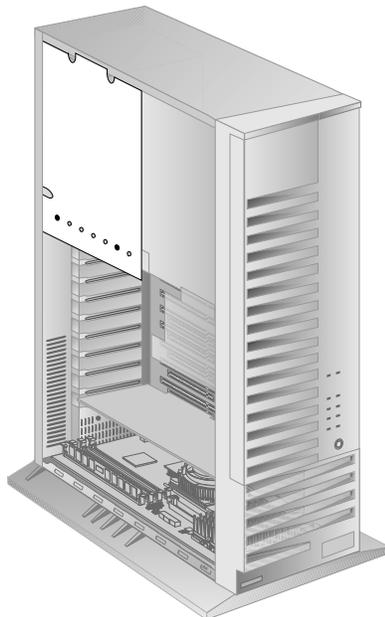
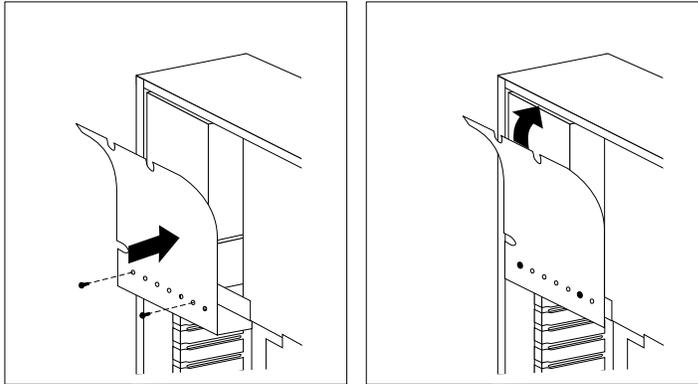
Completing the Installation

Completing the Installation

Before you begin

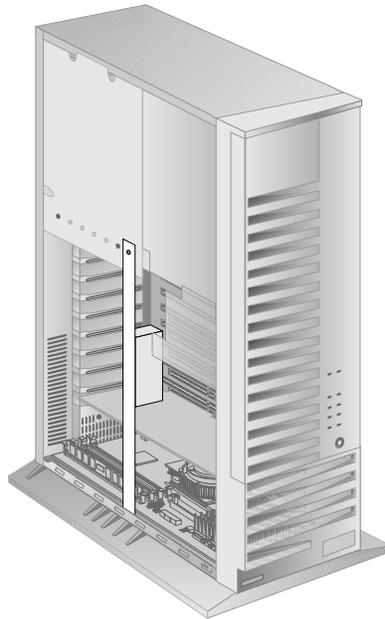
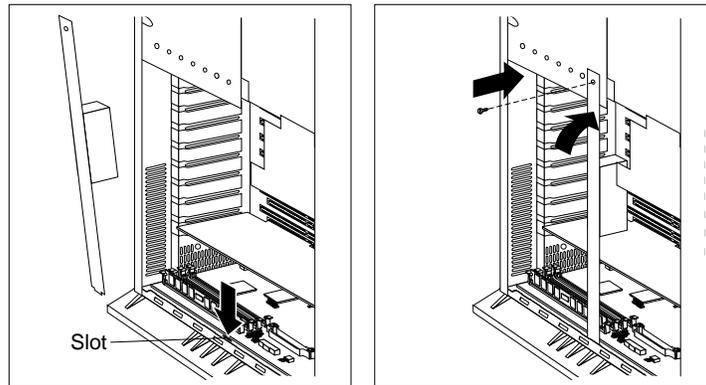
Complete all the installation procedures for the options you have chosen to install.

1. Reinstall the air baffle if you removed it.



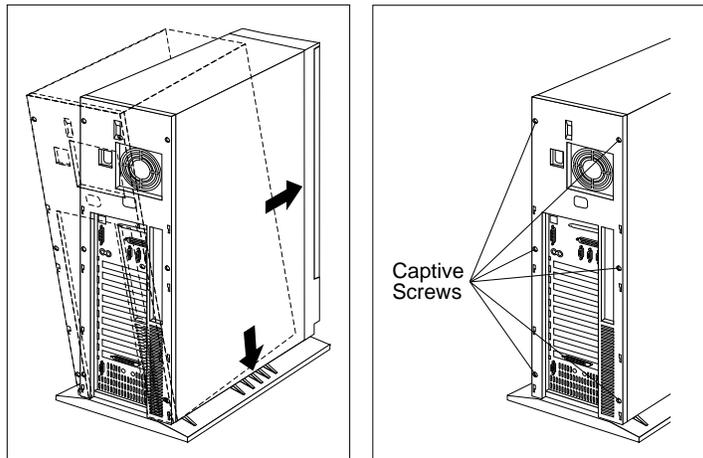
Completing the Installation

2. Reinstall the adapter retention bracket.

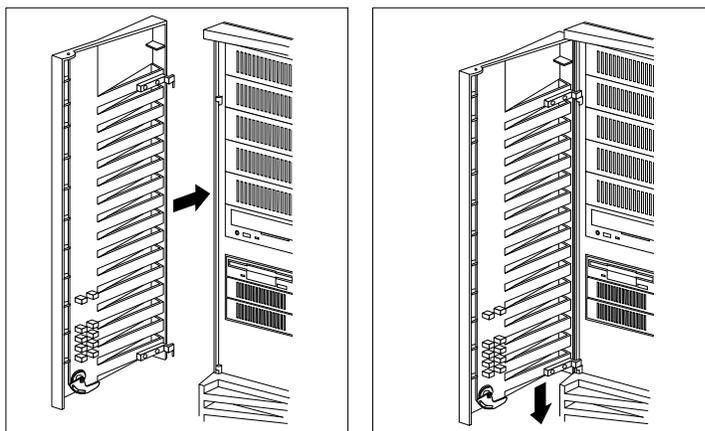


Completing the Installation

3. Install the cover on the server.
 - a. Align the cover over the frame of the server and slide the cover in place.
 - b. Tighten the six screws in the recessed holes on the cover.



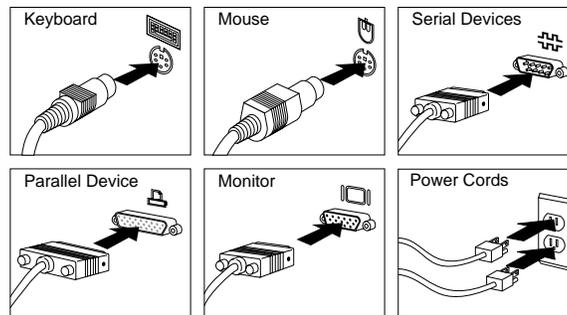
4. Close and lock the server door, if you haven't done that yet.



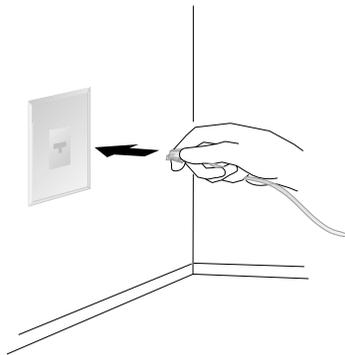
Attention: Be sure to maintain a clearance of at least 51 mm (2 inches) on all sides of the server to allow for air circulation.

Completing the Installation

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



6. If you have a modem or fax machine attached to the server, reconnect the telephone line to the wall outlet and the server.



Where to go next?

When you have completed installing the cover and cables, go to “Updating the Server Configuration” on page 225.

Connecting External Options

Connecting External Options

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

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

Adding a Hot-Swap Storage Expansion Enclosure

The IBM PC Server Enterprise Expansion Enclosure is one of several SCSI storage enclosures that you can attach your server. You can connect the storage enclosure to the external SCSI connector on a separately installed SCSI adapter, such as the 16-bit UltraSCSI controller or PC ServeRAID Adapter. Contact your IBM marketing representative or your IBM reseller for additional information.



Adding External SCSI Devices

Notes:

1. You can attach only one external SCSI device to the server's external SCSI connector. To attach additional external SCSI devices, you must install a SCSI adapter.
2. If you plan to install both internal and external SCSI devices, you must follow the instructions given in "Installing Internal Drives" on page 149 in addition to the instructions in this section. Read "Installing Internal Drives," and then return here.
3. You might need to change the setting of the external SCSI termination jumper (J38). See Appendix A, "Jumpers" on page 321 for more information.

If you plan to install external SCSI devices, you must order an additional SCSI cable. That is, to use external devices with the PC Server 330, you must connect them to the external SCSI connector, using a SCSI cable. This SCSI cable must have the proper connector for the SCSI external connector on one end, and the proper connector for the first external device on the other end. To select and order the correct SCSI cable for use with the external device, contact your IBM marketing representative or your IBM reseller.

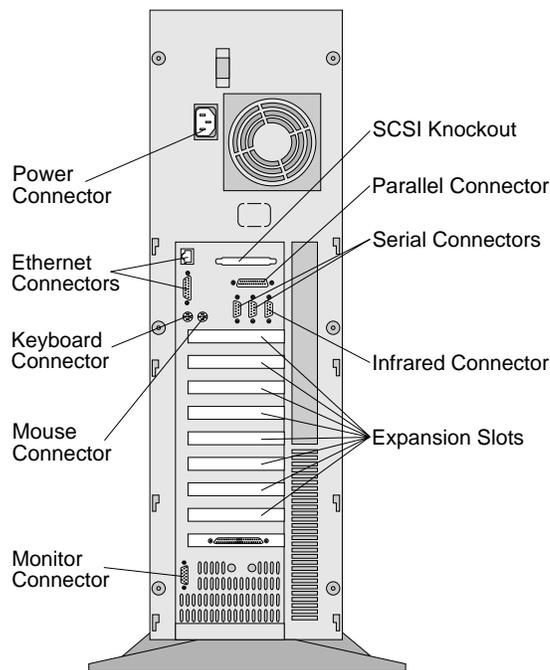
The SCSI controller on the system board can support up to six internal SCSI devices and one external SCSI device.

Connecting External Options

Adding External Options

To add an external option:

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



Where to go next?

- Device drivers to install? See the instructions that come with the option to determine if device drivers are required, and, if so, how to install them.
- If you do not need to install any device drivers or update the system configuration, your server is ready to use.

Updating the Server Configuration

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

Notes:

1. If you remove a SCSI device, the server might not recognize any SCSI devices that are still connected. See Chapter 5, “Solving Problems” for information on 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 programs.

Record the new configuration information on the device-record form in Appendix B, “Server Records” on page 331.



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.

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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 this chapter's table of contents.

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 drives (such as the diskette, CD-ROM, and hard disk drives) are working

While the memory is being tested, the amount of available memory and appears on the screen. These numbers advance as the system progresses through POST. If POST finishes without detecting any problems, a single beep sounds and the first screen of your operating system or application program appears.

Diagnostic Tools Overview

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 299.

Test Programs

The PC Server Diagnostic Diskette contains the QAPLus/PRO test programs, developed by DiagSoft, Inc. for IBM. These programs are the primary method of testing the system board, memory, disk drives, and many other options that you can install in the PC Server 330.

You can use the programs to test the IBM components of the system and some external devices. 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 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.

Types of 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. There are four types of error messages: 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 247.

Diagnostic Tools Overview

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

The charts given in “Troubleshooting Charts” on page 288 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.

If your optional device or adapter comes with an Option Diskette, you might need to install some configuration files and/or diagnostic files. See Chapter 3, “Configuring Your Server” on page 87 for instructions on installing the configuration files, or see “Installing Additional Test Programs” on page 305 for installing diagnostic files.

About the Test Programs

This section includes useful information about navigating through the test programs, as well as procedures for starting and stopping them. These programs are designed to test the IBM PC Server 330. Non-IBM products tested with these programs might present misleading error messages or unexpected system responses. If you want to test a non-IBM product, refer to the information that comes with that product.

Using the PC Server Diagnostic Diskette

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

To start the diagnostic programs:

1. Insert the backup copy of the PC Server Diagnostic Diskette into the diskette drive; then, turn on the system. Or, if the system is turned on already, press **Ctrl+Alt+Del**.

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

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

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

About the Test Programs

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

If the diagnostic programs do not find a problem, see to “Troubleshooting” on page 288 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 choices:
 - **Quick Check** automatically checks the hardware configuration and builds a group of tests based on the configuration check. The diagnostic program then runs the tests for each of the devices or modules found during the configuration check. Upon completion of the Quick Check, you are prompted to Press any key to continue. Pressing any key then returns you to the Diagnostics Menu.
 - **Module Tests** 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 241 for more information about running the module tests.
 - **Options** sets or changes 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 243.
- **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.

About the Test Programs

- **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 Diagnostic Diskette. These utility programs include: RAM Chip Locator, File Editor, and Format Diskette. For more information about the File Editor, see “Using the File Editor” on page 308.
- **Exit:** Select this choice to exit from the Diagnostic Diskette.

About the Test Programs

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 from Help and returns to where you left off.
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.

About the Test Programs

- F10** Displays the Local Menu when the Module Tests Menu is displayed or from individual Test Group test screens. The 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 Command Line Options

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

At the operating system prompt, type QAPRO /XXX (where /XXX represents one of the following); then press **Enter**.

- /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. Note that *file* is the name of the Error Log file that you specify.

About the Test Programs

/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, 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, this option specifies 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 and utility programs

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
```

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

About the Test Programs

`/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.

IntruderAlert

When you run the diagnostic programs, IntruderAlert checks for damage to the Diagnostic Diskette. If a virus or program alteration is detected, the diagnostic programs do not load.

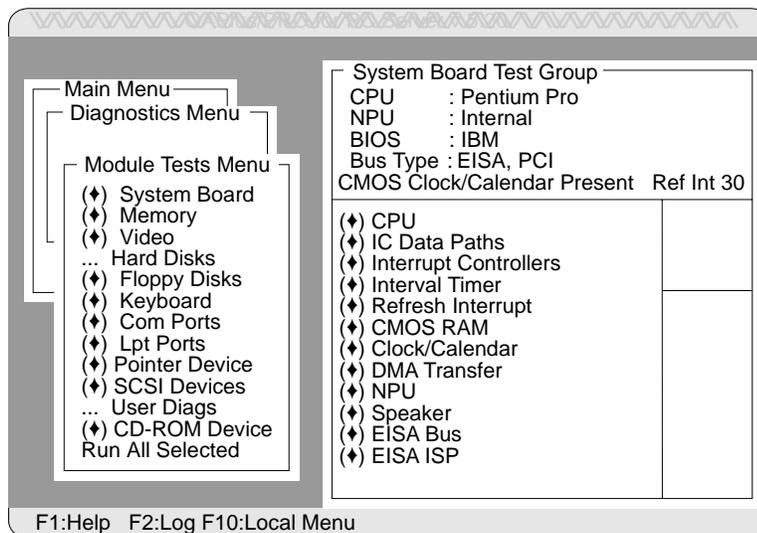
To suspend IntruderAlert and continue loading the diagnostic programs, press **Esc**.

About the Test Programs

The Test Group Window

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

Test Group Specifications: In the upper portion of the Test Group window are the specifications for the related test group.: The following illustration is an example of the Test Group Window when the system board is selected from the Module Tests Menu.



Using the Module Tests

To start the Module Tests from the Main Menu of the Diagnostic Diskette:

1. Start the diagnostic programs. If you do not know how to do this, see “Using the PC Server Diagnostic Diskette” on page 233.
2. Select **Diagnostic** from the Main Menu, then press **Enter**.
3. Select **Module Tests**, then press **Enter**. Use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar from one selection to the next within the Module Tests menu.
4. To select or deselect a test, use the Spacebar (the Spacebar toggles your selection on or off). When you have selected a test, a diamond (◆) appears next to the selection.

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

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

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

About the Test Programs

Changing Selected Tests in Test Groups

To add or remove a test from a test group:

1. In the Module Tests Menu, use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar to your selection.
2. Press **Tab** to move into the expanded Test Group window.
3. Move the highlight bar to the test you want to select or deselect.
4. Press the Spacebar at the highlighted test to toggle between select (indicated by a diamond (◆) and deselect.

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

5. Press **Enter**.

Creating Test Scripts

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

To 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=file[,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:** You can set the number of times to run each group of tests. The default setting is 1. You can enter a number from 0 to 10. 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 have the test programs pause between test modules and wait for you to press any key to continue. Also, you can 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:** You can 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.

About the Test Programs

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 the 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.

Note: If you plan to run hard disk tests and to do test logging, do the test logging on a drive other than the drive to be tested. If you log to a drive that is to be tested, the logging is disabled for the remainder of the test cycle.

About the Test Programs

- **Test Log Mode:** This choice determines the amount of data to be logged after you select COM1, LPT1, ASCII, or .DBF. The available options are LogAll or LogFail. LogAll logs all test information. LogFail logs only failures.
- **Log Message Queue:** Pressing F2 allows you to examine the test results to date through a Log Message Queue. This information is generated whether or not you select a Test Log. It does not, however, allow you to examine previous Test Logs.
- **Save Script:**
See “Creating Test Scripts” on page 242 for a more detailed description of scripting.

Running the Ethernet Diagnostics

You must use the Ethernet diagnostic to perform diagnostic tests on the integrated Ethernet controller. This diagnostic diskette includes the LAN AID utility program.

Backing Up the Ethernet Diagnostic Diskette

Use an operating system command, such as the DOS DISKCOPY command, to make a *complete* backup copy of the IBM PC Server PCI Ethernet diagnostic diskette. Using the backup copy can prevent damage to the original diskette. Your operating system documentation provides information on backing up diskettes.

Starting the Ethernet Diagnostics

To start the Ethernet diagnostic diskette:

1. Insert the backup copy of the Ethernet diagnostic diskette into the diskette drive.
2. Turn on the server, or if it is already on, shut down the operating system and restart the server.
3. At the LAN AID C prompt, enter **/diags**; then, press **Enter**.
4. Follow the instructions on the screen.
5. When the diagnostic tests are complete, remove the diskette from the diskette drive; then, restart the server.

Error Messages

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.

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.

Passwords

If you have a power-on password or administrator password set, you must type the password and press **Enter** before POST will continue.

The level of password protection determines the number of choices that are available on the Configuration/Setup utility program menu.

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
E100	POST detected an invalid EISA configuration.
E101	<i>Action:</i> Run the EISA configuration utility.
E10x	POST detected an invalid EISA configuration for slot x. This error occurred because an EISA adapter was added or removed. <i>Action:</i> Run the EISA configuration utility.
101 102 106	A failure occurred during testing of the system board and microprocessor. <i>Action:</i> Have the system serviced. <i>Action:</i> Have the system serviced.
111	An input/output (I/O) channel check occurred during testing of the system board and memory. This failure is generally caused by an adapter. <i>Action:</i> Have the system serviced.

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 start the system without the option installed, reinstall each option and retest. When an option fails, replace it.</p> <p>If you cannot isolate and correct the problem, 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> Have the system serviced.</p>
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. You must turn on external devices before turning on the server.</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 time of day has not been set.</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, 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 message can be caused by adding memory, or removing 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, start the Configuration/Setup utility programs; then, exit, saving the new configuration settings. Restart the server. If the message appears again, reseal the memory-module kit.2. Running the diagnostic tests might isolate the location of the problem memory-module kit and provide additional information.3. If the diagnostic tests fail, have the system serviced.
173	<p>A change in configuration occurred. One or more errors occurred in accessing the VPD.</p> <p><i>Action:</i> Have the system serviced.</p>
175	<p>A hardware error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
176	<p>The server cover has been removed improperly.</p> <p><i>Action:</i> Check for indications that the server has been tampered with.</p>
177	<p>A security hardware error occurred.</p>
178	<p><i>Action:</i> Check for indications that the server has been tampered with.</p>
182	<p>A system board error occurred.</p> <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 have forgotten the correct password, you must have the system serviced (see "Using the Administrator Password Menu" on page 98 for more information).</p>

Error Messages

POST Message	Description
184	<p>The power-on password information stored in your server was removed.</p> <p><i>Action:</i> From the Configuration/Setup utility program Main Menu, select System Security. Then, follow the instructions on the screen. For instructions on using the configuration programs, see "Using the Configuration/Setup Utility Main Menu." 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 programs, see "Using the Configuration/Setup Utility Main Menu."</p>
186	<p>A system board or hardware error occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
187	<p>VPD serial number not set./1804</p> <p><i>Action:</i> Have the system serviced.</p>
188	<p>System ID information destroyed. Bad VPD CRC#2.</p> <p><i>Action:</i> Have the system serviced.</p>
189	<p>An attempt has been made to access the server with invalid passwords. After three incorrect attempts, the server locked up.</p>
201	<p>A failure occurred during testing of the memory. This error can be caused by:</p> <ul style="list-style-type: none">• Incorrectly installed memory• A failing memory-module kit• A processor-board failure• A system-board failure <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 142 to verify that the new memory is correct for your system. Verify that the memory-module kit is installed correctly.2. Run the diagnostic tests to verify the problem. <p>If the diagnostic tests fail, have the system serviced.</p>

Error Messages

POST Message	Description
229	<p>An cache error or failure occurred.</p> <p><i>Action:</i> Have the system serviced.</p>
301	<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. If the error message remains, have the keyboard, cable and 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 the server on. If the error message goes away, replace the device.</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 programs 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.
605	<p>A failure occurred during testing of a diskette drive. This error occurred when the system could not unlock the diskette drive for the insertion or removal of diskettes.</p> <p><i>Action:</i> The server can be used; diskettes that are presently in diskette drives will work. However, you cannot insert a diskette into or remove a diskette from the locked drive.</p>

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 the diskette drive setting is correct in the configuration programs. If the setting is not correct, change the setting. For instructions on using the configuration programs, 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 programs. If the setting is not correct, change the setting. For instructions on using the configuration programs, 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. Wait five seconds; then, 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>
1762	<p>A hard disk configuration error occurred.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure the cables are securely attached to all drives.2. Make sure the settings for the drive options are correct in the configuration programs. If the settings are not correct, change them. For instructions on using the configuration programs, 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 diagnostic tests.</p>

Error Messages

POST Message	Description
1800	<p>A PCI adapter has requested a hardware interrupt that is not available.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure the PCI adapter and all other adapters are set correctly in the configuration programs. If the interrupt resource settings are not correct, change the settings. For instructions on using the configuration programs, see “PCI Routing.”2. If all interrupts are being used by other adapters, you might need to remove an adapter to make an interrupt available to the PCI adapter, or force other adapters to share an interrupt. For instructions on removing adapters, see “Working with Adapters” on page 133. For instructions on setting interrupts, see “PCI Routing.”
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 the PCI adapter and all other adapters are set correctly in the configuration programs. If the memory resources settings are not correct, change the settings. For instructions on using the configuration programs, see Chapter 3, “Configuring Your Server.”2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. For instructions on removing adapters, see “Working with Adapters” on page 133.
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 all other adapters are set correctly in the configuration programs.2. If the I/O port resource settings are correct, the PCI adapter might be defective.

Error Messages

POST Message	Description
1803	<p>A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.</p> <p><i>Action:</i></p> <ol style="list-style-type: none">1. Make sure that all other adapters are set correctly in the configuration programs. If the memory resource settings are not correct, change the settings. For instructions on using the configuration programs, see Chapter 3, "Configuring Your Server."2. If the memory resource settings are correct, the PCI adapter might be defective.
1804	<p>A PCI adapter has requested a memory address that is not available.</p> <p><i>Action:</i> If all memory addresses are being used, you might need to remove an adapter to make memory addresses available to the PCI adapter. For instructions on removing adapters, see "Working with Adapters" on page 133.</p>
1805	<p>A PCI adapter ROM error occurred.</p> <p><i>Action:</i> Remove the PCI adapters. If you can start the system without the adapters, reinstall each adapter and retest. When an option fails, replace it.</p> <p>If you cannot isolate and correct the problem, have the system serviced.</p>
1806	<p>A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB.</p> <p><i>Action:</i> Remove the PCI adapter that has the PCI bridge. If you can start the system without the adapter, reinstall each adapter and retest. When an option fails, replace it.</p> <p>If you cannot isolate and correct the problem, have the system serviced.</p>
2400	<p>A failure occurred during testing of the video controller on the system board. This error can be caused by a failing monitor, a failing system board, or, if a video adapter is installed, a failing video adapter.</p> <p><i>Action:</i> Verify that the monitor is connected correctly to the video connector. If it is have the system serviced.</p>

Error Messages

POST Message	Description
2462	<p>A video memory 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 the error persists, have the system serviced.
8603	<p>A failure occurred during testing of the pointing device (mouse) and pointing device controller. This error can be caused by the addition or removal of a 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>
19990305	<p>An operating system could not be found.</p> <p><i>Action:</i> Install an operating system. If you already installed the operating system, check the drive startup sequence (see "Start Options" on page 101). If the drive sequence is correct, run the diagnostics 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>

Error Messages

POST Message	Description
Other Numbers	The POST found an error. <i>Action:</i> Follow the instructions on the screen.

SCSI Messages

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

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

SCSI Messages	Description
All	<p>One or more of the following might be causing the problem.</p> <ul style="list-style-type: none"> • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable <p><i>Action:</i> 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. • If you have attached an external device to the server's external SCSI connector, the external SCSI termination jumper (J38) is set to the proper position (see Table 6 on page 325). • The last device in each SCSI chain is terminated correctly. (See "Installing Internal Drives" on page 149 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>

Ethernet Controller Messages

Ethernet Controller Messages

The integrated Ethernet controller might display messages from the following drivers:

- Novell NetWare Server ODI
- Novell NetWare Server DOS ODI
- Novell NetWare Server OS/2 ODI
- Novell NetWare Server LAN
- NDIS Adapter for level 2.01
- NDIS Adapter for level 3.0
- SCO UNIX LLI, UnixWare DLPI, and SunSoft Solaris
- Packet Driver

Novell NetWare Server ODI Driver Messages

This section contains the error messages for the Novell NetWare server ODI driver. The explanation and recommended action are included with each message.

PCNTNW-NW-026 The MSM is unable to parse a required custom keyword.

Explanation: The user entered an incorrect parameter keyword.

Action: Enter the keyword correctly. Then, reload the driver.

PCNTNW-NW-054 The board did not respond to the initialization command.

Explanation: The board did not respond when the driver tried to initialize it.

Action: Perform the following steps:

1. Verify that the Ethernet jumper on the system board is set to the default, enabled position.
2. Go to "About the Test Programs" on page 233 to run the diagnostic utility.

PCNTNW-NW-58 The board did not respond to the initialization command.

Explanation: The IRQ setting might be incorrect with the hardware setting, or the EEPROM might be corrupted.

Action: Perform the following steps:

1. Verify that the IRQ settings in the NET.CFG file match the configuration settings in the configuration programs. See "PCI Routing" on page 94 for information on setting the interrupt requests.
2. Verify that the EEPROM on the system board is programmed correctly.

PCNTNW-NW-66 The cable might be disconnected from the board.

Explanation: The cable might be disconnected from the server's Ethernet port.

Action: Verify that a cable is connected to the AUI port or the 10BASE-T port.

PCNTNW-NW-071 The matching virtual adapter could not be found.

Explanation: You tried to load another instance of the driver with a different I/O address. This new board could not be found.

Action: If you installed an IBM Ethernet adapter, make sure the adapter is seated properly. Also, check the I/O settings of the board with the settings supplied to the drive.

Ethernet Controller Messages

PCNTNW-NW-072 A resource tag is unavailable.

Explanation: The driver tried to allocate some resources that were not available.

Action: Add or free some memory in the server. Then, restart the server.

PCNTNW-NW-073 Unable to allocate memory.

Explanation: The driver failed to allocate the memory needed for normal operation.

Action: Add more memory, or free some memory resources in the server. Then, restart the server.

PCNTNW-NW-074 The hardware interrupt cannot be set.

Explanation: An attempt was made to initialize a given hardware interrupt. The attempt was not successful.

Action: Perform the following steps:

1. Verify that the Ethernet jumper on the system board is set to the default, enabled position.
 2. Make sure that the interrupt request numbers are set correctly, and that no other devices are using the interrupt. See "PCI Routing" on page 94 for more information.
-

PCNTNW-NW-075 The MLID cannot be registered with the LSL.

Explanation: An error occurred while the driver was trying to register with Link Support Layer.

Action: Check the version of Netware Operating System. Make sure that this driver is correct for the version of Netware that you are using. Restart the server.

PCNTNW-NW-076 The polling procedure cannot be added.

Explanation: An error occurred while the driver was adding a polling procedure to the Netware Operating System polling routines.

Action: Check the version of Netware Operating System. Make sure that this driver is correct for the version of Netware that you are using. Restart the server.

PCNTNW-NW-077 The event notification cannot be registered.

Explanation: The driver failed to register its event notification routines with the Netware Operating System.

Action: Check the version of Netware Operating System. Make sure that this driver is correct for the version of Netware that you are using. Restart the server.

Ethernet Controller Messages

PCNTNW-NW-078 The firmware file cannot be read.

Explanation: The driver to read a firmware file. The read process failed.

Action: Make sure that the support files that accompany the driver are present. Restart the server.

PCNTNW-NW-079 The MLID did not initialize MSMTx Free Count.

Explanation: The MSMTx Free Count is not initialized properly.

Action: Restart the server. If the error recurs, call for service.

PCNTNW-NW-084 Unable to allocate memory below the 16 megabyte boundary.

Explanation: A request was made to allocate memory below 16 megabytes. The request did not complete successfully.

Action: Free some memory below 16 megabytes, or add more memory below the 16 megabyte boundary.

PCNTNW-NW-086 The driver parameter block is too small.

Explanation: The driver parameter block is too small.

Action: Restart the server. If the error recurs, call for service.

PCNTNW-NW-087 The media parameter block is too small.

Explanation: The driver media parameter block is too small.

Action: Restart the server. If the error recurs, call for service.

PCNTNW-NW-091 The hardware configuration conflicts.

Explanation: You tried to load a new frame type for the existing adapter. The hardware assumptions made in doing so are incorrect.

Action: Make sure that your hardware configuration matches the software settings. See "PCI Routing" on page 94 for information on viewing and changing interrupt requests.

PCNTNW-NW-092 Cannot schedule AES without an HSM routine.

Explanation: The Netware Operating System needs a Hardware Support Module routine before it schedules an AES event.

Action: Restart the server. If the error is still present, call for service.

Ethernet Controller Messages

PCNTNW-NW-093 Cannot schedule interrupt time call back without an HSM routine.

Explanation: The driver needs a Hardware Support Module routine before it can schedule an interrupt time call back.

Action: Restart the server. If the error recurs, call for service.

PCNTNW-NW-094 Cannot set hardware interrupt without an HSM routine.

Explanation: The driver needs a hardware interrupt call back routine before it sets the interrupt.

Action: Restart the server. If the error recurs, call for service.

PCNTNW-NW-095 Cannot add polling without an HSM routine.

Explanation: The driver needs an HSM polling routine before it can start the polling process.

Action: Restart the server. If the error recurs, call for service.

PCNTNW-NW-126 The group bit in the node address override was cleared.

Explanation: The IEEE address has a group bit indicating that an address belongs to a group of stations. This bit is used only as a destination address; it cannot be used as a source address. You tried to enter a source address with this bit set. The driver cleared the group bit of the source address.

Action: None.

PCNTNW-NW-127 The local bit in the node address override was set.

Explanation: The local bit in the IEEE address format indicates that the addresses are being managed locally. If you use the node address override capabilities of this driver to enter a new address, the local bit should be set. You entered an address without the local bit set. The driver has set the local bit.

Action: None.

PCNTNW-NW-164 The device was not found.

Explanation: The driver cannot find an Ethernet controller in the server.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Go to "About the Test Programs" on page 233 to run the diagnostic utility.

Ethernet Controller Messages

PCNTNW-NW-164 Device not found at IOADDRESS.

Explanation: The Ethernet controller cannot be found at the IO address specified in the NET.CFG file.

Action: Verify that the IO Address in the NET.CFG file matches with the board. Otherwise, remove the PORT keyword from the NET.CFG file.

PCNTNW-NW-167 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet jumper on the system board is set to the default, enable position.
2. Edit the NET.CFG file to change the BUSTYPE keyword to PCI1.
3. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.

PCNTNW-NW-180 The DMA parameter is not necessary for PCI device.

Explanation: The Ethernet controller does not require a DMA setting.

Action: Delete the DMA parameter from the NET.CFG file.

Novell NetWare DOS ODI Driver Messages

This section contains the error messages for the Novell NetWare DOS ODI device driver. The explanation and recommended action are included with each message.

PCNTW-DOS-1 The LSL is not loaded.

Explanation: The Link Support support module (LSL.COM) is not loaded.

Action: Load LSL.COM; then, load the device driver.

PCNTW-DOS-2 The LSL has no more room for a board using Frame <string>.

Explanation: The maximum number of adapters, whether virtual or physical, has been registered with the Link Support Layer. In the PC Server 330, the DOS ODI LSL can support up to five PCI Ethernet adapters, plus the Ethernet controller in the system board.

Action: Reduce the number of active adapters in the systems by removing an adapter, or by decreasing the number of frame types activated by Multiple Link Interface Driver (MLID).

Ethernet Controller Messages

PCNTW-DOS-3 Could not find PCNTNW MLID to unload.

Explanation: A request was made to unload PCNTNW MLID, but the MLID is not loaded.

Action: None.

PCNTW-DOS-4 A TSR is loaded above the PCNTNW MLID.

Explanation: You tried to unload the PCNTNW MLID from memory, but the PCNTNW MLID detected another Terminate and Stay Resident (TSR) program loaded above the MLID. For the PCNTNW MLID to unload safely, you must first unload any TSR programs that were loaded after you loaded the MLID.

Action: Either unload the other TSR program before loading the PCNTNW MLID, or unload the TSR program before attempting this operation.

PCNTW-DOS-5 PCNTNW MLID could not be unloaded; the operation was aborted.

Explanation: The PCNTNW MLID attempted to remove the resident PCNTNW MLID from memory, and failed. A hardware error has probably occurred.

Action: Run the Ethernet diagnostic.

PCNTW-DOS-6 The adapter did not initialize. PCNTNW did not unload.

Explanation: The hardware did not initialize correctly. The PCNTNW driver did not load.

Action: Check the hardware. Make sure that the board's hardware setting matches its settings in the NET.CFG file.

PCNTW-DOS-7 You need another PCNTNW MLID Section Heading in the NET.CFG file in order to load the MLID again.

Explanation: You tried to load the PCNTNW MLID a second time. Normally, you would do this so that you could use two or more Ethernet controllers in the server. When two or more of the same type of Ethernet controllers are installed in the server, an associated PCNTNW MLID section heading must be specified in the NET.CFG file.

Action: Create a NET.CFG file and add the commands for both PCNTNW MLID boards to the file. Then, restart the server.

Ethernet Controller Messages

PCNTNW-DOS-8 A NET.CFG is required to load the MLID again.

Explanation: You tried to load the PCNTNW MLID a second time. Normally, you would do this so that you could use two or more Ethernet controllers in the server. When two or more of the same type of Ethernet controllers are installed in the server, an associated PCNTNW MLID section heading must be specified in the NET.CFG file.

Action: Create a NET.CFG file and add the commands for both PCNTNW MLID boards to the file. Then, restart the server.

PCNTNW-DOS-9 The NET.CFG entry has been ignored.

Explanation: The PCNTNW ignored the NET.CFG entry.

Action: Verify that the entries in the NET.CFG file are correct.

The PCNTNW MLID has been successfully removed.

Explanation: A request was made to unload a PCNTNW MLID. The PCNTNW MLID has been removed from memory.

Action: None.

PCNTNW-DOS-11 The MLID does not support frame <string>. The PROTOCOL keyword has been ignored.

Explanation: The NET.CFG files specified the PROTOCOL option for a PCNTNW MLID. The specified frame type is not supported by the PCNTNW MLID.

Action: Check the PROTOCOL line in the NET.CFG file for possible omissions of required dashes and underscores or any misspellings.

PCNTNW-DOS-12 The protocol keyword must have a frame type. Entry ignored.

Explanation: The PROTOCOL option was specified in the NET.CFG file for a PCNTNW MLID. The entry failed to specify the associated frame type for the protocol ID addition. An entry in the NET.CFG file for the PROTOCOL option should use the following format:

```
LINK DRIVER PCNTNW
PROTOCOL IPX 8137 ETHERNET_II
```

Action: Specify a frame with the PROTOCOL option.

PCNTNW-DOS-13 The MLID could not register Protocol ID <string> for protocol stack <string> for frame type.

Explanation: The PCNTNW MLID could not register the specified Protocol ID.

Action: Verify the protocol information in the NET.CFG file.

Ethernet Controller Messages

PCNTNW-DOS-14 This version of LSL is not supported.

Explanation: The PCNTNW MLID cannot run successfully using this version of the LSL.

Action: Update your LSL.COM to a newer version.

PCNTNW-DOS-15 The frame type is already activated for frame <string>. The NET.CFG entry has been ignored.

Explanation: Two FRAME keywords under the same main section heading specified the same frame type. A specified frame type can be specified only once per driver.

Action: Remove the duplicate FRAME keyword entry.

PCNTNW-DOS-16 The node address was incorrectly specified in NET.CFG.

Explanation: You used the **NODE ADDRESS** option in the NET.CFG file to override the node address on the network board. The number specified was not a valid Ethernet address. An Ethernet address is six bytes in length. This error occurs if Bit 0 of the first address byte is a 1. This bit must always be 0. For example, if the first byte has the following address, an invalid Ethernet address is generated.

FIRST BYTE							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	1

This byte will produce node addresses in the 0100 0000 0000 to 01FF FFFF FFFF range (in hexadecimal), all of which will be invalid.

Action: Specify a valid node address in the NET.CFG file.

PCNTNW-DOS-17 An invalid keyword was specified in NET.CFG on line xx.

Explanation: The keyword specified in the NET.CFG file is incorrect.

Action: Check the keyword in question. Make sure that the keyword is correctly spelled.

PCNTNW-DOS-18 The frame type specified in the NET.CFG file is not supported.

Explanation: The NET.CFG file specified the **PROTOCOL** option for a PCNTNW MLID. The specified frame type is not supported by the PCNTNW MLID.

Action: Check the **PROTOCOL** line in the NET.CFG file for possible omissions of required dashes and underscores, or any misspellings. Check the PCNTNW MLID documentation for supported frame types.

Ethernet Controller Messages

PCNTNW-DOS-19 An invalid Ethernet node address is specified in NET.CFG. The MLID modified the incorrect address bits.

Explanation: The NET.CFG file has an invalid node address. The PCNTNW MLID modified and corrected the address.

Action: Verify the node address entries in the NET.CFG file.

PCNTNW-DOS-50 The board cannot be found.

Explanation: The Ethernet controller is either not configured correctly or is disabled.

Action: Perform the following steps:

1. Verify that the Ethernet jumper on the system board is set to the default, enabled position.
2. Check the settings for the Ethernet controller (for example, the I/O and interrupt request settings) against the settings in the NET.CFG. See “PCI Routing” on page 94 for information on setting the interrupt requests.
3. If the problem persists, go to “About the Test Programs” on page 233 to run the diagnostic utility.

PCNTNW-DOS-54 The board did not respond to the initialization command.

Explanation: The Ethernet controller initialization failed.

Action: Verify that the Ethernet jumper on the system board is set to the default, enabled position. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

PCNTNW-DOS-58 The board did not respond to the initialization command.

Explanation: The IRQ setting might be incorrect with the hardware setting, or the EEPROM might be corrupted.

Action: Verify that the IRQ settings in the NET.CFG file match the configuration settings in the configuration programs. See “PCI Routing” on page 94 for information on setting the interrupt requests. Verify that the EEPROM on the system board is programmed correctly.

PCNTNW-DOS-61 PCI device IRQ number mismatch.

Explanation: The IRQ number specified in the NET.CFG file does not match with the IRQ number assigned in the configuration programs.

Action: Remove the IRQ number in the NET.CFG file.

Ethernet Controller Messages

PCNTNW-DOS-64 The device was not found.

Explanation: The driver cannot find any PCnet device in the server.

Action: Verify that the Ethernet enable jumper is set to the default (enable) position. Go to "Running the Ethernet Diagnostics" on page 245 to run the diagnostic utility.

PCNTNW-DOS-65 Device not found at IOADDRESS.

Explanation: The device was not found at the IO address specified in the NET.CFG file. The driver cannot find an Ethernet controller in the server.

Action: Verify that the IO address in the NET.CFG file matches with the with the board. Otherwise, remove the PORT keyword from the NET.CFG file.

PCNTNW-DOS-67 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Use the BUSTYPE keyword to specify a value of PCI1.
3. If the problem persists, go to "Running the Ethernet Diagnostics" on page 245 to run the Ethernet diagnostics.

PCNTNW-DOS-75 Unsupported bus ID specified.

Explanation: The bus ID number specified in the NET.CFG file is not supported by Novell.

Action: Correct the bus ID number in the NET.CFG file.

PCNTNW-DOS-76 Wrong bus ID specified.

Explanation: The bus ID number specified in the NET.CFG file is different from the bus type found in the server.

Action: Correct the bus ID number in the NET.CFG.

PCNTNW-DOS-80 The DMA parameter is not necessary for PCI device.

Explanation: The board does not require a DMA setting.

Action: Edit the NET.CFG file to delete the DMA parameter.

Novell NetWare OS/2 ODI Driver Messages

This section contains the error messages for the NetWare OS/2 ODI driver. The explanation and recommended action is included with each message.

PCNTNW-OS2-1 The LSL is not loaded.

Explanation: The Link Support Layer module (LSL.SYS) is not loaded.

Action: Load LSL.SYS before loading the driver.

PCNTNW-OS2-21 Could not add the MLID Protocol ID.

Explanation: The PCNTNW MLID could not register the specified Protocol ID.

Action: Edit the NET.CFG file and correct the protocol information.

PCNTNW-OS2-22 Could not allocate memory. The virtual board did not load.

Explanation: The driver could not allocate memory for the virtual adapter.

Action: Check the system configuration.

PCNTNW-OS2-54 The board did not respond to the initialization command.

Explanation: The board initialization failed.

Action: Verify that the Ethernet enable jumper is set to the default (enable) position. Go to "About the Test Programs" on page 233 to run the diagnostic utility.

PCNTNW-OS2-56 This interrupt is already used and cannot be shared.

Explanation: The interrupt is already used by another device and cannot be shared.

Action: Assign a different IRQ in the configuration programs. See "PCI Routing" on page 94 for information on setting the interrupt requests.

PCNTNW-OS2-58 The board did not respond to the initialization command.

Explanation: The IRQ setting might be incorrect with the hardware setting, or the EEPROM might be corrupted.

Action: Verify that the IRQ settings in the NET.CFG file match the configuration settings in the configuration programs. See "PCI Routing" on page 94 for information on setting the interrupt requests. Verify that the EEPROM on the system board is programmed correctly.

Ethernet Controller Messages

PCNTNW-OS2-61 PCI device IRQ number mismatch.

Explanation: The IRQ number specified in the NET.CFG file does not match with the IRQ number assigned in the configuration programs. The IRQ numbers might be assigned automatically, or you might have manually assigned the IRQ number.

Action: Remove the IRQ number in the NET.CFG file. Or, see “PCI Routing” on page 94 for information on setting the interrupt requests.

PCNTNW-OS2-64 The device was not found.

Explanation: The driver cannot find the Ethernet controller in the server.

Action: Verify that the Ethernet enable jumper is set to the default (enable) position. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

PCNTNW-OS2-65 Device not found at IOADDRESS.

Explanation: The Ethernet controller cannot be found at the IO address specified in the NET.CFG file.

Action: Verify that the IO address in NET.CFG matches with the board. Otherwise, remove the PORT keyword from the NET.CFG file.

PCNTNW-OS2-67 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet jumper on the system board is set to the default, enable position.
 2. Edit the NET.CFG file to change the BUSTYPE keyword to PCI1.
 3. If the problem persists, go to “About the Test Programs” on page 233 to run the diagnostic utility.
-

PCNTNW-OS2-73 Unable to allocate memory.

Explanation: The driver could not allocate memory for the virtual board.

Action: Check the system configuration.

PCNTNW-OS2-80 The DMA parameter is not necessary to PCI device.

Explanation: The Ethernet controller does not require a DMA setting. This parameter is not a valid driver parameter. The PCI system BIOS automatically sets the DMA channel number.

Action: Edit the NET.CFG file to delete the DMA parameter.

NDIS 2.01 Driver Messages

This section contains the error messages for the NDIS 2.01 drivers. The explanation and recommended action are included with each message.

PCNTND-DOS-1 Unable to open the Protocol Manager.

Explanation: The NDIS stack is not configured properly.

Action: Check and correct your configuration.

PCNTND-DOS-6 Out of memory while allocating buffers.

Explanation: The driver could not allocate the requested buffers.

Action: Check your system configuration. Edit the PROTOCOL.INI file to reduce the number of Txbuffers and Rxbuffers specified for the driver.

PCNTND-DOS-7 Protocol Manager device error.

Explanation: The NDIS stack is not configured properly.

Action: Check and correct your configuration.

PCNTND-DOS-8 Bad status for Protocol Manager.

Explanation: The NDIS stack is not configured correctly.

Action: Check and correct your configuration.

PCNTND-DOS-9 Cannot find PROTOCOL.INI entry.

Explanation: The NDIS stack is not configured properly in the PROTOCOL.INI file.

Action: Check and correct your configuration.

PCNTND-DOS-10 The Protocol Manager ioctl failed.

Explanation: The NDIS stack is not configured properly in the PROTOCOL.INI file.

Action: Check and correct your configuration.

PCNTND-DOS-11 Protocol Manager registration failed.

Explanation: The NDIS stack is not configured properly.

Action: Check and correct your configuration.

Ethernet Controller Messages

PCNTND-DOS-15 Device not found.

Explanation: The driver cannot find an Ethernet controller in the server.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.
3. Call for service.

PCNTND-DOS-16 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.
3. Call for service.

PCNTND-DOS-21 Board failed checksum test. Please run configuration utility.

Explanation: The driver cannot find an Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.

PCNTND-DOS-23 WARNING: PCNET IRQ found =

Explanation: The IRQ setting in PROTOCOL.INI does not match the hardware IRQ setting.

Action: Remove the IRQ setting from PROTOCOL.INI (or match the IRQ setting in PROTOCOL.INI with the configuration settings in the configuration programs. See "PCI Routing" on page 94 for information on setting the interrupt requests.)

PCNTNW-DOS-24 WARNING: PCNET IRQ doesn't match protocol.ini.

Explanation: The IRQ setting in PROTOCOL.INI does not match the hardware IRQ setting.

Action: Remove the IRQ setting from PROTOCOL.INI or match the IRQ setting in PROTOCOL.INI with the hardware jumper setting.

Ethernet Controller Messages

PCNTNW-DOS-25 PCI scan specified, PCI bus not found!

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

PCNTNW-DOS-29 WARNING: DMA number is not necessary for PCI device.

Explanation: The Ethernet controller does not require a DMA setting.

Action: Remove the DMA setting in PROTOCOL.INI.

PCNTNW-DOS-32 IRQ number is already in use by another PCNET device.

Explanation: The specified IRQ number is already in use by another Ethernet controller or device.

Action: Modify the IRQ setting in the PROTOCOL.INI file, or modify the IRQ settings in the configuration programs. See “PCI Routing” on page 94 for information on setting the interrupt requests in the configuration programs.

PCNTNW-DOS-33 PCNET device with specified IOBASE is already in use.

Explanation: The specified IO address number is already in use by another Ethernet controller or device.

Action: Modify the IO address setting on the hardware, or modify the IO address setting in the PROTOCOL.INI file.

Ethernet Controller Messages

NDIS 3.0 Driver Messages

Windows NT error messages are logged into a log file. You can view the file with the Event Viewer. Error messages appear with the “PCNTN3” prefix followed by a “Missing Configuration Parameter” message and several hex numbers. The hex numbers must be converted to decimal values so that they correspond to the error numbers used in this manual.

PCNTN3-9 IO base address is already in use by another PCNET device.

Explanation: The specified IO address number is already in use by another device.

Action: Modify the IO address setting on the hardware or modify the IO Address setting in the setup dialog box.

PCNTN3-13 IRQ and/or DMA number is already in use by another device.

Explanation: The specified IRQ is specified by another device.

Action: Modify the IRQ setting in the setup dialog box.

PCNTN3-18 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default **Enable** position.
2. If the problem persists, go to “About the Test Programs” on page 233 to run the diagnostic utility.

PCNTN3-19 LanceOpenAdapter failed.

Explanation: The configuration is set up incorrectly.

Action: Rerun the setup program.

PCNTN3-20 Device at specified IO base address not found.

Explanation: The Ethernet controller cannot be found at the specified IO address.

Action: Verify that the IO address matches with the board. Otherwise, remove the IO Address specification from the setup.

Ethernet Controller Messages

PCNTN3-21 Device not found.

Explanation: The driver cannot find any PCnet device.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default **Enable** position.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

Packet Driver Messages

This section contains the error messages for the packet driver. The explanation and recommended action are included with each message.

PCNTPK-DOS-1 The command syntax is PCNTPK [-n] [-d] [-w]

```
<INT=packet_int_no>  
[IRQ=int_no] [IOADDR=io_addr] [DMA=dma_no] [BUSTYPE=bus]  
[DMAROTATE] [TP] [LED0=xx] [BUSTYPE=bus] [LED0=xx]  
[LED2=xx] [LED3=xx]
```

Explanation: The driver command was not entered correctly.

Action: If you entered the command from the command line, enter the command with the correct syntax. If the command is in the AUTOEXEC.NET file, edit the file to correct the syntax. The only parameters that should be included are PCNTPK and BUSTYPE=PCI.

PCNTPK-DOS-2 Unable to reset the PCnet device.

Explanation: The software could not reset the Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. If the problem persists, go to “About the Test Programs” on page 233 to run the diagnostic utility.

PCNTPK-DOS-3 Unable to initialize the PCnet device.

Explanation: The software could not initialize the Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Check the interrupt settings in the configuration programs. For more information, go to “PCI Routing” on page 94.
3. If the problem persists, go to “About the Test Programs” on page 233 to run the diagnostic utility.

Ethernet Controller Messages

PCNTPK-DOS-5 There is already a packet driver at xxxx.

Explanation: The driver is already loaded at this memory location. It cannot be loaded a second time at the same location.

Action: Do not load the driver again. If you want to load the driver at a different memory location, specify another software interrupt address on the INT parameter.

PCNTPK-DOS-6 <IRQ=int_no> should be between 0 and 15 inclusive.

Explanation: The specified IRQ is out of range for the Ethernet controller.

Action: Use valid IRQ values.

PCNTPK-DOS-7 Packet driver failed to initialize the board.

Explanation: The board initialization failed.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Go to "About the Test Programs" on page 233 to run the diagnostic utility.

PCNTPK-DOS-8 <INT=packet_int_no> should be in the range 0x60 to 0x80.

Explanation: The specified software interrupt number is out of the allowable range.

Action: Specify a valid value for the INT parameter.

PCNTPK-DOS-12 PCI device IRQ number mismatch.

Explanation: The specified IRQ number does not match with the IRQ number assigned by the PCI BIOS.

Action: Remove the IRQ setting.

PCNTPK-15 The device was not found.

Explanation: The driver cannot find an Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.

Ethernet Controller Messages

PCNTPK-DOS-18 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.

Packet driver is at segment xxxx.

Explanation: The memory address where the packet driver is loaded is xxxx.

Action: None.

Packet interrupt number xxxx.

Explanation: The interrupt number used by the packet driver is xxxx.

Action: None.

My Ethernet address is xxxxxxxxxxxx.

Explanation: The Ethernet address of this station is xxxxxxxxxxxx.

Action: None.

My ARCnet address is xxxx.

Explanation: The ARCnet address of this station is xxxx.

Action: None.

Ethernet Controller Messages

UNIX Messages

This section contains the error messages for the following UNIX drivers.

- SCO UNIX LLI
- UnixWare DPLI
- SunSoft Solaris

pnt0-2 PCI search specified, PCI device not found!

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Perform the following steps:

1. Run netconfig to search for another Ethernet controller.
2. Verify that the Ethernet enable jumper is set to the default (enable) position.
3. If the problem persists, go to "About the Test Programs" on page 233 to run the diagnostic utility.

pnt0-6 Cannot allocate memory for the adapter during an interrupt. Please check your Streams parameters.

Explanation: The system is out of Streams memory blocks.

Action: Use the CRASH utility to increase the number of Streams memory blocks for the failing size. another Ethernet controller.

Action: Modify the IRQ settings in the configuration programs, or run netconfig to match the hardware settings.

pnt0-6 Cannot allocate memory for the adapter during an interrupt! Please check your Streams parameters.

Explanation: On a SunSoft Solaris system, this message indicates that the system is out of Streams memory blocks.

Action: Use the CRASH utility to increase the number of Streams memory blocks for the failing size.

pnt0-7 Cannot allocate memory for the adapter during reset! Please check your Streams parameters.

Explanation: The system is out of Streams memory blocks.

Action: Use the CRASH utility to increase the number of Streams memory blocks for the failing size.

Ethernet Controller Messages

pnt0-11 device not found!

Explanation: The driver cannot find an Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

pnt0-12 device failed checksum test!

Explanation: The driver cannot find an Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

pnt0-13 add_intr_handler failed! Interrupts already enabled.

Explanation: The IRQ specified or found conflicts with other devices in the system.

Action: Perform the following steps:

1. Modify your hardware settings.
2. Run netconfig to match the hardware settings.

pnt0-14 Cannot locate hardware.

Explanation: The SunSoft Solaris driver cannot find any Ethernet controller.

Action: Perform the following steps:

1. Verify that the Ethernet enable jumper is set to the default (enable) position.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

pntO-15 No more devices to open.

Explanation: The SunSoft Solaris driver cannot find any more Ethernet controllers.

Action: Perform the following steps:

1. Verify that additional IBM PCI Ethernet adapters are present or replace the Ethernet adapter that fails to respond.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

Ethernet Controller Messages

pntO-17 Device fault.. Reset initiated!

Explanation: The SunSoft Solaris driver has been reset due to device fault.

Action: Perform the following steps:

1. Verify that additional IBM PCI Ethernet adapters are present or replace the PCnet card that fails to respond.
2. Go to “About the Test Programs” on page 233 to run the diagnostic utility.

pntO-19 IRQ found for PCnet hardware does not match space.c!

Explanation: This is a warning message referring to the IRQ found in the system.

Action: Ignore this message if you are sure that this is what you want to do. Otherwise, run netconfig to match the hardware settings.

pntO-19 IRQ found for PCnet hardware does not match pnt.conf!

Explanation: This is a warning message referring to the IRQ that the SunSoft Solaris driver found in the system.

Action: Ignore this message if you are sure that this is what you want to do. Otherwise, run netconfig to match the hardware settings.

pnt0-20 add_intr_handler failed! Unknown interrupt type.

Explanation: The IRQ specified or found conflicts with other devices in the system.

Action: Perform the following steps:

1. Modify your hardware settings.
2. Run netconfig to search for another Ethernet controller.

pnt0-21 add_intr_handler failed! Out of range interrupt number.

Explanation: The IRQ specified or found conflicts with other devices in the system.

Action: Perform the following steps:

1. Modify your hardware settings.
2. Run netconfig to search for another Ethernet controller.

pnt0-22 add_intr_handler failed! Out of range IPL.

Explanation: The IRQ specified or found conflicts with other devices in the system.

Action: Perform the following steps:

1. Modify your hardware settings.
2. Run netconfig to search for another Ethernet controller.

Ethernet Controller Messages

pnt0-23 **add_intr_handler failed! Vector already occupied.**

Explanation: The IRQ specified or found conflicts with other devices in the system.

Action: Perform the following steps:

1. Modify your hardware settings.
2. Run netconfig to search for another Ethernet controller.

pnt0-24 **add_intr_handler failed! Vector already shared at different IPL.**

Explanation: The IRQ specified or found conflicts with other devices in the system.

Action: Perform the following steps:

1. Modify your hardware settings.
2. Run netconfig to search for another Ethernet controller.

pnt0-26 **The DMA number is not necessary for PCI device.**

Explanation: The IBM PCI Ethernet adapter does not require a DMA setting.

Action: Edit the SPACE.C file to delete the DMA parameter.

pnt0-29 **The IRQ number is already in use by another**

Explanation: The IBM PCI Ethernet adapter

Explanation: The specified IO address is already in use by

pnt0-31 **IO address is not necessary for the PCI device.**

Explanation: The I/O address specified is not required.

Action: Remove the assigned IO address specified for the Ethernet controller.

ServeRAID Adapter Messages

This section lists the ServeRAID diagnostic and run-time error messages that might appear during startup of a PC Server 330 disk-array system.

The ServeRAID adapter contains a device-error table that collects statistics on the number and types of errors that occur on a selected hard disk drive. After correcting a problem with the disk array, clear the table so that you can identify any subsequent errors quickly. For more information, see “Displaying Drive Information” on page 62.

All hard disk drives contain unique identifiers, such as the drive serial number and manufacturer. During configuration, the ServeRAID adapter stores this information.

The ServeRAID adapter also adds an additional unique identifier, called the host ID, to each hard disk drive that is part of a logical drive. The host ID is a user-defined 12-character string. (See “Display/Change the ServeRAID Adapter Parameters” on page 79 for information on assigning a host ID.)

ServeRAID Adapter POST and Setup Messages

During POST, the ServeRAID adapter compares the stored configuration information to the configuration that is actually present. If a discrepancy exists, one or more status messages appear after POST completes, but before the operating system loads. When the ServeRAID adapter requires your input, a list of function keys will appear below the message.

New Drive Installed

When the ServeRAID adapter detects a new drive that is not part of the current configuration, the following message appears:

```
(old state: new state ch: bay)
```

This is an information message. No action is required.

ServeRAID Adapter Messages

Configured Drives are Missing

When the ServeRAID adapter detects that a previously configured drive is missing, the following message appears:

(old state: new state: ch: bay)

where *old state* is the configured state of the drive, *new state* is the state that the ServeRAID adapter will assign to the drive, *ch* and *bay* are the channel and bay where the drive was located previously.

Examples of the possible state changes include:

(ONL: DDD x: y)
(RDY: EMP x: y)
(SBY: EMP x: y)
(RBL: DDD x: y)
(HSP: DHS x: y)
(SHS: DHS x: y)

Two choices will follow this message:

F4 Retry. Select this key after correcting a problem. For example, select retry after you turn on the external storage enclosure that contains the hard disk drive.

F5 Select this key to accept the new state that the ServeRAID adapter will assign to the drive. For example, the adapter will assign the drive a state of defunct or empty.

You can also select F5 when you must remove a drive, RAID level 1 and RAID level 5 logical drives are present, and performance in a degraded mode is acceptable. The ServeRAID adapter will assign the drive a state of defunct, but the server can complete startup. However, the array will remain in Critical mode and the potential for data loss will exist until you replace and rebuild the defunct drive. To prevent the loss of data, replace and rebuild the defunct drive in a timely manner.

ServeRAID Adapter Messages

Configured Drives Are Not in the Configured Location

When the ServeRAID adapter detects that a previously configured drive is present, but the drive is in a new location, the following message appears:

```
(old ch: old bay: > new ch: new bay)
```

where *old ch* is the channel that matches the existing drive configuration information, *old bay* is the bay that matches the existing drive configuration information, *new ch* is the channel where the drive is now located, and *new bay* is the bay where the drive is now located.

For example:

```
(2 :5 > 2: 6)
```

In this example, the message indicates that the drive from Channel 2, Bay 5 is now located at Channel 2, Bay 6. The drive might have been physically moved to the new bay.

Three choices will follow this message:

- F4** Retry. Select this key after correcting a problem. For example, select retry after you move the hard disk drive to its previously assigned location.
- F5** Select this key to accept the new state that the ServeRAID adapter will assign to the drive. For example, the adapter will assign the drive a state of defunct.
- F6** Select this key to modify the configuration to match the current drive location.

You might remove the hot-swap drives from the server for security reasons. If you replace the drives but install them in different bays, you can press **F6** to accept the new locations, and the ServeRAID adapter will update the configuration.

ServeRAID Adapter Messages

New Adapter Installed in a Configured Server

When the ServeRAID adapter detects that the identifiers of the drives do not match the adapter configuration information, the following message appears:

```
host id: old ch: old bay: new ch:new bay
```

where *host id* is the adapter identification, *old ch* is the channel that matches the drive configuration information, and *old bay* is the bay that matches the drive configuration information. *New ch* is the channel where the drive is now located, and *new bay* is the bay where the drive is now located.

For example:

```
(My Machine : 1:6 > 2:10)
```

In this example, the message indicates that the drive from Channel 1, Bay 6 is now located at Channel 2, Bay 10. The drive might have been physically moved to the new bay.

Two choices will follow this message:

- F4** Retry. Select this key after correcting the problem. For example, select retry after you move the hard disk drive to its previously assigned location, or after you install the original ServeRAID adapter.
- F7** Select this key to import the configuration information from the drive and to update the configuration information on the ServeRAID adapter. This choice is useful when you replace the ServeRAID adapter in an existing disk-array model.

You also might select F7 if you replace a whole set of drives with drives that were configured in another server with a ServeRAID adapter.

Note: When you install drives in a server that has no logical drives defined, the F7 choice will not appear. This can occur when you replace the ServeRAID adapter itself. The adapter does not contain any logical drives in its factory configuration. Therefore, F7 will not appear. In

ServeRAID Adapter Messages

this case, restart the server and press **Ctrl+I** to enter the Mini-Configuration (see “Using the ServeRAID Adapter Mini-Configuration Program” on page 81); then, select **Advanced Functions**. From that menu, select **Import Configuration from Drives to Adapter**.

ServeRAID Adapter Status and Error Messages

This table lists, in alphabetic order, messages associated with the IBM PC ServeRAID Adapter.

Where the “Action” information tells you to start the IBM ServeRAID configuration program, insert the ServeRAID Adapter Configuration Diskette in the primary diskette drive (usually drive A); then, press **Ctrl+Alt+Del**. The action column also provides general information about the message.

Where *m* or *n* appears in these messages, a number will appear in the actual message.

RAID Adapter Message	Description
<i>n</i> logical drives are installed.	<i>n</i> represents the number of defined logical drives. <i>Action:</i> This is an information message. No action is required.
Controller is not responding to commands. No logical drives are installed.	The ServeRAID adapter is not operational. <i>Action:</i> Make sure that the adapter is fully seated. If the problem persists, have the system serviced.
Error: Cannot disable this adapter BIOS.	The adapter was unable to prevent an extra copy of the adapter BIOS from being stored on the server. This condition occurs when the server contains multiple ServeRAID adapters. <i>Action:</i> When the prompt to disable extra copies of the adapter BIOS appears, type N.

ServeRAID Adapter Messages

RAID Adapter Message	Description
Following drives not responding. (old state: new state ch: bay)	<p>One or more drives did not respond to the adapter. For example, the adapter detected a new drive in an unconfigured bay, and the drive is not part of the current configuration. This might also occur if the adapter detected that a configured drive is missing.</p> <p><i>Action:</i> Select F5 to accept the new state that the ServeRAID adapter will assign to the drive. For example, the adapter will assign the drive a state of defunct or empty.</p>
Following new drives found. (old state: new state ch: bay)	<p>One or more drives were found in an unconfigured bay. For each drive listed, a new state of Ready (RDY) appears.</p> <p><i>Action:</i> This is an information message. No action is required.</p>
Following drives found in new location (old ch: old bay > new ch: new bay)	<p>POST found that the location of one or more drives does not match the stored configuration information.</p> <p><i>Action:</i> See “Configured Drives Are Not in the Configured Location” on page 284 for more information.</p>
Installation stopped.	<p>The server cannot access the ServeRAID adapter.</p> <p><i>Action:</i> This is a follow-on message to a preceding message. Follow the “Action” instructions for the preceding message to resolve the problem.</p>
Recoverable configuration error; run Configuration program.	<p>The configuration data stored on the adapter NVRAM does not match the configuration data stored in the adapter EEPROM.</p> <p><i>Action:</i></p> <ol style="list-style-type: none"> 1. Insert the IBM ServeRAID Adapter Configuration Diskette 2. Press Ctrl+Alt+Del to restart the system. 3. Select Advanced Functions and synchronize the adapter configuration. 4. See “Configuring Your Disk Arrays” on page 25 for more information.
WARNING: <i>n</i> logical drives are critical; <i>n</i> logical drives are offline.	<p>One or more drives have failed.</p> <p><i>Action:</i> Replace the defunct drives as soon as possible to prevent data loss.</p>
Your server has an error due to a Blocked Logical Drive.	<p>One or more logical drives are in a blocked state.</p> <p><i>Action:</i> Press F4 to unblock the logical drive. Or press F5 to continue without any changes.</p>

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

CD-ROM Drive Problems	Action
The CD is not working properly.	Clean the CD by wiping it with a soft, lint-free cloth, from the center of the CD to the outer edge. Do not clean in a circular pattern. This can cause loss of data. If this does not correct the problem, clean the optical-head lens. Discs for cleaning the lens are available from your place of purchase. If a problem still exists, have the system serviced.
CD-ROM drive tray not working	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 116 for information on the SCSISelect utility program).

Troubleshooting

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> <ul style="list-style-type: none">• The diskette drive is enabled in the configuration programs.• The diskette is good and not damaged. (Try another diskette if you have one.)• The diskette is inserted correctly in the drive.• The diskette contains the necessary files to start the system.• Your software program is OK (see Software Problem at the end of these troubleshooting charts). <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, have the system serviced.</p>

Monitor Self-Tests	Action
	<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 system 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 the monitor on.</p> <p><i>Note:</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 AnyView Professional or WinMode.</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 9.</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.
General Problems	Action
The server does not power on.	Verify that: <ol style="list-style-type: none">1. The power cables are properly connected to the server.2. The power outlet functions properly.3. If you just installed an option, remove it, and restart the server. If the server now powers on, you might have installed more options than the power supply supports.4. The type of memory installed is correct.

Troubleshooting

Intermittent Problems	Action
A problem occurs only occasionally and is difficult to detect.	Verify that: <ol style="list-style-type: none">1. All cables and cords are connected securely to the rear of the system and attached options.2. When the system is turned on, 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.

Microprocessor Problems	Action
The server emits a continuous, 1 KHz tone during POST.	The startup (boot) microprocessor is not working properly. If your server contains two microprocessors, the microprocessor in the secondary microprocessor socket is the boot microprocessor. Restart the server. If the problem recurs, perform the following steps: <ol style="list-style-type: none">1. Verify that the boot microprocessor is seated properly.2. If your server contains two microprocessors, remove the boot microprocessor and restart the server. If the server starts properly, replace the old boot microprocessor.3. Replace the boot microprocessor. Restart the server. If the problem recurs, 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:

1. The memory-module kits are seated properly.
2. You have installed the correct type of memory (see "Working with Memory-Module Kits" on page 142).
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 System Board Diagnostic Diskette. The system might have detected a bad memory module and automatically reallocated memory to enable you to continue to operate. If the memory tests fail, have the system serviced.

Option Problems**Action**

An IBM option that was just installed does not work.

Verify that:

1. The option is designed for the system.
 2. You followed the installation instructions 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. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the system. <p>For more information, see your SCSI documentation.</p> <p>If the 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 system serviced.</p>
A serial device does not work.	<p>Verify that:</p> <ol style="list-style-type: none">1. The serial port is enabled and is assigned a unique address.2. If the serial device is connected to serial port B, the infrared port is set to Disabled.

Troubleshooting

Infrared Port Problems	Action
An infrared device does not work.	Verify that: <ol style="list-style-type: none">1. No serial device is assigned to serial port B.2. The infrared port is enabled and is assigned a unique address.3. The infrared transceiver is properly installed.4. The infrared device drivers have been properly installed.5. Nothing is blocking the infrared transceiver. If the items above are correct, have the system serviced.

Printer Problems	Action
The printer does not work.	Verify that: <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 9.) <i>Note:</i> Non-IBM printer cables might cause unpredictable problems.3. You have assigned the printer port correctly in your operating system or application program.4. You have assigned the printer port correctly using the configuration programs. 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 system serviced.

Troubleshooting Other Network Adapters

Software Problem	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>

Note: If you cannot find the problem in the troubleshooting charts, go to “About the Test Programs” on page 233 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.

Troubleshooting Other Network Adapters

This section provides general troubleshooting information for problems that might occur when a network adapter is installed in the server. For more specific details about troubleshooting your network adapter, see your network-adapter documentation.

If the network adapter cannot connect to the network, or if the network adapter contains LEDs that do not work, check the following:

- Make sure that:

Troubleshooting Other Network Adapters

- You installed the latest revision levels of the device drivers that came with the network adapter, as described in your operating-system documentation.
 - The network adapter is seated firmly in the connector (see “Installing Adapters” on page 135).
 - You installed the correct network cable. (If you need information about selecting the correct cable, contact your IBM marketing representative or your IBM reseller.)
 - The network cable is securely attached at all connections. If the cable is attached correctly but the problem persists, try a different cable.
- Check for operating-system-specific causes for the problem. Refer to your operating-system documentation and your network-adapter documentation.
 - Test the network adapter. The adapter test requirements depend on which operating system you are using. Refer to your operating-system documentation and your network-adapter documentation for details.
 - If the network adapter fails during testing, remove it and install another network adapter as described in “Installing Adapters” on page 135.

Troubleshooting Other Network Adapters

Network Adapter Troubleshooting Chart

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

Adapter Problem	Action
The Setup program reports the network adapter's interrupt as "0" or "255."	The PCI BIOS is not configuring the network adapter correctly.
The Setup program reports "No PCI Bus."	The PCI BIOS is not configuring the network adapter correctly.
The server stops running when loading device drivers.	Change the PCI BIOS interrupt settings.
Data is corrupted or sporadic.	Make sure that you are using the correct types of cables.
The network adapter stopped working when another adapter was added to the server.	Check the following: <ul style="list-style-type: none">• Make sure that the network cable is connected to the network adapter.• Make sure that your PCI system BIOS is current.• Reseat the network adapter (see "Installing Adapters" on page 135).
The network adapter stopped working without apparent cause.	Check the following: <ul style="list-style-type: none">• Reseat the network adapter or try a different connector.• Reinstall the device drivers (see your operating-system documentation and your network-adapter documentation).• Use a different network adapter (see "Installing Adapters" on page 135).

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 beep codes vary in the length of the pause, and not the duration of the beep tones, will help you to distinguish the beeps.

Beep Codes

Beep Code Chart

Beep Code	Description
1-1-2	Microprocessor register test is in progress
1-1-3	CMOS write/read test is in progress or has failed
1-1-4	BIOS ROM checksum is in progress or has failed
1-2-1	Programmable Interval Timer test is in progress or has failed
1-2-2	DMA initialization is in progress or has failed
1-2-3	DMA page register write/read test is in progress or has failed
2-1-1	Secondary DMA register test is in progress or has failed
2-1-2	Primary DMA register test is in progress or has failed
2-1-3	Primary interrupt mask register test has failed
2-1-4	Secondary interrupt mask register test is in progress or has failed
2-2-1	Interrupt vector loading is in progress
2-2-2	Keyboard controller test is in progress or has failed
2-2-3	CMOS power failure and checksum checks are in progress
2-2-4	CMOS configuration information validation is in progress
2-3-1	Screen initialization is in progress or has failed
2-3-2	Screen memory test is in progress or has failed
2-3-3	Screen retrace tests are in progress or have failed
2-3-4	Search for video ROM is in progress
2-4-1	Screen believed operable
3-1-1	Timer tick interrupt test is in progress or has failed
3-1-2	Interval timer channel 2 test is in progress or has failed
3-1-3	RAM test is in progress or has failed above address hex 0FFFF
3-1-4	Time-of-Day clock test is in progress or has failed
3-2-1	Serial port test is in progress or has failed
3-2-2	Parallel port test is in progress or has failed
3-2-3	Math Coprocessor test is in progress or has failed
3-2-4	Comparison of CMOS memory size against actual is in progress
3-3-1	Memory size mismatch occurred
	<i>Action:</i> Have the system serviced.
1-2-4	RAM refresh verification failure is in progress or has failed
1-3-1	First 64K RAM test failure is in progress
1-3-2	First 64K RAM parity test is in progress or has failed
	<i>Action:</i> Reseat the memory module. If the problem recurs, have the system serviced.
Continuous tone	Boot microprocessor has failed
	<i>Action:</i> Replace the boot microprocessor. If you installed a microprocessor in the secondary microprocessor socket, it became the boot microprocessor. Replace the boot microprocessor and restart the server. If the continuous tone recurs, call for service.

Beep Codes

Beep Descriptions

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

Beep Type	Meaning
No Beeps	If no beep occurs 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.
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's system board or speaker subsystem might contain a failing component.
Repeating Short Beeps	This beep combination indicates that your server's 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's system board and an optional video adapter have failed. This beep combination

Beep Codes

might also indicate that your server's system board contains a failing component.

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

Two Long and Two Short Beeps This beep combination indicates that POST does not support the system board video subsystem. This beep combination occurs when the video subsystem is upgraded or replaced with another that is incompatible with your server.

Checking the System for Damage

This section provides instructions on what to do if your system might be damaged.

After Dropping It

Look for loose cables and obvious damage. If any cables are loose, reconnect them securely. If there is obvious damage to the system, have it serviced.

If you see no damage, turn on the system. If it works correctly, the system probably did not suffer any damage.



CAUTION:

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

If the system does not work correctly, turn it off and check the adapters and memory modules to ensure that they are connected correctly. Go to “Electrical Safety” on page 124 and follow the instructions for opening your system; then reseal all adapters and memory modules.

If the system still does not work correctly, use the diagnostic program and test the system. Refer to “About the Test Programs” on page 233 for instructions.

Checking the System for Damage

After Spilling Liquid on It

If liquid gets on the keyboard:

1. Turn off the server.
2. Unplug the keyboard from the back of the server.
3. Turn the keyboard upside down to drain excess liquid.
4. Dry off the keyboard with a lint-free cloth.

After the keyboard is completely dry, plug it in and turn on the server. If it does not work correctly, have the keyboard serviced.

If liquid gets inside the monitor:

1. Turn off the monitor.
2. Turn off the server.
3. Unplug the monitor from the server and the electrical outlet.
4. Have the monitor serviced immediately.

If liquid gets inside the server:

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

Installing Additional Test Programs

You can add other test programs to the PC Server 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 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 on this list

The PC Server Diagnostic Diskette includes a sample file called SAMPLE.CFG.

The user diagnostic tests must generate the following return codes upon completion so that the tests can be registered properly in the test log:

- | | |
|---------------------|-------------------|
| 0 | The test passed. |
| 1 | The test failed. |
| 2 or greater | The test aborted. |

Abort messages from the user diagnostic test program also report the ABORT return 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 run.

Installing Additional Test Programs

3. If the program executable file is in a directory other than the QA directory (or other directory you have designated to contain the QA files), that directory must be listed in the PATH= section of the AUTOEXEC.BAT.
4. You can use a .CFG file other than USERDIAG.CFG if you use the command line USRCONFIG=filename, when running the diagnostic programs. For example, you might use: QAPLPRO /USRCONFIG=MYTESTS.CFG.

Installing Additional Test Programs

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
- 206 CMD 2
- 207 CMD 3

Using the Utility Programs

The PC Server 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 — 1.44MB

Format A: low density — 720 KB

Format B: high density — 1.44MB

Format B: low density — 720 KB

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

Using the File Editor

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

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

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

Key	Description
Arrows	Use the arrow keys to move the cursor to the place in the text where you want to make changes.
Home	To move the cursor to the start of the current line, press Home once. To move to the beginning of the current screen, press Home twice. To move to the beginning of the file, press Home three times.

Using the Utility Programs

- 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 (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 programs configure only the system hardware. They do 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 programs 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 (1 KB = 1024 bytes) 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 330, see Chapter 5, “Solving Problems” on page 227.

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 227, 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 the HelpWare Support Family

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.

Using the HelpWare Support Family

- **PRODIGY**
Use the Jump command; type **IBM** and select **PC Product Support**.
- **America Online**
Use the “Go to” keyword **IBM Connect**.

Using the World Wide Web

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

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

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

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

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

Using the HelpWare Support Family

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, 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.

Purchasing Additional HelpWare Services

These services are available 24 hours a day, 7 days a week (excluding some holidays).²

- 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.

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.

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 technical support for:

² Response time will vary depending on the number and complexity of incoming calls.

Purchasing Additional HelpWare Services

- Installing and configuring client workstations and servers
- Identifying system problems and correcting problems on the client or the server
- 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
- 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.

Purchasing Additional HelpWare Services

- 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.

Ordering Publications

Ordering Publications

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

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

Appendix A. Jumpers

Jumpers located on the system board and the processor board help you to customize the way your server operates.

Changing Jumper Positions

Your system board and processor board contain two-pin and three-pin jumper blocks.

In some cases, groups of two-pin jumpers combine to define a function. For example, the settings of jumpers J1 and J20 together define the clock speed of the microprocessor.

Two-Pin Jumper Blocks

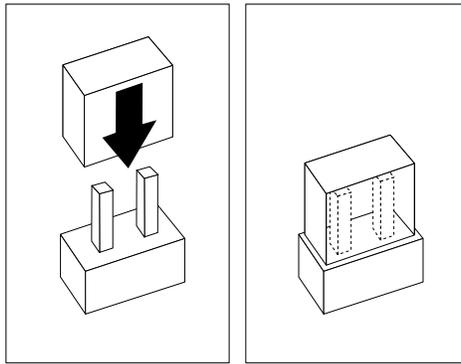
Covering both pins with a jumper defines one function of the jumper block. To change the function of the jumper block, cover one pin only or remove the jumper entirely. To change a jumper's position for a two-pin jumper block:

1. Turn off the server; then disconnect the server power cord.
2. Remove the server cover (see "Preparing to Add Options" on page 126).

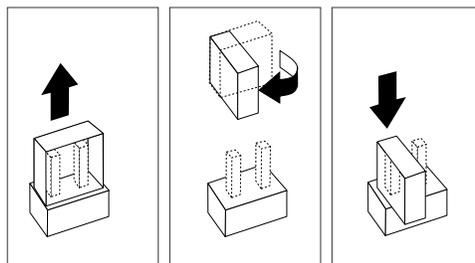
Changing Jumper Positions

3. Do one of the following:

- Lift the jumper straight off the pin block.
- Align the holes in the bottom of the jumper with the two pins on the pin block, and then slide the jumper onto these pins.



- Align one of the holes in the bottom of the jumper with one of the pins on the pin block, and then slide the jumper onto that pin only.



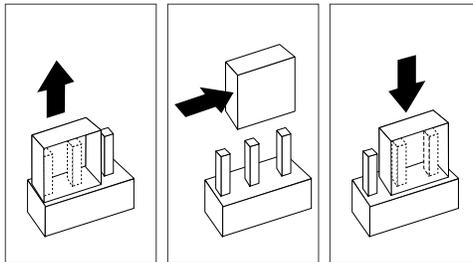
4. Reinstall the server cover and connect the cables (see “Completing the Installation” on page 218).

Changing Jumper Positions

Three-Pin Jumper Blocks

With the three-pin jumper blocks, each jumper covers two of the three pins on a pin block. You can position the jumper to fit over the center pin and either of the other two pins. 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.

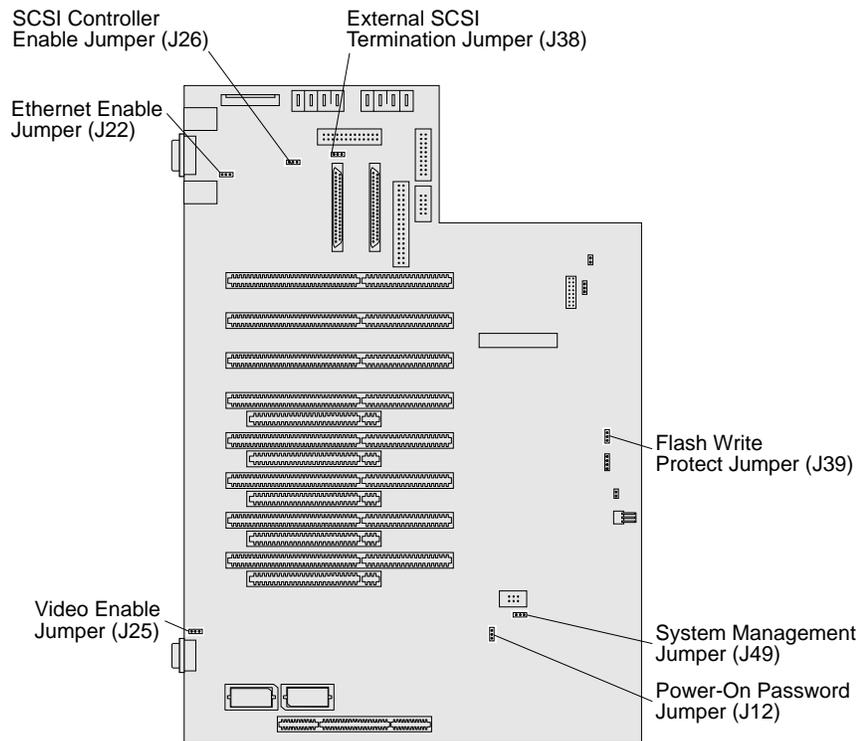


5. Slide the jumper fully onto these pins.
6. Reinstall the server cover and connect the cables (see “Completing the Installation” on page 218).

System Board Jumpers

System Board Jumpers

The following illustration shows the system board jumper block locations.



System Board Jumpers

The following table provides the system board jumper identifiers and descriptions of the jumpers.

Note: Turn off the server, and disconnect the power cord before moving any jumpers.

<i>Table 6. System Board Jumpers</i>		
Identifier	Jumper Position	Description
J12		Power-on password reset For instructions on resetting the power-on password, see “Bypassing an Unknown Power-on Password” on page 326.
J22		Ethernet controller enable
J25		Video enable
J26		SCSI controller enable Move the jumper to the disable position if you are not using the SCSI controller on the system board, for example, if you install a SCSI adapter, and plan to connect all drives to it. By disabling the system board SCSI controller, you free system resources.
J38		External SCSI termination Use the default jumper position when you install a 16-bit SCSI external device, or when no external device is attached. Use this jumper position when you install an 8-bit internal or external SCSI device.
J30		Flash update enable jumper The default jumper position enables you to update the flash BIOS on the system board.
J49		System management When your server model supports the System Management Adapter, the LogicLock features are enabled.

Bypassing an Unknown Power-on Password

Bypassing an Unknown Power-on Password

When a power-on password is set, the POST does not complete until you enter the password. If you forget the power-on password, you can regain access to the server in the following ways:

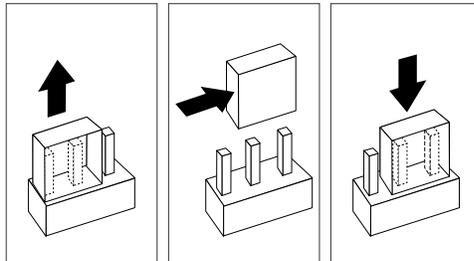
- Enter the administrator password at the power-on prompt. Start the Configuration/Setup utility programs and change the power-on password. See “Using the Power-on Password Menu” on page 100.
- Change the position of the power-on password jumper. When you restart the server, POST proceeds without prompting for the password for this startup only. Start the Configuration/Setup Utility programs and set a new power-on password.

Before you begin

- Read “Electrical Safety” on page 124 and “Handling Static-Sensitive Devices” on page 125.
- Turn off the server.
- Disconnect all external cables and power cords (see “Preparing to Add Options” on page 126).
- Remove the server cover (see page 127).

Bypassing an Unknown Power-on Password

1. Locate the power-on password jumper (J12). Refer to the figure in “System Board Jumpers” on page 324 for the location of the jumper.
2. Change the jumper's position.
 - a. Lift the jumper straight off the pin block.
 - b. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.
 - c. Slide the jumper over these pins. POST will bypass the power-on password the next time that you restart the server.

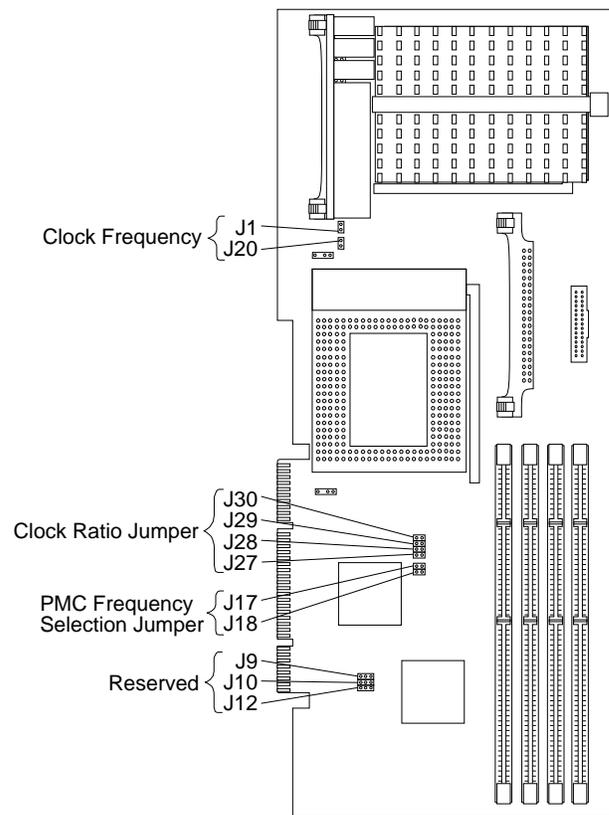


3. Replace the server cover and reconnect all external cables and power cords. (See “Completing the Installation” on page 218 if you need additional information).
4. Use the Configuration/Setup utility programs to set a new power-on password. Refer to “Using the Power-on Password Menu” on page 100 for more information.

Processor Board Jumpers

Processor Board Jumpers

The following illustration shows the processor board jumper block locations. Table 7 on page 329 contains the identifiers and description of the jumper blocks located on the processor board.



Processor Board Jumpers

Notes:

1. Turn off the server, and disconnect the power cord before moving any jumpers.
2. Refer to Table 8 on page 330 for the correct clock speed and PMC frequency selection jumper settings for the microprocessor. For example, if you have a 200 MHz microprocessor installed and the system bus speed is 66 MHz (the default), be sure that the jumpers are set to a bus-to-core ratio 3 (200/66).

MHz denotes internal clock speed of the microprocessor only; other factors also affect application performance.

Attention: If the microprocessor bus-to-core ratio is incorrect, system board components will overheat and component damage can occur. Be sure that the microprocessor bus-to-core ratio jumper is properly set.

Identifier	Default Jumper Position	Description
J1		Clock speed jumper block. The default setting is 66.66 MHz. Use the appropriate microprocessor clock speed for the microprocessor you have installed.
J20		
J30		Frequency selection jumper block. The default Core/Bus fraction is 3 (200/66 MHz).
J29		
J28		
J27		
J17		Microprocessor memory controller (PMC) frequency selection jumper block. The default is 66.66 MHz.
J18		

Processor Board Jumpers

Table 7 (Page 2 of 2). Defining Microprocessor Operating Parameters

Identifier	Default Jumper Position	Description
J9 J10 J12	  	Reserved

When you install a microprocessor, check the jumper settings carefully. Make sure that the setting for the clock speed jumper matches the clock speed of the microprocessor that you installed.

Table 8. Frequency Parameters

Speed (in MHz)	Multiplier	Clock Speed	PMC Frequency
200/66.66	J30  J29  J28  J27 	J1  J20 	J17  J18 
180/60	J30  J29  J28  J27 	J1  J20 	J17  J18 
166/66.66	J30  J29  J28  J27 	J1  J20 	J17  J18 

Appendix B. Server Records

Whenever you add options to your server, be sure to update the information in this appendix. Accurate, up-to-date records make it easier to add other options and, if the need should arise, to report a hardware problem.

Record the Identification Numbers

Record and retain the following information.

Product Name	IBM PC Server 330
Machine Type 8640 Model Number	Pentium Pro Microprocessor _____ <input type="checkbox"/> with preinstalled hard disk drive <input type="checkbox"/> without preinstalled hard disk drive
Serial Number	_____
Key Serial Number	_____
ServerGuide License Diskette Serial Number	_____

The server serial number and other identification numbers are located on a label on the rear of the server.

The server serial number is also located near the bottom on the front bezel.

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

Installed Device Records

Use the following tables to keep a record of the options installed in or attached to your system. You can also record your system's default configuration settings. This information can be helpful when you install additional options in your server or if you ever need to have your server serviced. Copy these tables before recording information in them, in case you need extra space to write new values later, when you update your system's configuration.

Device Records

Record the types and SCSI IDs for drives or devices attached to your server in the following table. If you attach a drive or other device to an adapter, be sure to record the descriptive information properly.

Location	Drive or Device Description
	Internal Devices
Bay 1	_____
Bay 2	_____
Bay 3	_____
Bay 4	_____
Bay 5	_____
Bay 6	<u>5.25-Inch CD-ROM Drive</u>
Bay 7	3.5-Inch 1.44 MB Diskette Drive
Bay 8	_____
Bay 9	_____
Bay 10	_____
<i>Note:</i> Hot-swap servers contain 10 bays. Non-hot swap servers contain nine bays.	
	External Devices
SCSI ID	_____

Table 9. Internal and External Drives and Devices

Device Records

Table 10 (Page 1 of 2). Configuration/Setup Program Defaults and Changes

Option	Default Value	New Value	Additional Information
System Summary			
Microprocessor	Pentium Pro	_____	_____
Microprocessor Speed	_____	_____	_____
Secondary Microprocessor	(Pentium Pro)*	_____	_____
Secondary Microprocessor Speed	_____	_____	_____
System Memory	640 KB	_____	_____
Extended Memory	31 MB	_____	_____
Cache Size (internal)	_____	_____	_____
Shadow RAM	384 KB	_____	_____
System ROM	E0000h — FFFFFh	_____	_____
PCI Data Parity NMI	[Enabled]	_____	_____
Diskette Drive A	1.44 MB 3.5-inch diskette drive	_____	_____
Diskette Drive B	[Not Installed]	_____	_____
Mouse	[Installed]	_____	_____
<i>Note:</i> The secondary microprocessor must have the same cache size and type, and the same clock speed as the primary microprocessor.			
System Information			
Product Data			
Flash EEPROM Revision Level	_____	_____	_____
BIOS Date	_____	_____	_____
PCI Routing			
Planar SCSI IRQ	IRQ15	_____	_____
Planar Ethernet IRQ	IRQ11	_____	_____
<i>Note:</i> The screen displays Int_A, Int_B, Int_C, and Int_D for each PCI slot. The default value for each is not routed .			
Devices and I/O Ports			
Serial Port A Address	[3F8h – IRQ 4]	_____	_____
Serial Port B Address	[2F8h – IRQ 3]	_____	_____
Infrared Connector	[Disabled]	_____	_____
Infrared DMA	[Disabled]	_____	_____
Parallel Port	[3BCh – IRQ 7]	_____	_____
Parallel Port Mode	[Standard]	_____	_____
Parallel Port Extended Mode	[_____]	_____	_____
Parallel Port DMA	[Disabled]	_____	_____
Mouse	[Installed]	_____	_____
Diskette Drive A	1.44 MB 3.5-inch diskette drive	_____	_____
Diskette Drive B	[Not Installed]	_____	_____
System Security			
Power-On Password	_____	_____	_____
Administrator Password	_____	_____	_____

Device Records

Table 10 (Page 2 of 2). Configuration/Setup Program Defaults and Changes

Option	Default Value	New Value	Additional Information
Start Options			
Keyboard NumLock State	[On]	_____	_____
Keyboard Speed	[Fast]	_____	_____
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]	_____	_____
Virus Detection*	[Disabled]	_____	_____
<i>Note:</i> The Virus Detection test checks for changes to the boot sector.			
Advanced Setup			
Cache Control			
Cache State	[Enabled]	_____	_____
Cache Type	[Write-Back]	_____	_____
Cache Size	_____	_____	_____
Video BIOS Caching	[Enabled]	_____	_____
Video Buffer Caching	[Disabled]	_____	_____
Option ROM Caching	[Disabled]	_____	_____
ROM Shadowing			
F0000h - FFFFFh (System BIOS)	Enabled	_____	_____
E0000h - EFFFFh (System BIOS)	Enabled	_____	_____
D8000h - DFFFFh	[Disabled]	_____	_____
D0000h - D7FFFh	[Disabled]	_____	_____
C8000h - CFFFFh	[Enabled]	_____	_____
C0000h - C7FFFh (Video BIOS)	Enabled	_____	_____
PCI Bus Control			
PCI Data Parity NMI	[Enabled]	_____	_____
CPU-PCI Write Buffers	[Disabled]	_____	_____
SCSI ROM Address	[C8000]	_____	_____
PCI Interrupt Requests			
Planar SCSI IRQ	[Automatic]	_____	_____
Planar Ethernet IRQ	[Automatic]	_____	_____
Slot1 IntA IRQ	[Automatic]	_____	_____
Slot2 IntA IRQ	[Automatic]	_____	_____
Slot3 IntA IRQ	[Automatic]	_____	_____
Slot4 IntA IRQ	[Automatic]	_____	_____
Slot5 IntA IRQ	[Automatic]	_____	_____
<i>Note:</i> The screen displays IntA, IntB, IntC, and IntD for each slot. The default value for each is Automatic .			

Device Records

The following table shows the defaults for system memory and extended memory in your server. Record changes to existing memory and upgrades here.

Option	Default Value	New Value	Additional Information
System Memory	640 KB	_____	_____
Extended Memory	31 MB	_____	_____
Connector J2	_____	_____	32 MB Kit <input type="checkbox"/> 64 MB Kit <input type="checkbox"/> 128 MB <input type="checkbox"/>
Connector J3	_____	_____	32 MB Kit <input type="checkbox"/> 64 MB Kit <input type="checkbox"/> 128 MB <input type="checkbox"/>
Connector J4	_____	_____	32 MB Kit <input type="checkbox"/> 64 MB Kit <input type="checkbox"/> 128 MB <input type="checkbox"/>
Connector J5	_____	_____	32 MB Kit <input type="checkbox"/> 64 MB Kit <input type="checkbox"/> 128 MB <input type="checkbox"/>
Total Memory	_____	_____	_____

Table 11. RAM Default Settings and Changes

Record expansion slot configuration information for your server in the following table.

Slot	Type	IRQ	DMA	I/O Port	ROM/RAM Address	Option Description and Additional Information
9	EISA	_____	_____	_____	_____	_____
8	EISA	_____	_____	_____	_____	_____
7	EISA	_____	_____	_____	_____	_____
6	EISA	_____	_____	_____	_____	_____
5	Shared	_____	_____	_____	_____	_____
4	Shared	_____	_____	_____	_____	_____
3	Shared	_____	_____	_____	_____	_____
2	Shared	_____	_____	_____	_____	_____
1	PCI	_____	_____	_____	_____	_____

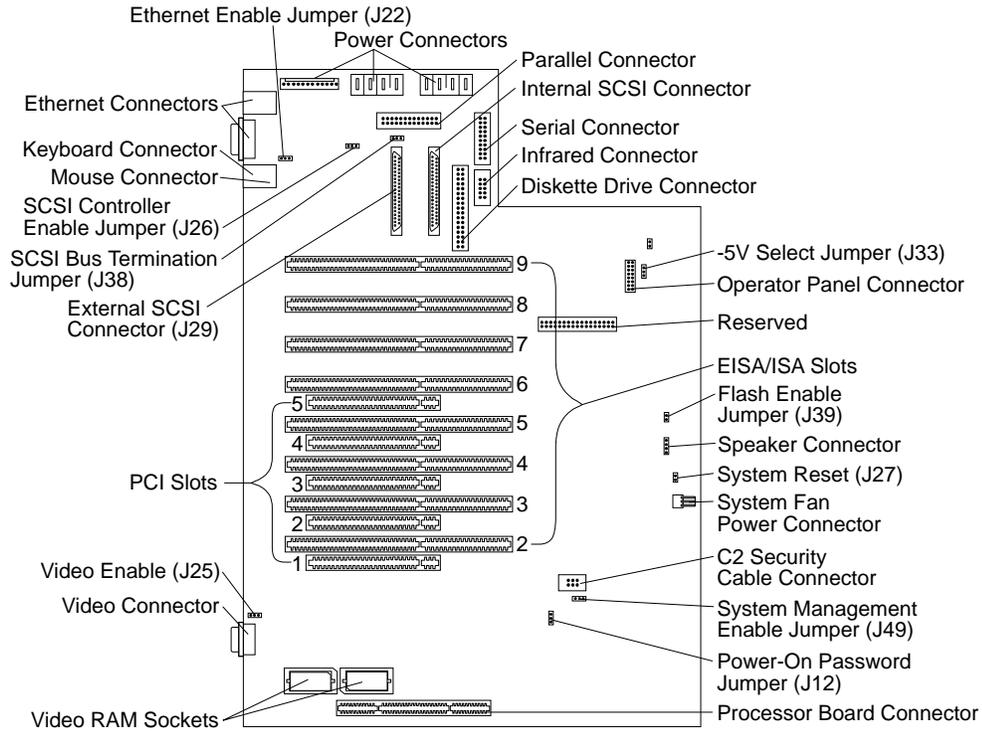
Notes:

- Slots 2 through 5 are shared by PCI and EISA connectors.
- Before setting values, review "Resolving Configuration Conflicts" on page 112 and follow the instructions for avoiding configuration conflicts.

Table 12. Expansion Slot Configuration Information

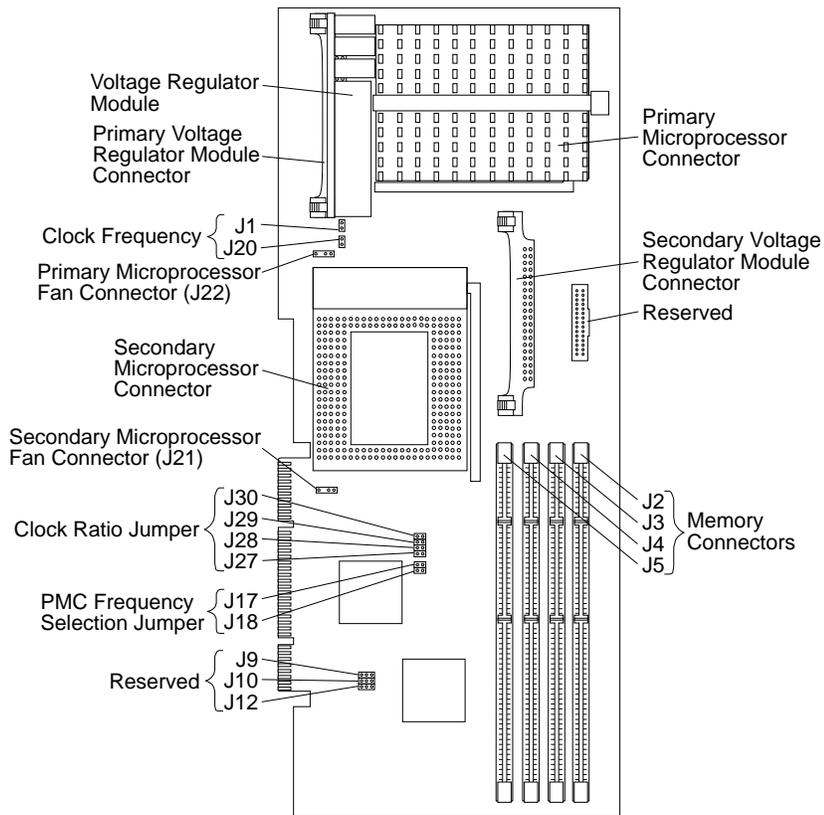
System Board Component Locations

The following layout of the system board identifies server components. You might need to refer to the diagram when recording information in the tables in this appendix.



Processor Board Component Locations

A simplified layout of the processor board is shown in the following diagram.



Appendix C. Ethernet Cable Specifications

This appendix contains the specifications for the unshielded twisted-pair (UTP) and attachment unit interface (AUI) cables that can be used to connect the server to an IEEE Standard 802.3 network.

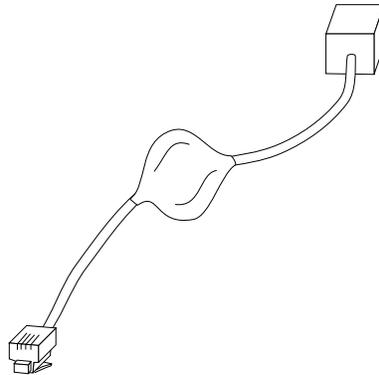
10BASE-T Cables

To connect to the server's 10BASE-T port to a 10BASE-T port on a repeater, use a UTP cable with RJ-45 connectors at both ends.

The cables used in a 10BASE-T link segment do not require grounding. However, all of the devices connected to the cables must be grounded.

If your server comes with an Ethernet interface cable, you must install it to comply with FCC requirements.

1. Attach the Ethernet interface cable to the RJ-45 connector on the server.



2. Connect the male end of the UTP cable to the female end of the interface cable.
3. Connect the UTP cable to the repeater.
 - a. If the port on the repeater is a crossover port (also called an MDI-X port), use a UTP cable that is wired as a straight-through cable.

10BASE-T Cables

- b. If the port on the repeater is not a crossover port (also known as an MDI port), use a UTP cable that is wired as a crossover cable.

Do not use telephone extension cables to connect the server to a 10BASE-T repeater. The wire pairs in those cables are not twisted and the cable does not meet other requirements for use in a 10BASE-T network. You can identify telephone extension cables by their flat and thin appearance. UTP cables are rounder and thicker than telephone extension cables.

Table 13 describes the specifications for UTP cable used in 10BASE-T link segments.

Table 13. Cabling Specifications for 10BASE-T Link Segments

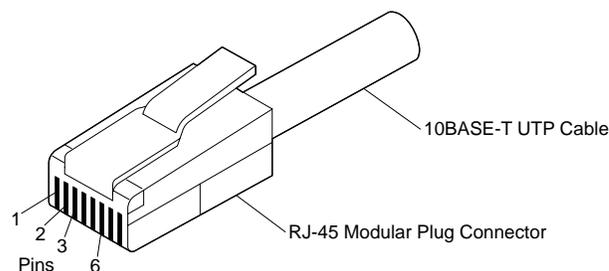
Characteristic	Specification ¹
Cable type	UTP cable with 2 twisted pairs of 22, 24, or 26 AWG ²
Nominal impedance	100 ohms
Velocity of propagation	0.585 c ³
Maximum attenuation	8 to 10 dB per 100 m at 10 MHz

¹ Cables that have been certified as EIA/TIA-568 Category 3, 4, and 5 are among the cable types that meet all of the 10BASE-T specifications.

² The cable can contain two to four twisted pairs, but only two of the pairs will be used by the 10BASE-T network.

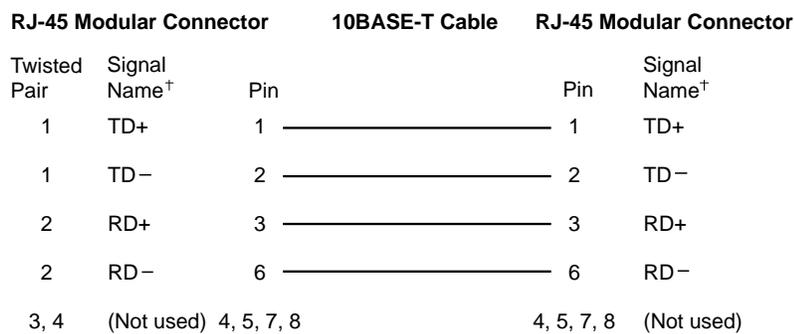
³ The c represents the velocity of light traveling in a vacuum, which is 300 000 km/sec (186 400 mi/sec).

The following figure illustrates the RJ-45 connector.



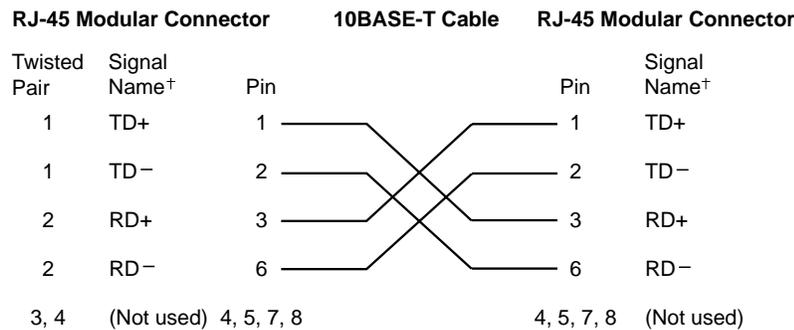
AUI Cable

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



[†] Relative to the device connected to the Adapter

The following figure illustrates the wiring in crossover cables.



[†] Relative to the device connected to the Adapter

AUI Cable

To connect the server's AUI port to a 10BASE5 segment, use an AUI cable to connect the server to the 10BASE5 transceiver. An AUI cable can also be used to connect the server's AUI port to a 10BASE2 or 10BASE-F transceiver.

AUI Cable

The following illustration shows the server's AUI port.

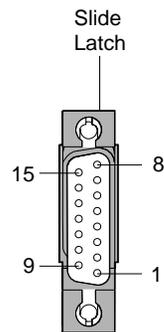


Table 14 provides the pin assignments for the server AUI port.

Table 14. Pin Assignments for AUI Port

Pin Number	Description
3	Data out +
10	Data out -
11	Digital ground
5	Data in +
12	Data in -
4	Digital ground
7	no connection
15	no connection
8	Digital ground
2	Collision in +
9	Collision in -
1	Digital ground
6	Digital ground
13	+ 12 volts
14	Digital ground
Shell	Frame ground

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PRODIGY	Prodigy Service Company
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QAPLUS/PRO	DiagSoft, Inc.
SCO	The Santa Cruz Operation, Inc.
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Numerics

- 1-800 telephone assistance 17, 316
- 1/4-inch SCSI tape backup drive 150, 155
- 10BASE-F transceiver 341
- 10BASE-T port 339
- 10BASE2 transceiver 341
- 10BASE5 transceiver 341
- 16-bit devices
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