



Netfinity 5000 Server

Hardware Information and Procedures



Netfinity 5000 Server

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Note

Before using this information and the product it supports, be sure to read the general information in “Product Warranties and Notices” in the “Legal and Safety Information” section of this *Server Library*.

Second Edition (January 1999)

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Safety Information Statements



Before installing this product, read the Safety Information.

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

安裝本產品之前，請先閱讀「安全資訊」。

1



DANGER

To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.

To avoid shock hazard:

- The power cord must be connected to a properly wired and earthed receptacle.
- Any equipment to which this product will be attached must also be connected to properly wired receptacles.

When possible, use one hand to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, connect and disconnect cables as described following when installing, moving, or opening covers of this product or attached devices.

To Connect

1. Turn Everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to receptacles.
4. Attach power cord(s) to outlet.
5. Turn device ON.

To Disconnect

1. Turn Everything OFF.
2. First, remove power cord(s) from outlet.
3. Remove signal cables from receptacles.
4. Remove all cables from devices.

NOTE: In the UK, by law, the telephone cable must be connected after the power cord.

NOTE: In the UK, the power cord must be disconnected after the telephone cable.

Lithium Battery Notice

2



CAUTION:

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

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

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

Laser Compliance Statement

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

3



CAUTION:

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

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

Removing the covers of the CD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. Do not remove the CD-ROM drive covers.

4

DANGER

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

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

About This Book

This book provides instructions on how to set up and configure your Netfinity 5000 server 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 “Express Setup and Installation” section of this *Server Library* for information on unpacking the server, attaching cables, and installing the operating system.

How This Book is Organized

Chapter 1, “Introducing Your Netfinity 5000,” provides a general introduction to using your server.

Chapter 2, “Arranging Your Workspace,” contains some planning considerations and instructions for arranging your workspace.

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

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, “Installing a Server in a Rack Enclosure,” describes how to install the server in a server rack enclosure.

Chapter 6, “Solving Problems,” includes an overview of the diagnostic tools, instructions for testing the server, lists of error messages, and troubleshooting charts. This chapter also contains information about checking the server for damage and resolving configuration conflicts.

Chapter 7, “Server Records and Specifications,” provides a section to record and update important information about your server, including serial numbers, key number, and device records. In addition to server records, this chapter contains the server specifications, such as: dimensions, system board layout, and switch locations and settings.

A glossary and 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.

Related Publications

- **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 *IBM Netfinity 5000 Hardware Maintenance Manual* and the *IBM Netfinity 5000 Hardware Maintenance Manual Supplement* are available for purchase. These manuals contain error codes, advanced diagnostic procedures, and a parts catalog for most models. These manuals are intended for the trained service technician. (Diagnostic diskettes are not included.)

The following manuals pertain to the server's Ethernet controller and are available for purchase:

IBM LAN Technical Reference IEEE 802.2 and NETBIOS API, SC30-3587

IBM Transmission Control Protocol/Internet Protocol Version 2.1 for DOS: Programmer's Reference, SC31-7046

IBM LAN Server Command and Utilities, S10H-9686

Guide to LAN Server Books, S10H-9688

DOS LAN Services and User's Guide, S10H-9684

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

- In the U.S., Canada, and Puerto Rico, call 1-800-879-2755.
- In other countries, contact your IBM reseller or IBM marketing representative.

Chapter 1. Introducing Your Netfinity 5000

We appreciate your decision to purchase an IBM Netfinity Server. Your Netfinity 5000 server is a high-performance server with the capability of microprocessor upgrade to a symmetric multiprocessing (SMP) server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

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

Your IBM Netfinity Server comes with a three-year limited warranty and IBM Netfinity Server Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your Netfinity Server model and other IBM Netfinity Server products at the following address:
<http://www.pc.ibm.com/us/netfinity/>

The *Server Library* binder that comes with your server contains several compact discs (CDs). These CDs provide menu-driven programs to help simplify your operating system installation. The CDs also contain numerous application programs (no software activation keys required) and many other features at no additional cost. For more information, refer to the "ServerGuide and Netfinity Manager Information" section of this *Server Library*.

If you have not yet set up your server, refer to the "Express Setup and Installation" section of this *Server Library* for information on unpacking the server, attaching cables, and installing the operating system.

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

5



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:
Use safe lifting practices when lifting your machine.

This chapter contains:

Features at a Glance	3
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Controls and Indicators	7
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Input/Output Connectors	12
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Features at a Glance

The following table summarizes the features of the Netfinity 5000 server.

<p>Microprocessor</p> <ul style="list-style-type: none"> • Intel® Pentium® II or Pentium III microprocessor with MMX™ technology • 512 KB of level-2 cache (min) <p>Memory</p> <ul style="list-style-type: none"> • Standard: 64 MB (min), expandable to 1 GB • 100 MHz, error correcting code (ECC) registered synchronous dynamic random access memory (SDRAM) • Four dual-inline memory-module (DIMM) sockets <p>Diskette Drive</p> <ul style="list-style-type: none"> • One 3.5-inch, 1.44 MB <p>Hard Disk Drives</p> <ul style="list-style-type: none"> • Up to five hot-swappable internal hard disk drives are supported <p>CD-ROM Drive</p> <ul style="list-style-type: none"> • Standard: IDE <p>Keyboard and Auxiliary Device (tower models)</p> <ul style="list-style-type: none"> • Keyboard • Mouse <p>Expansion Slots</p> <p>Supports up to five adapters</p> <ul style="list-style-type: none"> • Two shared PCI/ISA slots • Three dedicated PCI slots 	<p>Expansion Bays</p> <ul style="list-style-type: none"> • One 3.5-inch diskette drive bay • Two 5.25-inch drive bays, open bay supports half-high SCSI tape drive • Five 3.5-inch drive bays, hot-swappable <p>Upgradable Microcode</p> <ul style="list-style-type: none"> • BIOS, diagnostics, and Netfinity Advanced System Management Processor code upgrades (when available) can update EEPROMs on the system board <p>Power Supply</p> <ul style="list-style-type: none"> • 350 W with voltage auto-selection (110, 120, 220, 240 V ac) and power redundancy <ul style="list-style-type: none"> – Standard—350 W non-redundant, 175 W redundant – Optional—Additional 175 W power supply available for 350 W redundancy • Built-in overload and surge protection • Automatic restart after a momentary loss of power 	<p>Integrated Functions</p> <ul style="list-style-type: none"> • Two serial ports • Two universal serial bus (USB) ports • System management port (C) • Advanced system management processor on system board • One IDE internal connector, supports the system IDE CD-ROM drive • 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) • Full-duplex 10/100 Mbps Ethernet controller <ul style="list-style-type: none"> – 10BASE-T/100BASE-TX port – Redundant Ethernet capability, through the use of an optional network interface card (NIC) • Video controller port, super video graphics array (SVGA) • 1 MB video memory <p>Security Features</p> <ul style="list-style-type: none"> • Bolt-down capability • Door lock (tower model only) • Power-on and administrator passwords • Selectable startup sequence
--	--	--

What Your IBM Netfinity 5000 Server Offers

The IBM Netfinity 5000 server is designed to be cost effective, powerful, and flexible. Your server offers:

- Impressive performance using an innovative approach to SMP

The Netfinity 5000 server supports up to two Pentium II or two Pentium III microprocessors. Your server comes with one Pentium II or Pentium III microprocessor installed on the system board. You can install multiple microprocessors in your server to enhance performance and provide SMP capability.

- Large system memory

The memory subsystem in your server supports up to 1 GB¹ of system memory. The memory controller provides error correcting code (ECC) support for 100 MHz SDRAM memory.

- Integrated network environment support

Your server supports various network environments. Your Netfinity 5000 server comes with a 10/100 Mbps Ethernet Controller on the system board. This Ethernet controller has an interface for connecting to 10-Mbps or 100-Mbps networks. The server automatically selects between 10BASE-T and 100BASE-TX. The controller provides full-duplex (FDX) capability. Full duplex allows simultaneous transmission and reception of data on the Ethernet local area network (LAN).

- Redundant network interface card

The addition of an optional, redundant network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic associated with this primary connection is automatically switched to the redundant NIC. This switching occurs without data loss and without user intervention.

- Redundant power capabilities

The 350-watt power supply in your server provides redundant power. If your server load is less than 175 watts and a problem occurs with one of the power modules in the power supply, the other module takes over the load. For power loads above 175 watts, you can install a second, optional, power supply to provide a full 350 watts of redundant power. If a problem occurs in either power module in the primary power supply, the second power supply takes over the load for that module.

- System-management capabilities

Your Netfinity 5000 server is shipped with a Netfinity Advanced System Management Processor on the system board. This processor, in conjunction with the Netfinity Manager provided on your ServerGuide CDs, allows you to manage the functions of the Netfinity 5000 server locally and remotely. The Advanced System Management processor also provides system monitoring, event recording, and dial-out alert capability.

¹ When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes; total user-accessible capacity may vary depending on operating environment.

Note: The Advanced System Management processor is sometimes referred to as the service processor.

Refer to the “Advanced System Management Information” section of this *Server Library* for more information.

- IBM ServerGuide CDs

The ServerGuide CDs included with IBM Netfinity servers provide programs to help you set up your server and install the network operating system (NOS). The ServerGuide program detects the hardware options installed, and provides the correct configuration program and device drivers. In addition, the ServerGuide CDs include a variety of application programs such as IBM Update Connector (to help keep your server BIOS and microcode updated) and IBM Netfinity Manager (for systems management).

For more information about the ServerGuide CDs, see the “ServerGuide and Netfinity Manager Information” section of this *Server Library*.

Reliability, Availability, and Serviceability Features

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

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

- Menu-driven configuration programs
- Menu-driven SCSI configuration programs
- Menu-driven setup programs
- Menu-driven diagnostic programs
- Power-on self-test (POST)
- Customer support center 24 hours per day²
- Hot-swap hard disk drive bays
- Cooling fans with error-sensing capability
- Error checking and correcting (ECC) memory
- Error codes and messages
- Remote systems management through the Netfinity Advanced System Management controller
- Remote system problem-determination support
- Upgradable BIOS, diagnostics, and Netfinity Advanced System Management Processor code
- Recovery for damaged BIOS
- Automatic restart after power failure
- Automatic restart on initial system-management processor error condition
- Parity checking on the SCSI bus, keyboard interface, and serial ports
- Monitoring and reporting the status of hard disk drives, power supplies, and cooling systems through status indicators on the front and back of the server and on the system board
- Early warning of failing hard disk drives and memory
- Vital product data (VPD), including serial number information and replacement part numbers, stored in nonvolatile memory, making remote maintenance of your server more efficient
- Standard redundant power supply
- Redundant power supply option for enhanced availability
- Redundant Ethernet capabilities (with optional adapter)

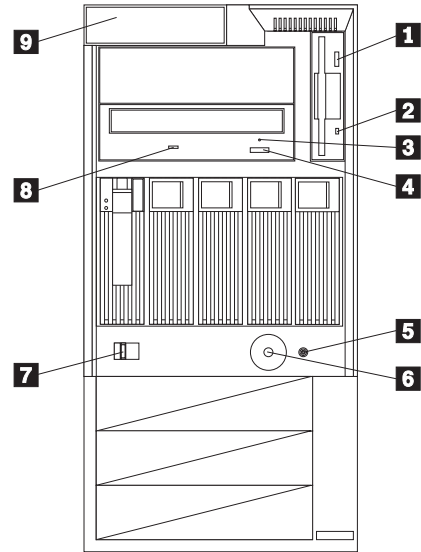
² Response time will vary, depending on the number and nature of calls received.

Controls and Indicators

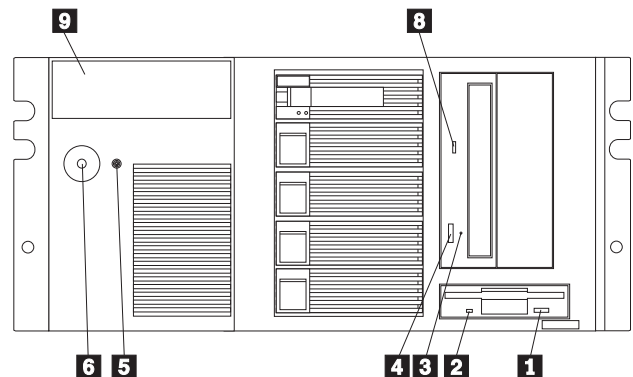
The most commonly used controls and status indicators are on the front of your server.

Server Controls

Tower model



Rack model



- 1 Diskette-Eject Button:** Press this button to release a diskette from the drive.
 - 2 Diskette Drive In-Use Light:** This light comes on when the diskette drive is accessed.
 - 3 CD-ROM Manual Tray-Release Opening:** Insert a straightened paper clip in the opening to release the CD-ROM tray when using the CD-ROM eject button is not successful.
 - 4 CD-ROM Eject Button:** Press this button to release a CD from the CD-ROM drive.
- Note:** If the CD-ROM tray does not extend out, insert the end of a straightened paper clip into the manual tray-release opening and gently pull the tray open.
- 5 Reset Button:** Press this button to reset the server.

- 6 Power-on switch:** Use this switch to turn on your server, or to return the server to *Standby mode* (power is present but the server is not turned on).

Important

After you plug the server power cord into an outlet, wait 20 seconds before pressing the power switch. (During this time, the system-management processor is initializing and the power-on switch does not respond.)

6



CAUTION:

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

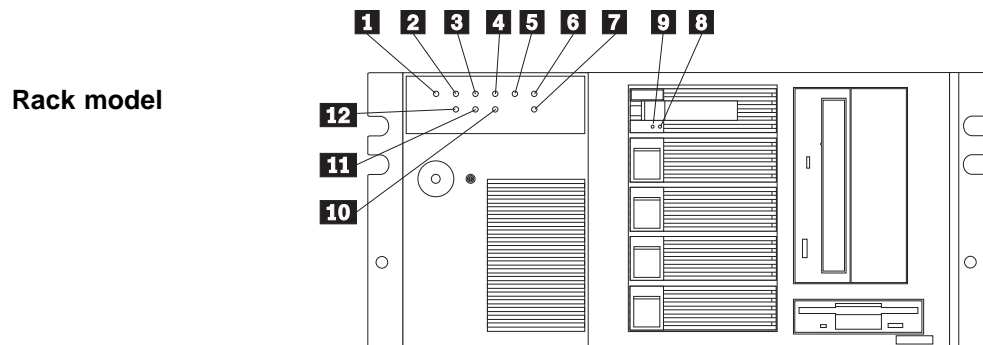
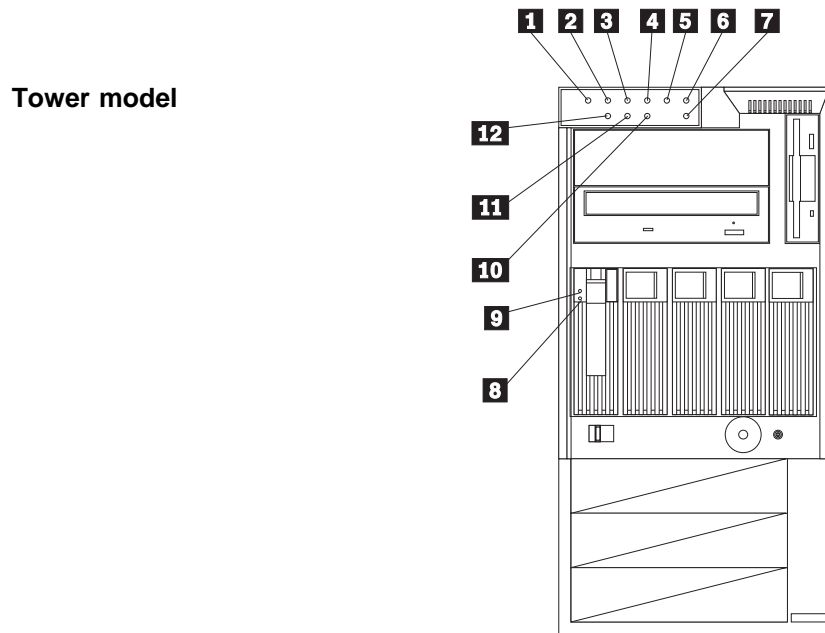
The automatic restart feature, which enables the server to restart following a momentary power loss, means that the server is never completely turned off. Do not set the server to the Standby mode if any drive in-use light is on. This might damage the information stored on a hard disk drive or on a diskette. A Power-On Switch protector, which prevents the Power-On Switch from being pushed accidentally, is shipped with the server.

To toggle the server between Standby mode and actively running, press and release the Power-On Switch.

- 7 Side-Cover Release Lever:** Use this lever to release the left-side cover.
- 8 CD-ROM Drive In-Use Light:** This light comes on when the CD-ROM drive is accessed.
- 9 Operator LED Panel** This panel contains LEDs that light to indicate conditions on the server, such as power on or a system error (see “Status Indicators” on page 9).










Status Indicators

The following illustrations identify the indicators located on the front of the server.



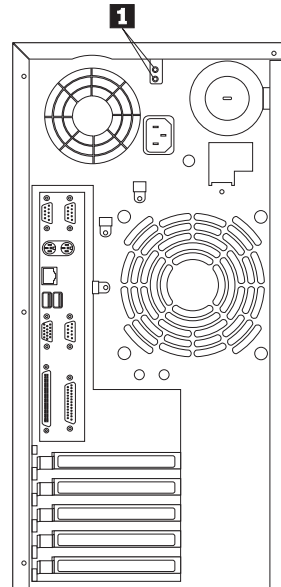
- 1** ● **Power-On Light:** This green LED blinks when the server is in Standby mode (power is present but the server is not turned on). The blinking changes to a solid (continuous) light when you turn on your server remotely (Unattended mode) or by pressing the Power-On Switch. If this light is not on, the power cord is not connected or the power supply has failed.
- 2** OK **POST Complete Light:** This green LED lights when the server completes the power-on self-test (POST) without any errors.
- 3** ☐ **SCSI Hard Disk Drive In-Use Light:** This green LED lights when your server is accessing a SCSI device. If this light remains illuminated, it might indicate that either the SCSI bus or the system microprocessor has stopped.

Controls and Indicators

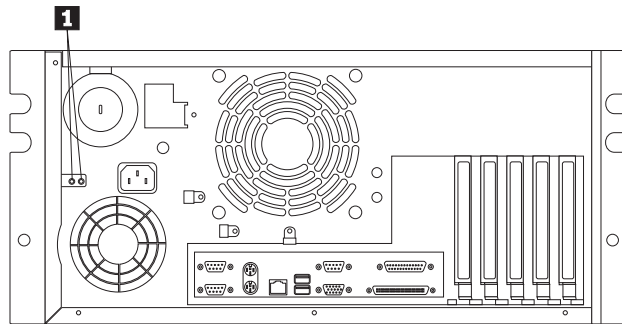
- 4**  **Primary Microprocessor Activity Light:** This green LED blinks to indicate the activity of a microprocessor installed in the primary microprocessor socket. The LED comes on during POST to indicate the presence of the microprocessor.
- 5**  **Secondary Microprocessor Activity Light:** This green 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.
- 6**  **System Error Light:** This amber LED shows that a system error occurred. System errors can include high temperature, excess current, or failure or errors in the microprocessor, system fan, memory, PCI bus, SCSI bus, USB, hard disk drive, diskette drive, serial port, keyboard interface, or power supply. When this LED is on, one or more LEDs on the system board also might be on, indicating where the error occurred (see “System Board LEDs” on page 166).
- 7**  **Reserved:** This LED is reserved for future use.
- 8**  **Hard Disk Drive Status Light (Amber):** In a RAID environment, this amber LED lights continuously when the drive is faulty and needs to be replaced. You can replace these hot-swappable drives without turning off the server. If you do not have a RAID environment, this LED is not operational.
- 9**  **Hard Disk Drive Activity Light (Green):** This green LED lights when the hard disk drive is being accessed.
- 10**  **Ethernet Transmit/Receive Activity Light:** This green LED shows transmission and reception activity on the network.
- 11**  **Ethernet Link Status Light:** This green LED shows an active link connection on the 10BASE-T or 100BASE-TX interface.
- 12**  **Ethernet Speed Light:** This green LED lights when the Ethernet LAN speed is 100 Mbps.

The following illustrations identify the indicators located on the back of the server.

Tower model



Rack model

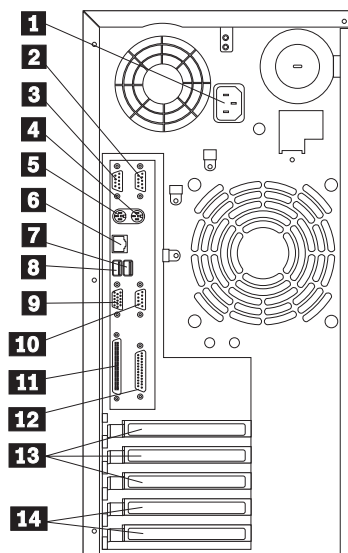


- 1 Power Supply Lights:** These green LEDs indicate a power good status for each of the 175-watt modules in the power supply. If any power supply light is not illuminated when the Power-On Light on the front of the server is on, there is a problem with that power supply. The power supply shipped with the server has two lights, one for each module in the power supply. The optional additional power supply has one power module and one green LED. See “Installing or Replacing the Power Supply” on page 71 for more information about the power supplies.

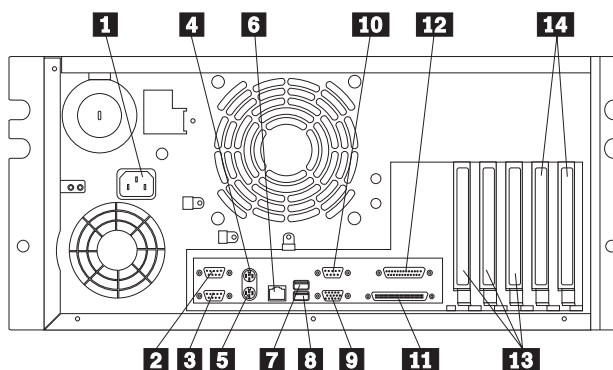
Input/Output Connectors

The following illustrations identify the connectors located on the back of the server.

Tower model



Rack model



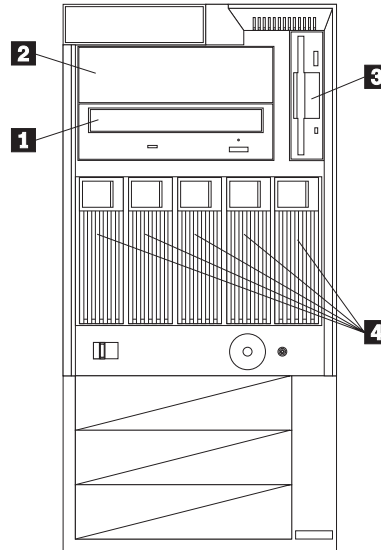
- 1 Power Connector:** The server power cable connects here.
- 2 Serial Connector A:** Signal cables for modems or other serial devices connect here to the 9-pin serial connector for serial port A. See “Devices and I/O Ports” on page 23 for port assignment information.
- 3 Serial Connector B:** Signal cables for modems or other serial devices connect here to the 9-pin serial connector for serial port B. See “Devices and I/O Ports” on page 23 for port assignment information.
- 4 Mouse Connector:** The mouse cable connects here. This connector is sometimes called the auxiliary-device port.
- 5 Keyboard Connector:** The keyboard cable connects here.
- 6 Ethernet Connector:** An unshielded, twisted-pair cable with an RJ-45 connector attaches here to the 10/100 Ethernet controller on the system board.

- 7 Universal Serial Bus (USB) Connector 1:** Attach I/O devices with universal serial bus (USB) connectors to USB connector 1. You need a 4-pin cable to connect a device to this port.
- 8 Universal Serial Bus (USB) Connector 2:** Attach I/O devices with universal serial bus (USB) connectors to USB connector 2. You need a 4-pin cable to connect a device to this port.
- 9 Monitor Connector:** The monitor signal cable connects here.
- 10 Management C Connector:** The cable to attach a modem that is dedicated to communication with the system-management processor connects here.
- 11 SCSI Connector:** External SCSI devices attach here. For more information, see “Connecting External Options” on page 72.
- 12 Parallel Connector:** A signal cable for a parallel device, such as a printer, connects here.
- 13 PCI Expansion Slots:** Cables to the external connectors on PCI adapters connect here (slots 3, 4, and 5).
- 14 PCI/ISA Expansion Slots:** Cables to the external connectors on either ISA or PCI adapters connect here (slots 1 and 2).

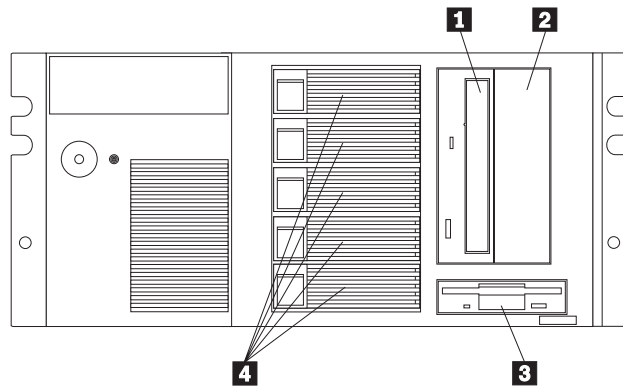
Expansion Bays

Your server comes with one 3.5-inch, 1.44 MB diskette drive, and one 5.25-inch CD-ROM drive. The following illustrations show the server front view with the door (if any) removed.

Tower model



Rack model



- 1 CD-ROM Drive:** Your server comes with an IDE CD-ROM drive.
- 2 Open Bay (5.25-inch):** The design of your server accommodates an additional 5.25-inch half-height device, such as tape or a rewritable optical disk drive.

For information on the supported types of drives and their installation, see “Installing or Removing Internal Drives” on page 56.

- 3 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.
- 4 Open Bays (3.5-inch):** The 3.5-inch open bays are for hot-swap SCSI hard disk drives only.

For information on the supported types of drives and their installation, see “Installing or Removing Internal Drives” on page 56.

Chapter 2. Arranging Your Workspace

This chapter contains information on arranging your workspace. You also can refer to the “Getting Help Information” section of this *Server Library* for information about obtaining ergonomic and environmental information from the World Wide Web.

If you have not already done so, unpack your server. Follow the instructions in the “Express Setup and Installation” section of this *Server Library*.

If you have a rack model, you can install your options and operating system before you install the server in the rack enclosure.

This chapter contains:

Arranging Your Workspace	16
Comfort	16
Glare and Lighting	16
Air Circulation	17
Electrical Outlets and Cable Lengths	17
Additional Planning Considerations	17

Arranging Your Workspace

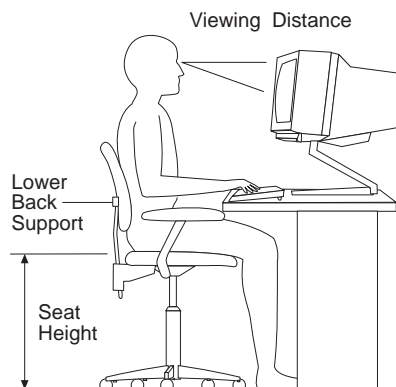
To get the most from your server, arrange both the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

Comfort

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

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

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



Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance, usually 51 to 61 cm (20 to 24 in.), and position it so you can view it without having to twist your body. Also position other equipment you use regularly, such as the telephone or a mouse, within easy reach.

Glare and Lighting

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

Where it is impossible to avoid reflections or to adjust the lighting, an antiglare filter placed over the screen might be helpful. However, these filters might affect the

clarity of the image on the screen; try them only after you have exhausted other methods of reducing glare.

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

Air Circulation

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

Electrical Outlets and Cable Lengths

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

When arranging your workspace:

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

See “Power Cords” on page 172 or refer to the “Legal and Safety Information” section of this *Server Library* for information about power cords for use in your country or region.

Additional Planning Considerations

- Make sure you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.

7



CAUTION:

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

- Place your server in a location that is dry. Rain or spilled liquids might damage your server.
- Leave about 127 mm (5 in.) of space around the front and rear of your server to allow the server's cooling system to work properly.

Arranging Your Workspace

Chapter 3. Configuring Your Server

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

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

This chapter contains:

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Using the Configuration/Setup Utility	22
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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. Because of this flexibility, you can choose from among thousands of adapters and devices that comply with any of the following standards:

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

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

Your server comes with the following hardware configuration utility programs:

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

Before installing a new device or program, read the documentation that comes with it. Reading the instructions helps you 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 switches on the server system board.
See “System Board Switches” on page 168 for the meanings of the system board switches.
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 39.
5. Install software programs.

Refer to the information provided with the “ServerGuide and Netfinity Manager Information” section of this *Server Library* and with your operating system for more information.

6. Resolve configuration conflicts.

See “Resolving Configuration Conflicts” on page 30.

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.

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 nonvolatile random-access memory (NVRAM). While the server is powered off, the configuration information remains available for the next system startup.

Always run the Configuration/Setup Utility program if you add or remove 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 option before making changes. Also, record the current settings (see Chapter 7, “Server Records and Specifications” on page 159) before making any changes.

To start the Configuration/Setup Utility program:

1. Turn on the server and watch the screen.
2. When the messages Press F1 for Configuration/Setup and Press F2 for Diagnostics appear, select the action you need.

- To configure your server, press F1 to select **Configuration/Setup Utility**.

The Configuration/Setup Utility main menu appears. For information about the menus, see “Using the Configuration/Setup Utility” on page 22.

Note: If you enter a power-on password and an administrator password has been set, a limited menu appears on the screen. To access the full Configuration/Setup Utility menu, you must enter the administrator password.

- To run the system diagnostics, press F2 to select **Diagnostic Utility**.

The Diagnostic Utility main menu appears. For information about running the system diagnostics, see “Diagnostic Test Programs” on page 109.

Important

If a defective PCI adapter is causing the system to stop responding during startup, you can press **Alt+F1** here. This will cause the server to bypass PCI device initialization (except video) and go directly to the **Configuration/Setup Utility**, where you can disable the defective PCI adapter. Disabling the defective PCI adapter should enable you to complete a normal startup when you restart the server.

Using the Configuration/Setup Utility

From the Configuration/Setup Utility program main menu you can 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. To view the full Configuration/Setup Utility menu you must enter the administrator password.
2. The choices on some menus might differ slightly, depending on the BIOS version that comes with your server.

To change configuration settings:

1. Use the Up Arrow (↑) key to select the item you want to change; then, press **Enter**.
2. Select the configuration setting you want to change. Use the Right Arrow (→) or Left Arrow (←) key to highlight the menu, if needed.
3. Use the Right Arrow (→) or Left Arrow (←) key to select the appropriate setting for the selected item.
4. Repeat Steps 1 through 3 for each setting that you want to change. Press **Esc** to return to the Configuration/Setup Utility main menu.
5. After making changes, you can select:
 - **Save Settings** to save the selected changes.
 - **Restore Settings** to delete the selected changes.
 - **Load Default Settings** to cancel the changes and restore the factory settings.
6. To exit from the Configuration/Setup Utility main menu, select **Exit Setup**.
7. The system prompts you to confirm your choice. You can return to the Configuration/Setup Utility main menu, or exit.

System Summary

Select this choice to display configuration information, such as 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.

System Information

Select this choice to display information about your Netfinity 5000 server, and to view the interrupt request (IRQ) settings for the SCSI and Ethernet controllers on the system board, and for other PCI and ISA adapters that you purchase and install.

Changes that you make on other menus might appear on this summary screen.

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.

System Card Data

Select this choice to view the system board model, submodel, system serial number, system board identifier, DASD backplane identifier, power backplane identifier, and identifiers for power supply 1 and power supply 2.

PCI Routing

Select this choice to view the interrupt request (IRQ) settings for PCI adapters and for the Ethernet, SCSI, and other controllers on the system board. See “PCI Bus Control” on page 29 for information about changing the PCI IRQ settings.

Devices and I/O Ports

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

Note: Serial port A can be shared by the system-management processor and operating system. Serial port B is used by the operating system only. Management port C is controlled exclusively by the system-management processor, cannot be used by the operating system, and cannot be configured using the Configuration/Setup Utility program. See the “Advanced System Management Information” section of this *Server Library* for information about configuring serial ports A and C.

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

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

You can configure the parallel port as standard, as bidirectional, as an Extended Capabilities Port (ECP), or as an Enhanced Parallel Port (EPP). Bidirectional, ECP, and EPP are all bidirectional modes; in all three modes, data can be both read from and written to a device. ECP and EPP are industry-standard, high-performance bidirectional modes. Which one of these modes you choose depends on what mode your device supports.

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

You can configure the mouse and diskette controller as enabled or disabled, and configure the type of diskette drive.

You can view the type of video controller and the amount of video memory installed.

Using the Configuration/Setup Utility

You can configure the IDE channel (enabled or disabled) and view the IDE Primary Master Device (type, size, transfer selection and mode, and logical block addressing (LBA) mode).

To display or change the port assignments:

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

Date and Time

Select this choice to set the system date and time.

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

Select **Date and Time**; then, use the Left Arrow (←) or Right Arrow (→) key to advance through each data field. Type the new information; the system saves the information as you type it.

System Security

To control access to the information in your server, you can implement security features, such as adding passwords and defining a system owner's name that displays during startup. Implementing these security measures helps you to ensure the integrity of the data and programs that are stored in your server.

Note: The default values for all security-related data fields are given in Table 14 on page 162 and following.

After setting a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse, but allows the server to start the operating system. The keyboard and mouse remain locked until you enter the correct password.

To set, change, or delete a password:

1. Select **System Security**.
2. Select the password that you want to change.
3. Follow the instructions on the screen.

After you have set a power-on or administrator password, you must enter the password whenever 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. You can access all choices on the Configuration/Setup Utility program main menu.
Power-on password only	<ul style="list-style-type: none"> You must enter the password to complete the system startup. You can access all choices on the Configuration/Setup Utility program main menu. If you forget the power-on password, you can regain access to the server by using switch 8 on the system board. See “Using the Power-on Password Menu” on page 25 for details.
Administrator password only	<ul style="list-style-type: none"> You must enter the password to enter the Configuration/Setup Utility program. You can access all choices on the Configuration/Setup Utility program main menu. If the administrator password is forgotten, it cannot be overridden or removed. You must replace the system board.
Administrator <i>and</i> power-on password	<ul style="list-style-type: none"> You 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 main 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 main menu. This might include changing or deleting the power-on password. If you forget the power-on password, and the administrator password has been set, use the administrator password at the password prompt. Then, start the Configuration/Setup Utility program and change the power-on password.

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** from 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.

Note: A message appears if the two passwords do not match. If this happens, press **Enter** to return to the Power-On Password menu.

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

5. A confirmation window appears. Press **Enter** to change the power-on password. Press **Esc** to return to the System Security menu.

Using the Configuration/Setup Utility

When a power-on password is set, POST does not complete until you enter the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password has been set, enter the administrator password at the power-on prompt (see “Using the Administrator Password Menu” on page 27 for details). Start the Configuration/Setup Utility program and change the power-on password as described in steps 1 through 5 above.
- Use the Bypass-Power-On-Password switch on the system board to temporarily bypass the power-on password.
 1. See “Preparing to Install Options” on page 43 through “Preparing a Tower Model” on page 44 or through “Preparing a Rack Model” on page 46 for instructions on powering off the server and removing the cover. Then, refer to the system-board diagram inside your server for the location of the switch block.
 2. Locate switch 8 (see “System Board Switches” on page 168).
 3. Set switch 8 on the switch block to On, to bypass the power-on password.
 4. Restart the server, then start the Configuration/Setup Utility program and change the power-on password as described in steps 1 through 5 above.
 5. Turn the server off again.
 6. Set switch 8 back to Off.
 7. Restart the server.

To delete a power-on password:

1. Select **Power-on Password** from 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 allow the server to start in unattended mode when a power-on password is set:

Note: The **Allow for unattended boot with password** data field must be set to **On** for the system to support locally or remotely scheduled system shutdowns or restarts in unattended-start mode.

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

The Power-on Password menu appears.
2. Select **Allow for unattended boot with password**. Press the Left Arrow (←) or Right Arrow (→) key to toggle the entry to **On**.

If no power-on password is set on the server, this option has no effect.

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.

Important

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** from the System Security menu; then, press **Enter**.
2. Type the password in the **Enter Administrator Password** data field.
A password can contain any combination of up to seven alphanumeric characters (A–Z, a–z, and 0–9). Keep a record of your password in a secure place.
3. Move the cursor to the **Enter Administrator Password Again** data field and type the password again.
Note: A message appears if the two passwords do not match. If this happens, press **Enter** to return to the Administrator Password menu.
4. Select **Change Administrator Password** to save the new password; then, press **Enter**. The password becomes effective immediately.

To delete an administrator password:

1. Select **Administrator Password** from the System Security menu; then, press **Enter**.
2. Select **Delete Administrator Password**; then, press **Enter**.
3. A confirmation window appears. Press **Enter** to delete the administrator password. Press **Esc** to return to the System Security menu.

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

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

Defining a System Owner's Name

You can specify a system owner's name that displays during POST each time that your server is started. If you set an administrator password, only the administrator can set, change, or delete the system owner's name.

To set the system owner's name:

1. Select **System Owners Name** from the System Security menu; then, press **Enter**.

The System Owners Name screen appears.

2. Type the name in the **Enter System Owners Name String** data field. You can use any combination of up to 15 characters and spaces in your system owner's name.
3. Press the Down Arrow (↓) key to select the **Set or Change System Owners Name** data field.
4. Press **Enter** to set the name or change a previously defined name.

To delete the system owner's name, select **Delete Stored System Owners Name**; then, press **Enter**.

Start Options

Start options take effect when you start your server.

You can select keyboard operating characteristics, such as the keyboard speed. You also can specify whether the keyboard number lock (NumLock) starts on or off. You also can enable the server to run in disketteless and monitorless operation.

You can specify the startup sequence the server is to use to determine the device from which the operating system loads. For example, you can define a startup sequence that checks for a CD-ROM, then checks an installed hard disk drive, and then checks a network adapter.

Note: The default startup options, including startup sequence, are given in Table 14 on page 162.

Attention: If the CD-ROM drive contains a startable CD, you must remove the CD if you want to use a startup sequence that begins with a startable diskette.

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

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

Advanced Setup

Select **Advanced Setup** to change values for advanced hardware features, such as cache control, PCI bus control, memory settings, and advanced ISA settings.

Note: 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 (←) or Right Arrow (→) key to highlight the options for the selected menu item.

Core Chipset Control

Select this choice to modify settings that control features of the core chip set on the system board. Do not make changes here unless directed to do so by an IBM authorized service representative.

PCI Bus Control

Select **PCI Bus Control** to:

- Change the master latency timer values for PCI bus 1 and PCI bus 2.
- Specify the planar interrupt routing (IRQs) for SCSI, Ethernet, video, and USB.
- Specify the slot interrupt routing (IRQs) for PCI slots.
- Enable and disable PCI device types (SCSI, video, Ethernet) and slots. When a PCI adapter is defective, you can use **Alt+F1** at startup and then disable the PCI adapter in order to enable the system to start up successfully.

Note: Any changes you make to IRQs will not be reflected in the PCI Interrupt Routing selection of the System Information menu until you restart the server.

Cache Control

Select this choice to define the microprocessor cache state as enabled or disabled, and to define the microprocessor cache type as Write-back or Write-through.

Selecting write-back mode will provide the maximum system performance.

Memory Settings

Select this choice to view the server banks of memory and to enable or disable selected rows of memory within those banks.

If a memory error is detected during POST or memory configuration, the Netfinity 5000 server can automatically disable the failing row of memory and continue operating with reduced memory capacity. If this occurs, you must manually enable the row of memory after the problem is corrected. Choose **Memory Settings** from the Advanced Setup menu; then use the the Up Arrow (↑) or Down Arrow (↓) key to highlight the row that you want to enable. Use the Left Arrow (←) or Right Arrow (→) key to select **Enable**.

Advanced ISA Settings

Use this selection to set the timer delay for ISA I/O recovery.

Server Processor IRQ Settings

Use this selection to specify the IRQ the system-management processor is to use.

Resolving Configuration Conflicts

Plug and Play

Most adapters designed for PCI slots are Plug and Play devices that are auto-configuring. However, many ISA adapters are not Plug and Play devices and you must allocate the system resources that the adapter will use. Select **Plug and Play** to identify the available system resources:

- Memory
- I/O ports
- DMA
- Interrupt

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

Select **Plug and Play**; then, use the Up Arrow (↑) and Down Arrow (↓) key to highlight the system resource that you want to change. Use the Left Arrow (←) or Right Arrow (→) key to toggle from **Plug and Play** to **ISA Legacy** for the selected menu choice.

Error Log

Select **Error Log** to view the three most recent power-on self-test (POST) errors the system has generated, or to view the system error log. You can clear both error logs from this screen by selecting **Clear Error Logs**.

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.”

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 29). Verify that the IRQ assignments are correct.

Your Netfinity 5000 server 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 setting, see “PCI Bus Control” on page 29.

Resolving Configuration Conflicts

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

Conflicts in the configuration occur if:

- A device 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” for additional information.

Resolving Hardware Configuration Conflicts

Use the following information to help resolve hardware configuration conflicts:

1. Run the Configuration/Setup Utility program to view and change resources used by the system board functions. Record the current settings before making any changes. (See “The Configuration/Setup Utility” on page 21 for instructions.)
2. Determine which adapter or device is causing the conflict.
3. Change adapter jumpers or switches. Some devices use jumpers and switches to define the system resources that the device needs. If the settings are incorrect or set to use a resource that cannot be shared, a conflict occurs and the device will remain deactivated by the configuration program.
4. Change system board jumpers or switches. See “Preparing to Install Options” on page 43 for instructions on removing the cover. Then, refer to the system-board diagram inside your server.
5. Remove the device or adapter. Some configurations are not supported. If you must remove an adapter, see “Installing or Removing Adapters” on page 50.

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 expanded memory specification (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.

Configuring the Ethernet Controller

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

Your Netfinity 5000 server comes with an Ethernet controller on the system board. The Ethernet controller provides 10BASE-T and 100BASE-TX support through the RJ-45 connector on the back of your server.

When you connect your server to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps or 100 Mbps) on the network and then sets the controller to operate at the appropriate rate. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), half duplex (HDX), or full duplex (FDX). This process is also known as *auto-negotiation*. This auto-negotiation occurs without software intervention. The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

Auto-negotiation works only if the hub or switch to which your server is connected also supports auto-negotiation. If the hub or switch does not support auto-negotiation, the speed (10 Mbps or 100 Mbps) will still be detected correctly, but half-duplex mode will always be selected. A full-duplex switch that does not support auto-negotiation will not attach to the Netfinity 5000 server in full-duplex mode.

In this case, if you want the network to operate in full-duplex mode, you must manually override the settings to obtain a full-duplex connection. To do this, your server must have a device driver that supports manual overrides. Use the ServerGuide CDs to install this device driver. Refer to the “ServerGuide and Netfinity Manager Information” section of this *Server Library* for instructions on installing device drivers. The ServerGuide CDs contain IBM Update Connector, a dial-up³ program that keeps your BIOS and device drivers current. Verify that you have installed the appropriate device driver. Also, refer to your Ethernet documentation for additional information on operating modes, manual overrides, and device drivers (see “Related Publications” on page xii).

Attention:

- The 10BASE-T Ethernet and the 100BASE-TX Fast Ethernet cabling in the network must be Category 5 or higher to meet various standards, including electromagnetic compatibility.
- You must install a device driver to enable your operating system to address the Ethernet controller. Use the ServerGuide CDs to install this device driver. Refer to the information in the “ServerGuide and Netfinity Manager Information” section of this *Server Library* for instructions on installing device drivers, or for more information about the ServerGuide CDs.

Fast Ethernet operates at a data rate of up to 100 Mbps. However, except for the different operating speeds, Fast Ethernet and standard Ethernet are structurally

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

identical. Most applications and protocols that are currently installed on a standard Ethernet system can be seamlessly migrated to a Fast Ethernet system. Because of the equivalence of the two types of Ethernet, mixed Ethernet and Fast Ethernet systems also can be designed and implemented.

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

The Ethernet controller is a PCI device, and is therefore, a Plug and Play device. You do not have to set any jumpers or configure the controller for your operating system before you use the Ethernet controller.

Notes:

1. For troubleshooting information, see “Troubleshooting the 10/100 Mbps Ethernet Controller” on page 147.
2. The Ethernet controller supports the operating systems that your server supports. To find out which operating systems your server supports, go to the following World Wide Web address:
<http://www.pc.ibm.com/us/compat/>

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

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

Failover for Redundant Ethernet

Your Netfinity 5000 server has an integrated Ethernet controller. The IBM Netfinity 10/100 Fault Tolerant Adapter is an optional redundant network interface card (NIC adapter) that you can install in your Netfinity 5000 server. If you install this NIC adapter and connect it to the same logical segment as the primary Ethernet controller, you can configure the server to support a *failover* function. You can configure either the integrated Ethernet controller or the NIC adapter as the primary Ethernet controller. In failover mode, if the primary Ethernet controller detects a link failure, all Ethernet traffic associated with it is switched to the redundant (secondary) controller. This switching occurs without any user intervention. Applications with active sessions do not experience any data loss. When the primary link is restored to an operational state, the Ethernet traffic automatically switches back to the primary Ethernet controller.

Failover for Redundant Ethernet

Notes:

1. Only one controller in the redundant pair is active at any given time. For example, if the primary Ethernet controller is active, then the secondary Ethernet controller cannot be used for any other network operation.
2. Your operating system determines the maximum number of IBM Netfinity 10/100 Fault Tolerant Adapters that you can install in your Netfinity 5000 server. See the documentation that comes with the adapter for more information.

The failover feature currently is supported by OS/2, Windows NT, and IntraNetWare. The setup required for each operating system follows.

Configuring Failover on OS/2

1. Install the redundant NIC adapter according to the instructions provided with the adapter and in "Installing or Removing Adapters" on page 50.
2. Use the ServerGuide CDs to install the AMD PCNet Ethernet Family adapter device driver.
3. Using the MPTS utility program, select the driver from the list and select the **Edit** button.
Note: Only one driver instance needs to be loaded for each redundant pair of Ethernet controllers.
4. Change the PermaNet Server Feature keyword to **TRUE** and specify the Primary and Standby slots that contain the redundant pair. Refer to "System Board Illustration" on page 166 for the locations and slot numbers of the PCI slots. The integrated controller is located in slot 9.
5. To enable the writing of messages to the IBMCOM\LANTRAN.LOG file when a failover occurs:
 - a. Copy the file PCNETOS2.EXE from the OS2 directory of the diskette created by the ServerGuide program to your hard disk drive.
 - b. Add the following statement to the CONFIG.SYS file:

```
Run=d:\path\PCNETOS2.EXE
```

where *d* and *path* are the drive and path to which you copied PCNETOS2.EXE.
6. Restart the server.

The failover function is now enabled.

Configuring Failover on Windows NT

1. Install the redundant NIC adapter according to the instructions provided with the adapter and in "Installing or Removing Adapters" on page 50.
2. Use the ServerGuide CDs to install the AMD PCNet Ethernet Family adapter device driver.
3. From the NT desktop, select **Control Panel**, then select the **Network** icon, then the **Adapters** tab.
4. Highlight one of the adapters that will be in the redundant pair and then select the **Properties...** button.

5. Check the **Grouping** box. This will show the possible combinations for redundant pairs.
6. Select the adapter pair you want and then select **OK**. Note that the integrated Ethernet controller is located at PCI bus 1, slot 9.
7. Select **Close** to exit from the Network setup.

When you restart the server, the failover function will be in effect.

If a failover occurs, a message is written to the NT Event Viewer log. If the DMI instrumentation code for the integrated Ethernet controller is active (PCNET.EXE was run), a pop-up message is generated also.

Configuring Failover on IntraNetWare

1. Install the redundant NIC adapter according to the instructions provided with the adapter and in "Installing or Removing Adapters" on page 50.
2. Load the device driver by using the following command:

```
LOAD d:\path\PCNTNW.LAN PRIMARY=x SECONDARY=y
```

where *d* and *path* are the drive and path where the driver is located, and *x* and *y* are the PCI slot numbers where the redundant pair is located.

The slot number associated with the integrated Ethernet controller can vary depending upon the configuration of the Netfinity 5000 server. To determine the slot number, load the driver with no parameters. The driver will display the available slot numbers. The slot number that is greater than 10000 will be the slot number of the integrated Ethernet controller. When the slot number of the integrated Ethernet controller is determined, reload the driver with the appropriate parameters.

3. When the driver is loaded, bind it to a protocol stack.

The failover function is now enabled. If a failover occurs:

- A message is generated to the operating system console.
- The custom counters for the device driver contain variables that define the state of the failover function and the location of the redundant pair. You can use the NetWare Monitor to view the custom counters.

Using the SCSISelect Utility Program

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

You can use the SCSISelect Utility program to:

- View and change the device configuration
- Perform a low-level format or verify the media on a SCSI hard disk drive.

Starting the SCSISelect Utility Program

You can access this program when you start the server. The SCSISelect prompt appears after the IBM Netfinity Logo appears. 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.

The SCSI controller in your server is a dual channel device. Select channel B for internal devices, channel A for external devices.

SCSISelect Utility Program Choices

The following choices appear on the SCSISelect Utility program menu:

- Configure/View Host Adapter Settings
- SCSI Disk Utilities

Configure/View Host Adapter Settings

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

- Host Adapter SCSI ID
Select this choice to change the SCSI ID of the SCSI controller from its default value of 7. Do not assign the SCSI controller to a SCSI ID already in use, such as 14, which is used by the daughterboard card (SAF-TE) on the DASD backplane.
- SCSI Parity Checking
The default value is *Enabled*. This value should not be changed.
- Host Adapter SCSI Termination
The default value is *Enabled*. This value should not be changed.
- Boot Device Options
Select this choice to configure startable device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.
- SCSI Device Configuration
Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

- **Advanced Configuration Options**

Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for BIOS parameters if BIOS is enabled.

To reset to the the host adapter defaults, press **F6**; then, follow the instructions on the screen.

SCSI Disk Utilities

To see the IDs that are assigned to each SCSI device, to format a SCSI device, or to scan the disk for media defects, 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 were ready. Restart the server, and watch the SCSISelect messages as each drive spins up. After the drive that you want to view or format spins up, press **Ctrl+A**.

```
Unexpected SCSI Command Failure

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

Press 'Esc' to continue.
```

Performing a Low-Level Disk Format

You can perform a low-level format on hard disk drives 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 Format Disk Program

Use the Format Disk program:

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

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

Starting the Low-Level Format

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

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

Note: Hard disk drives 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 ServerGuide information in the “ServerGuide and Netfinity Manager Information” section of this *Server Library* that comes with your server.

Verifying the Disk Media

Select **Verify Disk Media** to scan the selected hard disk drive for media defects, such as bad tracks. All recoverable defects will be remapped.

The Verify Disk Media program takes about 15 to 20 minutes to complete.

Chapter 4. Installing Options

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

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Before You Begin

Before you begin to install options in your server, read the following information:

Notes:

1. Become familiar with the safety and handling guidelines specified under the “Legal and Safety Information” section of this *Server Library*, and under “Safety Information Statements” on page vii, “Electrical Safety” on page 41, and “Handling Static-Sensitive Devices” on page 42. These guidelines will help you work safely while working with your server and options.
2. Make sure you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options you intend to install.
3. Place your server in a location that is dry. Rain or spilled liquids might damage your server.
4. Have a supply of 1 MB and 2 MB, 3.5-inch diskettes available.
5. Back up all important data before you make changes to hard disk drives.
6. Have a small flat-blade screwdriver available.
7. Be sure to leave space around the server to allow the server cooling system to work properly.
 - On a tower model, leave about 127 mm (5 in.) of space around the front and rear of the server.
 - On a rack model, refer to the documentation that comes with the rack.
8. For a list of supported options for the Netfinity 5000 server, refer to <http://www.pc.ibm.com/us/compat> on the World Wide Web.

Electrical Safety

10

**CAUTION:**

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

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

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

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

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

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

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**CAUTION:**

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



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

Handling Static-Sensitive Devices

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

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

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

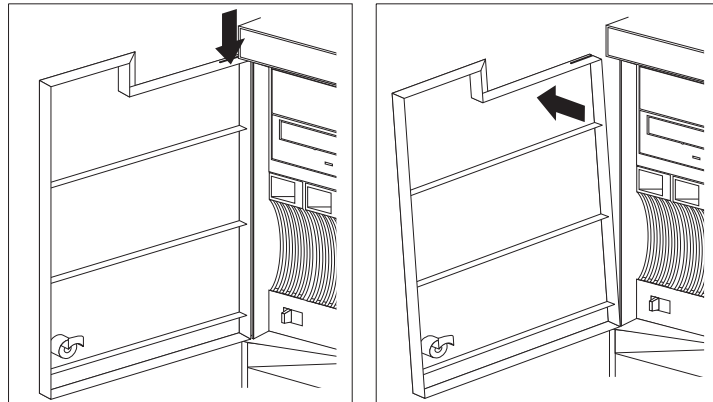
- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters and memory modules by the edges. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you are installing a new option, touch the static-protective package containing the option to an 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 Install Options

Before you begin

- Be sure your current server configuration is working properly.
- Locate the key to the cover lock, if any.
- Obtain a small, flat-blade screwdriver.
- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- If you are preparing a rack model, you might want to install it in the rack first before installing options. See Chapter 5, “Installing a Server in a Rack Enclosure” on page 91 for instructions on installing your rack model.

1. Unlock and open the server door, if any. For convenience during these procedures, you might prefer to remove the door completely.
 - a. Locate the flange on the top edge of the front door, near the hinge.
 - b. Press the flange downward while pressing out on the door; then, lift the door off the hinge. Set the door aside.



8



CAUTION:

When unlocked, the server door will not support the weight of the server. To avoid personal injury, be sure to remove or lock the server door before moving or lifting the server.

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 tower model, continue with “Preparing a Tower Model” on page 44.

If you have a rack model installed in a rack enclosure, go to “Preparing a Rack Model” on page 46.

Preparing a Tower Model

The hard disk drives in Netfinity 5000 server are hot-swappable. If you are installing only a hard disk drive (bays 1 through 5), go directly to “Installing or Removing Internal Drives” on page 56. Otherwise, continue with the following steps.

1. 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.

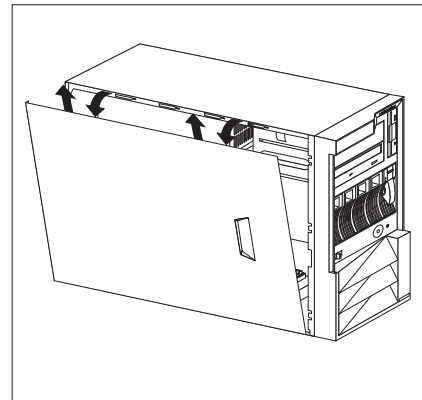
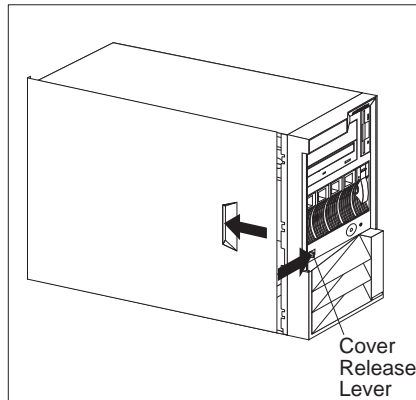
6



CAUTION:

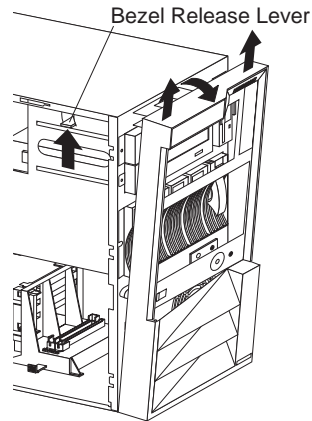
The Power-on switch on the front of the server does not turn off the electrical current supplied to the server. The server also might have more than one power cord. To remove all electrical current from the server, ensure that all power cords are disconnected from the power source.

2. Unplug all power cords (cables) from electrical outlets, and then disconnect all other cables from the back of the server.
3. Open the server door, if you have not already done so.
4. Remove the left-side cover.
 - a. Locate the cover-release lever on the front of the server and slide it to the right.



- b. Slide the left-side cover back about 25 mm (1 inch); then, lift the cover and remove it.
- c. Store the cover in a safe place.

5. If you are installing or removing a drive in bays A to C, remove the front bezel.
 - a. Locate the blue bezel release lever on the left side of the server in the top front corner.



- b. Move the lever upward following the curve of the lever opening.
 - c. Lift the bezel tabs out of the slots at the bottom and pull the bezel out from the server front.
6. Install (or remove) the desired options.

Option

Adapters
 Memory modules
 Internal drives
 Microprocessors
 Power supply

 External options
 Security options

Go To:

“Working with Adapters” on page 49
 “Working with Memory Modules” on page 54
 “Installing or Removing Internal Drives” on page 56
 “Installing Microprocessors” on page 66
 “Installing or Replacing the Power Supply” on page 71
 “Connecting External Options” on page 72
 “Adding Security” on page 74

Preparing a Rack Model

Before you begin

Read the documentation that comes with the rack enclosure for additional safety and operating information.

The hard disk drives in Netfinity 5000 server are hot-swappable. If you are installing only a hard disk drive (bays 1 through 5), go directly to “Installing or Removing Internal Drives” on page 56. Otherwise, continue with the following steps.

1. 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.

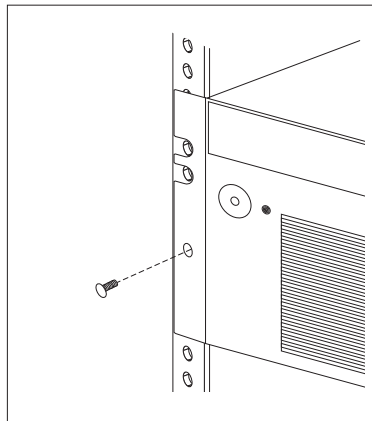
6



CAUTION:

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

2. Unplug all power cords (cables) from electrical outlets, and then disconnect all other cables from the back of the server.
3. Remove the screws from the brackets on either side of the server, and set them aside.

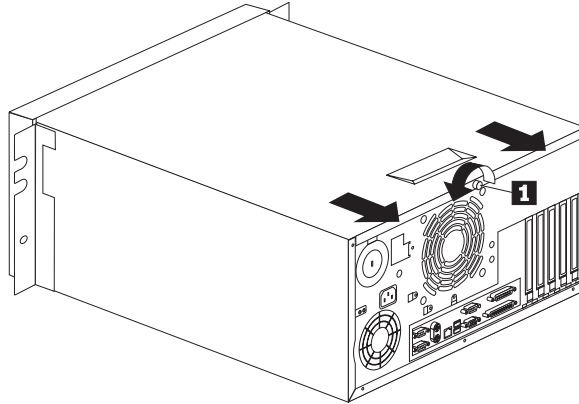


4. Pull the rack model out of the rack enclosure until both slide rails lock.

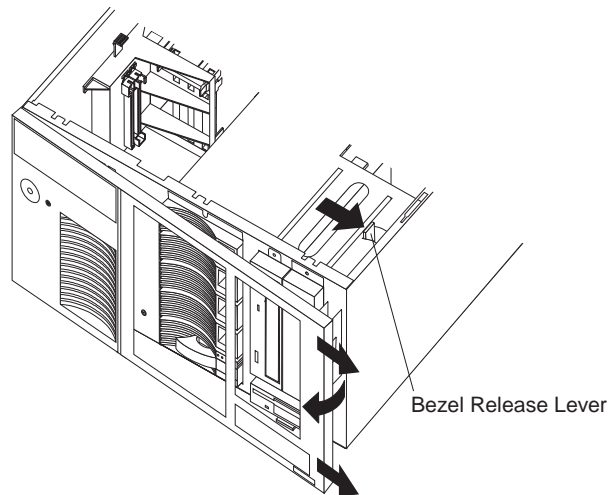
Note: When the server is in the locked position, you can easily reach the cables on the back of the server.

5. Remove the top cover.

- a. Locate the captive thumbscrew **1** on the back of the cover and turn it to release the cover.



- b. Slide the cover back about 25 mm (1 inch); then, lift the cover and remove it.
 - c. Set the cover aside in a safe place.
- a. If you are installing or removing a drive in bays A to C, remove the front bezel.
 - 1) Locate the blue bezel release lever on the top of the server, in the right front corner.
 - 2) Move the lever toward the right, following the curve of the lever opening.



- 3) Lift the bezel tabs out of the slots at the left and pull the bezel away from the server front.
- b. If necessary, remove the server from the rack enclosure before installing options. For more information about removing the server from the rack enclosure, see “Removing the Rack Model from a Rack Enclosure” on page 102.

Preparing to Install Options

6. Install (or remove) the desired options.

Option	Go To:
Adapters	"Working with Adapters" on page 49
Memory modules	"Working with Memory Modules" on page 54
Internal drives	"Installing or Removing Internal Drives" on page 56
Microprocessors	"Installing Microprocessors" on page 66
Power supply	"Installing or Replacing the Power Supply" on page 71
External options	"Connecting External Options" on page 72
Security options	"Adding Security" on page 74

Working with Adapters

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

Adapter Considerations

Your Netfinity 5000 server supports ISA and PCI adapters. You can install up to five adapters in the connectors on the system board.

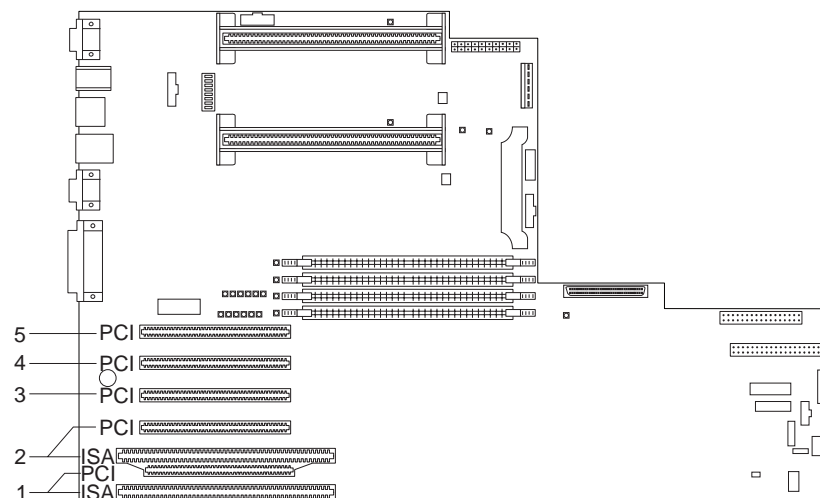
The system board in your server contains 16-bit, ISA-bus expansion connectors and 32-bit, PCI-bus expansion connectors. Two of the expansion slots are shared PCI/ISA slots. The remaining slots support only PCI adapters. Your server supports only 5.0-volt adapters on the PCI bus.

Notes:

1. You can install PCI adapters in slots 1–5. Slots 1–4 are on PCI bus 2, slot 5 is on PCI bus 1. Both PCI buses are primary buses; when the system scans the buses to see what devices are on them, it scans PCI bus 1 first.
2. You can install ISA adapters in the shared slots 1 and 2.

Note: If an ISA adapter is not a Plug and Play device, you must allocate the system resources that the adapter will use. Use the Plug and Play choice in the Advanced Setup selection of the Configuration/Setup Utility program to allocate resources.

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



Note: Expansion slots 1 and 2 are shared slots. Shared slots can be used by an adapter installed in either the PCI connector or the adjacent ISA connector, but not both.

Your server comes with a video controller. This video controller is an integrated component on the system board. It is *not* in an expansion slot. The integrated video controller has super video graphics array (SVGA) technology.

Working with Adapters

The integrated video controller is not removable. If you want to disable this controller and use a video adapter instead, you can install a video adapter in an expansion slot. When you install a video adapter, the server BIOS automatically disables the integrated video controller.

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 or Removing Adapters

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

Before you begin

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Read the documentation that comes with the option.

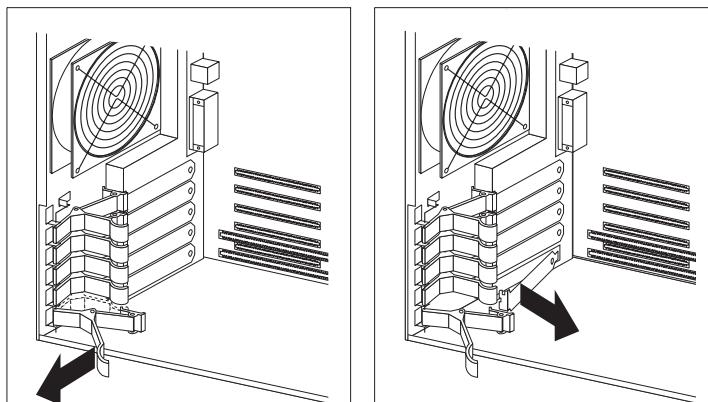
1. Review the instructions that come with the adapter to determine if the adapter must be installed in a certain slot; otherwise, use any available, bus-compatible slot.

Note: If you install a video adapter, the server automatically disables the video controller on the system board.

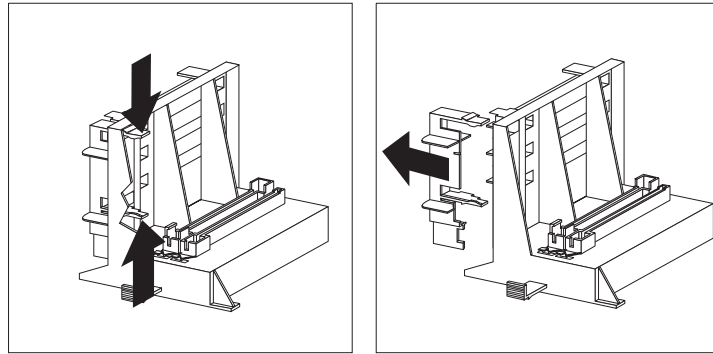
2. If you have not done so, remove the server cover. See “Preparing to Install Options” on page 43.
3. Remove the expansion-slot cover.

- a. Release the slot retaining clamp by pulling the curved arm on the clamp away from the system board.

Note: The slot retaining clamp might differ slightly from this illustration.



- b. Remove the expansion slot cover from the slot opening.
4. If the adapter is a full-length card, continue with this step. Otherwise, go to step 5 on page 52.
 - a. Remove the card support bracket retaining clip.

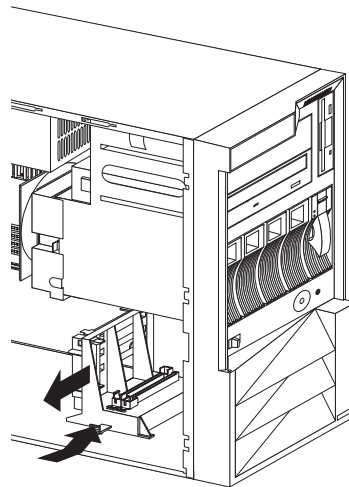


- b. If the adapter is a full length card in slot 1 or 2, ensure that the card support bracket has the appropriate card support installed for that slot.

Card Type	Card Support Color
ISA	Black
PCI	White

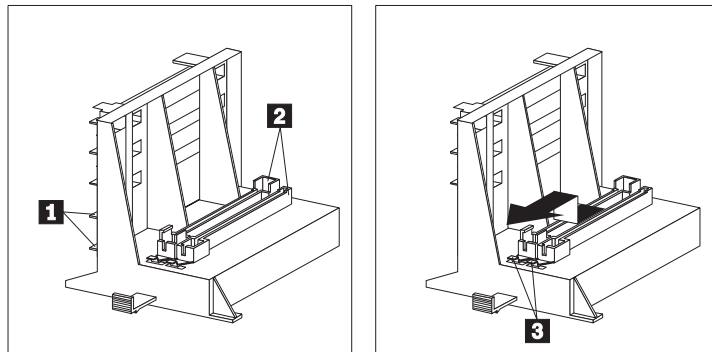
Each card support is also identified on the tab as ISA or PCI.

Note: You might find it easier to replace the card support with the appropriate color card support if you remove the card support bracket from the server first.

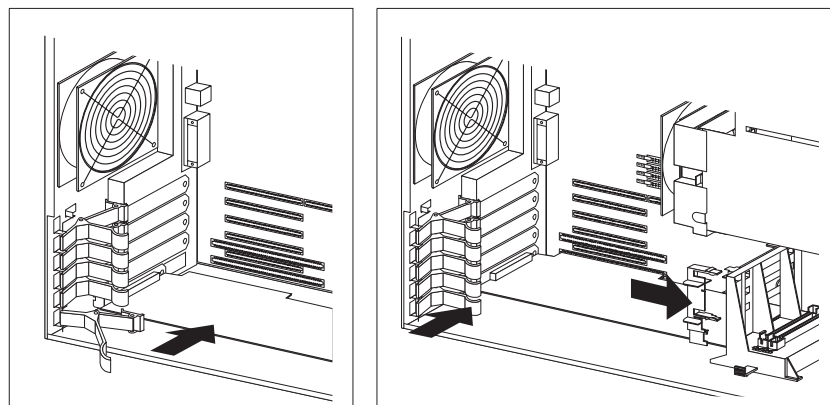


Working with Adapters

- 1) To remove a card support from a slot **1** or storage location **2**, gently release the card support tab **3** and slide the card support away from the system board until the card support is free.



- 2) To insert a card support in a slot or a storage location, place the card support in the slot or storage opening and slide the card support toward the system board until the tab clicks into place.
 - c. If you removed the card support bracket from the server, replace it in the server now.
5. Touch the static-protective package to any *unpainted* metal surface on the server; then, remove the adapter from the package.
 6. Install the adapter:
 - a. Carefully grasp the adapter and align it with the expansion slot (and with the card support bracket if a full-length adapter).
 - b. Press the adapter *firmly* into the connector until fully seated.



- c. Fit the foot of the slot retaining clamp to the top of the expansion slot.
 - d. Push the curved arm of the slot retaining clamp toward the adapter until the clamp is locked into place.
 - e. If necessary, connect any internal cables to the adapter. Refer to the documentation that comes with the option.
 - f. If you removed the card-guide retaining clip in step 4a on page 50, reinstall it now.
7. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Working with Memory Modules

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 modules*. The server uses a noninterleaved memory configuration, with error correcting code (ECC) data protection.

Notes:

1. Your server comes with one or more dual-inline memory modules (DIMM)s installed.
2. The server supports 100 MHz, 64 MB, 128 MB, and 256 MB DIMMs.
3. Install only registered SDRAM ECC DIMMs.
4. When you are installing memory modules, you might find it more efficient to install them in adjacent connectors, with no vacant memory connectors in between. For example, if your server only has one DIMM installed in memory connector J15, install additional memory in the J16 memory connector; then, continue with connectors J17 and J22.
5. If you are installing DIMMs of different sizes, you might find it more efficient to install DIMMs with the greater memory capacity starting with connector J15. For example, when installing two 256 MB DIMMs, install the DIMMs in memory connectors J15 and J16.
6. After installing or removing a DIMM, you must save the new configuration information using the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility” on page 22.

Installing or Removing Memory Modules

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

Before you begin

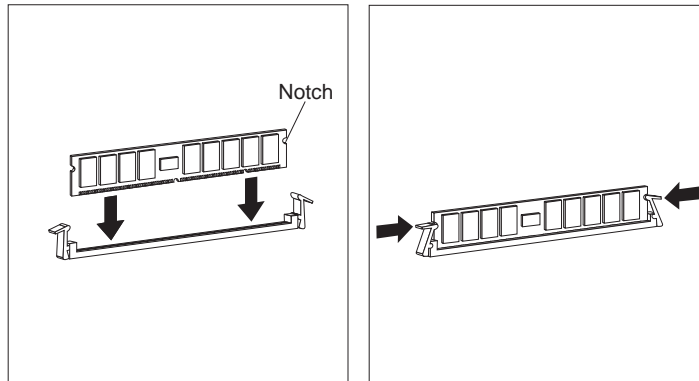
- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Read the documentation that comes with the option.

1. If you have not done so, remove the server cover. See “Preparing to Install Options” on page 43.
2. Locate the memory-module connectors on the system board (see “System Board Connectors” on page 167).

Notes:

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

4. Touch the static-protective package containing the DIMM to any *unpainted* metal surface on the server; then, remove the memory module from the package.
5. 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.
6. 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 when the DIMM is properly seated.)



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

7. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Installing or Removing Internal Drives

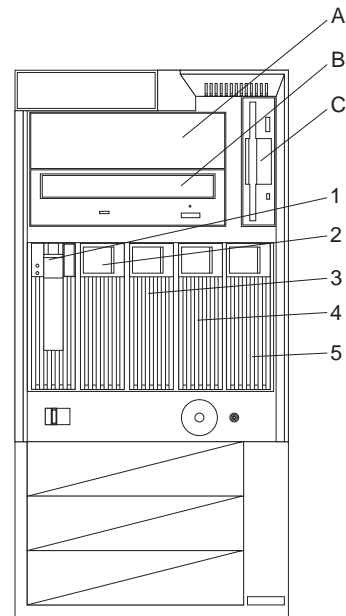
Drives are devices that your server uses to store and retrieve data. You can add drives to your server to increase storage capacity and to enable your server to read other types of media.

Location of Bays

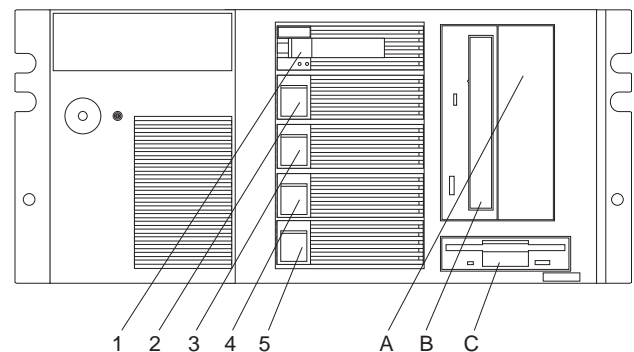
Internal drives are installed in *bays*. The bays are referred to as bay A, bay B, bay C, bay 1, bay 2, and so on.

The following illustrations show the locations of the bays in your server.

Tower model



Rack model



Your server comes with a CD-ROM drive installed in bay B and a diskette drive installed in bay C.

Bay	Drive Width	Drive Type	Drive Height
A	5.25-inch	Removable media drive ¹ only	41.3 mm (1.6 in.)
B	5.25-inch	CD-ROM	41.3 mm (1.6 in.)
C	3.5-inch	Diskette drive	25.4 mm (1.0 in.)
1 through 5	3.5-inch	Hot-swap hard disk	25.4 mm (1.0 in.) – Slim line (SL) 41.3 mm (1.6 in.) ² – Half height (HH)
<p>Notes:</p> <p>1. Removable media includes CD-ROMs, optical discs, and tapes. It does not include hard disk drives.</p> <p>2. A 41.3 mm drive installed in bays 1 through 5 will occupy two bays.</p>			

Table 1. Maximum Allowable Drive Sizes

Types of Cables

Drives connect to your server with cables. Each cable connector is designed to fit a corresponding connector on a drive.

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

- A four-wire power cable connects to each drive.
- A flat-ribbon signal cable connects to IDE devices.

- One flat-ribbon cable connects the internal diskette drive.

The connector on one end of this cable attaches to the system board. The primary diskette drive installed in your server (usually known as drive A) is attached to the connector on the other end of this cable.

Note: The primary diskette drive must always be attached to the drive connector on the end of this cable.

- A second flat-ribbon cable connects the CD-ROM drive.

This cable has two drive connectors. A third connector attaches to the system board. The CD-ROM drive that comes with your server is attached to the connector on the end of this cable.

- Another cable connects internal SCSI devices. This SCSI cable has two connectors that connect to SCSI devices:
 - One to the backplane of the DASD hot-swap enclosure
 - One to a SCSI device you install in the open 5.25-inch bay

A third connector attaches to the SCSI connector on the system board.

External SCSI devices usually come with a SCSI cable. You attach one end of this SCSI cable to the SCSI connector on the back of the server, and the other end to the SCSI device. You usually can attach additional SCSI devices to this cable.

SCSI Devices

Your Netfinity 5000 server supports drives that comply with American National Standards Institute (ANSI) SCSI Standards X3.131-1986 (SCSI), X3.131-1994, (SCSI-2), X3.277-1996 (SCSI-3 Fast-20 parallel interface), and X3.253-1995 (SCSI-3 parallel interface).

For a complete list of the SCSI devices supported on your Netfinity 5000 server, go to <http://www.pc.ibm.com/support/> on the World Wide Web.

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

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

SCSI IDs

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

The SCSI controller in your server supports SCSI IDs 0 to 15; ID 7 is reserved for the controller, ID 14 is reserved for the daughterboard (SAF-TE) on the DASD backplane. Use the SCSISelect Utility program to view the SCSI IDs of SCSI devices in your server. (See “Using the SCSISelect Utility Program” on page 35 for more information.)

Note: A daughterboard is a secondary adapter that can be plugged into another adapter or the system board. The SAF-TE daughterboard on the DASD backplane makes available the status information about the DASD drives that meet the following conditions:

- The drives are part of a RAID environment
- The status information comes from a supported IBM RAID adapter

If you install wide (16-bit) SCSI devices, you can set the IDs to any whole number between 0 and 6, or to any whole number between 8 and 13, or to 15. If you install narrow (8-bit) SCSI devices, you can set the IDs to any whole number between 0 and 6.

Your server automatically sets SCSI IDs for hot-swap hard disk drives, according to the jumper settings on the DASD backplane. Your server uses the hard disk drive SCSI IDs to send status information to the indicator lights on each hard disk drive. See “Status Indicators” on page 9 for the location and identification of the hard disk drive status lights.

Table 2 shows the default SCSI IDs that the backplane assigns for hot-swap hard disk drives.

Bay	1	2	3	4	5
ID	0	1	2	3	4

You can change the default ID addresses of the drives by changing the jumper settings on the DASD backplane. See “SCSI Jumpers” on page 171.

Termination Requirements

The UltraSCSI controller and the backplane of the hot-swap bays provide termination for the internal SCSI bus (cable) in your server. There are no termination requirements for any SCSI devices you install in the hard disk drive bays or attach to this cable.

If you attach a SCSI cable and devices to the external SCSI connector, set the termination for the last device on that SCSI cable to Enabled. Refer to the instructions that come with the SCSI device for more information about termination.

Preinstallation Steps (All Bays)

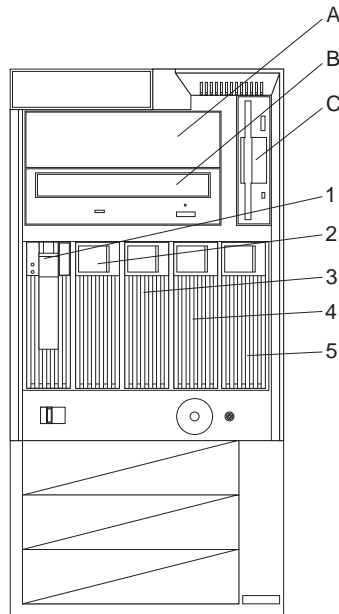
Before you begin, be sure you have:

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Read the documentation that comes with the option.
- Read “Termination Requirements.”
- Verified that you have all cables, drive trays, and any other equipment specified in the documentation that comes with the internal drive.

Before you can install drives in your Netfinity 5000, you might need to perform certain preinstallation activities. Some of the steps are required only during the initial installation of an option.

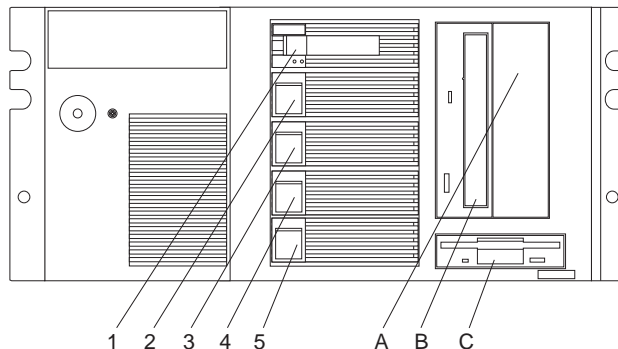
1. Choose the bay in which you want to install the drive. (Refer to Table 1 on page 57 for the drive types and sizes available for each bay.)

Tower model



Installing or Removing Internal Drives

Rack model



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

What to do next

- To install a removable-media drive, go to “Installing or Removing Drives in Bays A and B (Removable Media).”
- To install a diskette drive, go to “Installing or Removing a Drive in Bay C (Diskette Drive)” on page 62.
- To install a hard disk drive, go to “Installing or Removing Drives in Bays 1 through 5 (Hard Disk Drives)” on page 63.

Installing or Removing Drives in Bays A and B (Removable Media)

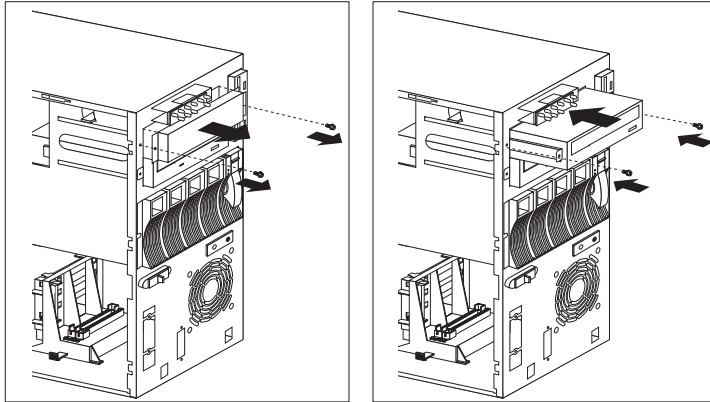
This section gives the procedure for installing a removable-media drive. If you want to remove a drive, reverse the following steps.

Before you begin

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Read “Preinstallation Steps (All Bays)” on page 59 and the instructions that come with the option.
- Read “Termination Requirements” on page 59

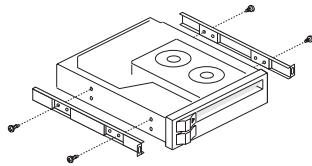
1. If you have not done so already, remove the server cover and the front bezel. See “Preparing to Install Options” on page 43.

2. Remove the bay cover plate, if present.
 - a. Remove the screws on either side of the cover plate that secure the plate to the target bay.
 - b. Remove the cover plate from the server front panel. (Save the cover plate for future use.)

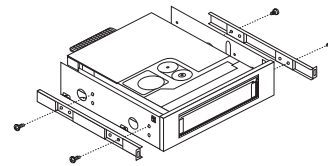


3. Attach one side rail to each side of the drive.

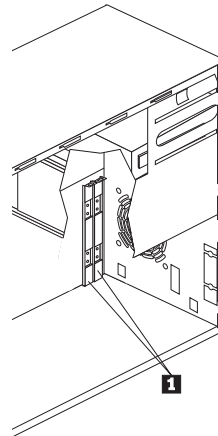
5.25-inch drive



3.5-inch drive



The two slide rails **1** are located in the inside front corner of the server, adjacent to the system board release mechanism.

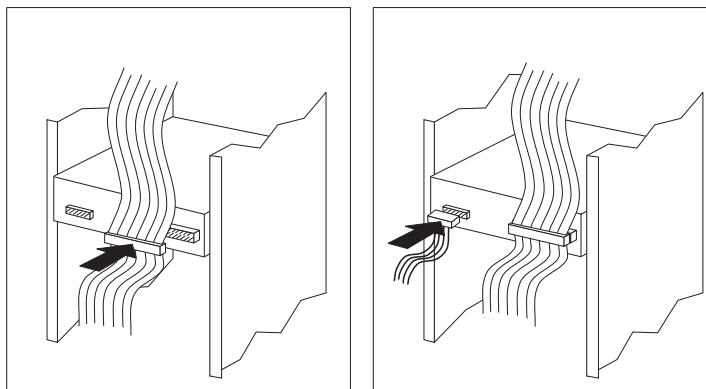


4. Using the instructions that come with the drive, together with these instructions, check that any switches or jumpers on the drive are set correctly. Change the settings if necessary. For information about termination requirements, see “Termination Requirements” on page 59.
5. Position the drive with the connectors facing the rear of the server.
6. Slide the drive into the bay until it stops.

Installing or Removing Internal Drives

7. Reinstall and tighten the screws that you removed in step 2 on page 61.
8. Connect the drive to the available connector on the SCSI cable or the IDE cable, as appropriate.

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



9. Connect one of the 4-pin power cables to the drive.
10. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Installing or Removing a Drive in Bay C (Diskette Drive)

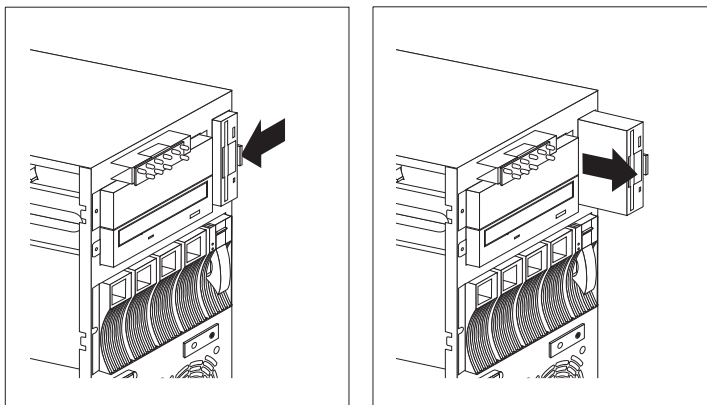
This section gives the procedure for installing or removing a diskette drive.

Before you begin

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Read the documentation that comes with the option.

To remove a drive in bay C:

1. Locate the drive-release tab on the diskette drive.

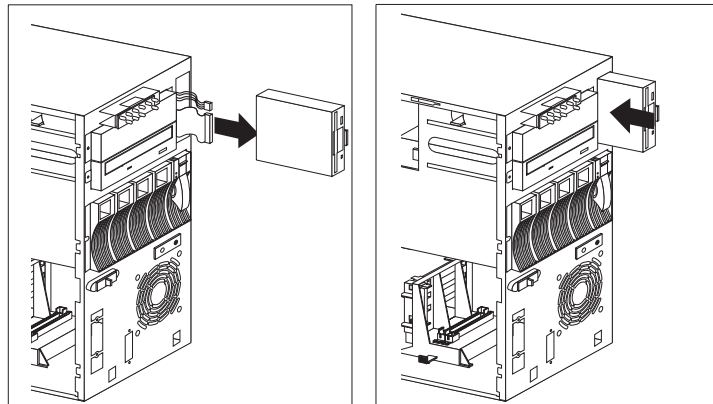


2. Press the tab against the drive and hold it there while pulling the drive out.
3. Disconnect the diskette drive cable and power cable from the drive.
4. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

To install a drive in bay C:

1. If you have not done so, remove the server cover and front bezel. See “Preparing to Install Options” on page 43.
2. Using the instructions that come with the drive, together with these instructions, check that any switches or jumpers on the drive are set correctly. Change the settings if necessary. For information about termination requirements, see “Termination Requirements” on page 59.
3. Insert the drive into the bay.
 - a. Position the drive so that the connectors face the rear of the server and the diskette eject button is toward the outside of the server.
 - b. Connect the diskette drive cable and power cable to the drive.

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



- c. Locate the drive-release tab on the diskette drive.
 - d. Press the tab against the drive and hold it there; slide the drive into the bay until it clicks into place.
4. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Installing or Removing Drives in Bays 1 through 5 (Hard Disk Drives)

This section gives the procedure for installing a hard disk drive. If you want to remove a drive, reverse the following steps.

Note: To minimize the possibility of damage to the hard disk drives when you are installing a hard disk drive in a rack model, install the rack model in the rack before installing the hard disk drives.

Attention: To avoid damage to a hard disk drive, **do not** remove the drive from the hot-swap bay until it has had time to spin down (approximately 30 seconds). Handle the drive gently.

Installing or Removing Internal Drives

Before you begin

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Read “Termination Requirements” on page 59

Your Netfinity 5000 server contains hardware that lets you replace a hard disk drive without turning off the Netfinity 5000 server. These drives are known as *hot-swappable* or *hot-swap* drives.

Each hot-swap drive that you plan to install must have a hot-swap-drive tray attached. The drive must have a single connector attachment (SCA) connector. Hot-swap drives come with the hot-swap-drive tray attached.

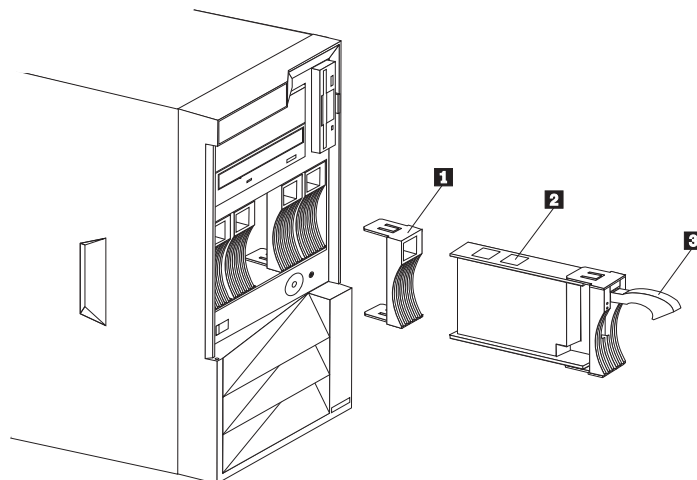
Notes:

1. The Netfinity 5000 server EMI integrity and cooling are both protected by having the hot-swap bays covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.
2. The hot-swap bays connect to a SCSI backplane. This backplane is the printed circuit board behind the hot-swap bays.

To install a drive in a hot-swap bay:

1. Remove the filler panel **1** from one of the empty hot-swap bays by inserting your finger into the depression at the top of the filler panel (tower model) or left side of the filler panel (rack model) and pulling it away from the server.

Attention: To maintain proper system cooling, do not operate the Netfinity 5000 server for more than two minutes without either a drive or a filler panel installed for each bay.



- 1** Filler panel
- 2** Drive
- 3** Tray handle

2. Install the hard disk drive **2** in the hot-swap bay.
 - a. Ensure the tray handle **3** is open (that is, perpendicular to the drive).

- b. Align the drive-tray assembly so that it engages the guide rails in the bay.
 - c. Gently push the drive-tray assembly into the bay until the drive connects to the backplane.
 - d. Push the tray handle toward the drive until the handle locks.
3. Check the hard disk drive status indicators to verify that the hard disk drives are operating properly. See “Status Indicators” on page 9 for details.

Notes:

- a. There are no termination requirements for any SCSI hard disk drives installed in the hard drive bays. Termination is achieved through the DASD backplane.
 - b. If your Netfinity 5000 server has a RAID adapter or controller, you might want to reconfigure your disk arrays after installing hard disk drives; consult the documentation that came with your adapter or controller. Record the configuration information in the appropriate tables in “Installed Device Records” on page 161.
4. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Installing Microprocessors

When you install an additional microprocessor, your Netfinity 5000 server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

Installing Microprocessor Upgrades

Your server comes with an Intel Pentium II microprocessor. This microprocessor incorporates MMX technology with built-in ECC level two (L2) cache. For the latest information about microprocessor upgrades available for your server, contact your IBM reseller, IBM marketing representative, or see <http://www.pc.ibm.com/us/compat/> on the World Wide Web. If you do upgrade the microprocessor, use the instructions that come with the upgrade along with the instructions in “Installing or Replacing a Microprocessor” on page 67.

Attention:

- If you install an additional microprocessor that is different from the currently installed microprocessor, your server operation might be unreliable. To prevent this, use a microprocessor with the same internal and external clock speed, and the same cache size and voltage requirements as those of the currently installed microprocessor. Microprocessor internal and external clock frequencies and cache size must be identical.
- The voltage-regulator module (VRM) for the additional microprocessor plugs into a connector on the system board (see “System Board Connectors” on page 167 for the location of the VRM connector). Because each microprocessor has specific power and voltage requirements, be sure to use the VRM that comes with the microprocessor.

Note: The voltage regulator function for the microprocessor that is shipped with your server is built into the system board.

- If you select a setting for the frequency switch that is greater than the actual frequency of the microprocessor, you might damage the microprocessor. The frequency switch settings are shown in Table 3 on page 70.

For additional information about microprocessor speeds, clock frequencies, and jumper settings, see Chapter 7, “Server Records and Specifications” on page 159.

Installing or Replacing a Microprocessor



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

Before you begin:

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server BIOS. The “ServerGuide and Netfinity Manager Information” section of this *Server Library* includes IBM Update Connector, which keeps your BIOS and device drivers current. You can also obtain the latest level of BIOS for your server through the World Wide Web and the IBM Personal Computer Company Bulletin Board System (BBS). See the “Getting Help Information” section of this *Server Library* for the appropriate World Wide Web addresses and bulletin board telephone numbers.
- For a list of supported operating systems, see <http://www.pc.ibm.com/compat/> on the World Wide Web.

Notes:

1. If you have not already done so, go to <http://www.pc.ibm.com/support/> on the World Wide Web and download the appropriate flash update program. Review the applicable README files, and use this information to create a *Flash Utility Diskette*. Perform the POST/BIOS (flash) update procedure.
2. The microprocessor in your server comes with an attached heat sink. The microprocessor plugs into the microprocessor socket on the system board and is stabilized with a plastic bracket attached to the system board.
3. If you replace the microprocessor with one that has a different speed, you must change the switch settings on the system board. To locate the switches, see “System Board Connectors” on page 167. For information about the appropriate switch settings, see Table 17 on page 168, or see the label inside the server cover.

Attention:

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

To install a microprocessor:

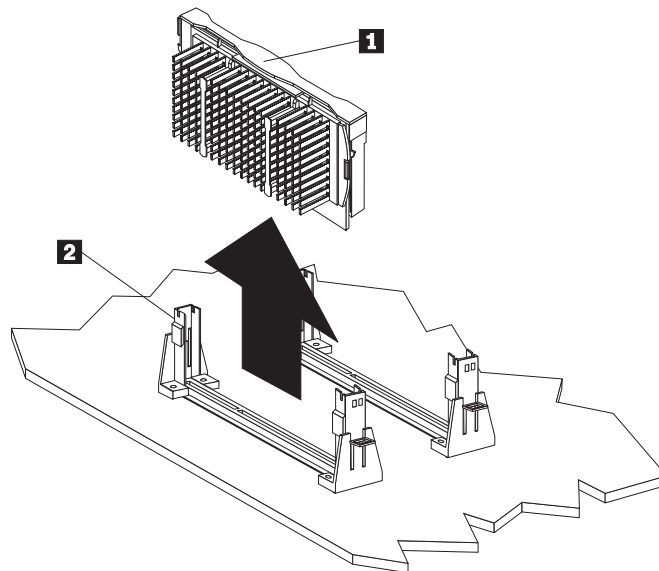
1. If you have not done so, remove the server cover. See “Preparing to Install Options” on page 43.

Installing Microprocessors

2. If you are installing an additional microprocessor, remove the terminator card from the secondary microprocessor connector. Otherwise, go to step 3.
 - a. Spread apart the posts of the secondary microprocessor connector bracket until the top of the terminator card is past the restraining latches.
 - b. Lift the terminator card out of the connector.

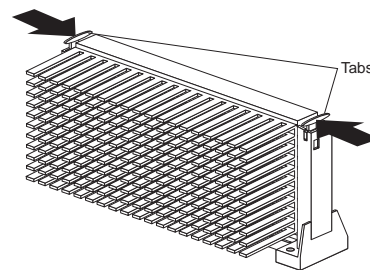
Note: When you install a second microprocessor, it becomes the startup (boot) microprocessor.

3. If you are replacing a microprocessor, remove the existing microprocessor from its socket. Otherwise, go to step 4 on page 69.
 - a. Locate the microprocessor socket on the system board. (See the illustration in “System Board Illustration” on page 166.)
 - b. Grasp the middle of the microprocessor adapter **1** and pull straight up, lifting the microprocessor out of the connector **2**.



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

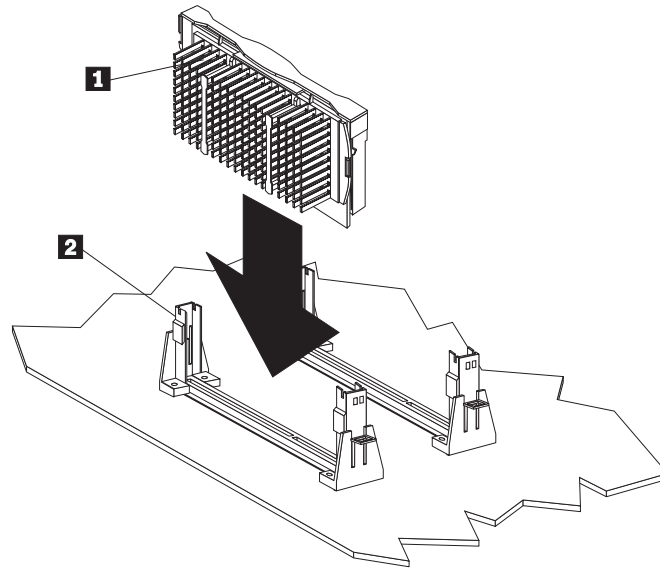
- 1) Place your index fingers on the small retainer tabs on the top of the microprocessor.
- 2) Push in toward the microprocessor until the tabs release.



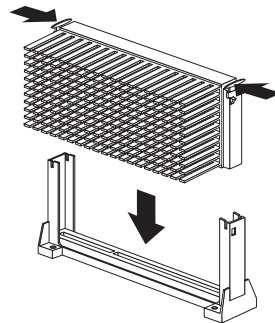
- 3) Lift the microprocessor out of the connector.

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

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



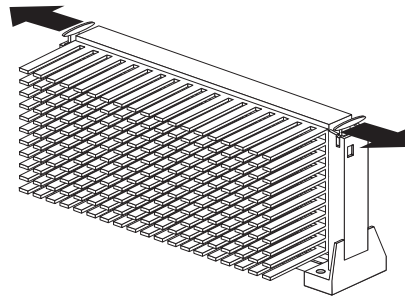
If the microprocessor has tabs at the upper corners instead of an adapter with a handle, press inward on the retainer tabs until they click into place.



6. Press the microprocessor into the connector until it snaps into place and is fully seated in the connector.

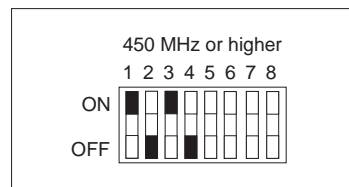
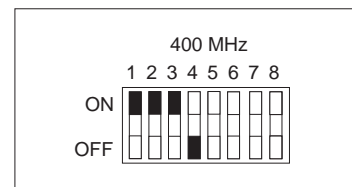
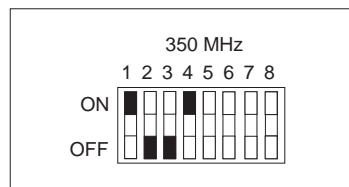
Installing Microprocessors

7. If the microprocessor has tabs at the upper corners instead of an adapter with a handle, pull outward on the retainer tabs to secure the microprocessor in place.



8. If you replaced the microprocessor with one that has a different speed, you must change the switch settings on the system board. To locate the switches, see “System Board Connectors” on page 167.

Table 3. Switch Settings for Microprocessor Speed



9. Go to “Record the Identification Numbers” on page 160 and Table 14 on page 162, and update the microprocessor information; then, return here.
10. Because you installed a new microprocessor in your server, you must reconfigure your server. Follow the procedure described in “Using the Configuration/Setup Utility” on page 22.
11. 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 that your server supports. See <http://www.pc.ibm.com/netfinity/> 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.
 - On some operating systems, if you install a second microprocessor it might be necessary to reinstall the operating system. See the documentation that comes with the new microprocessor.

12. If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Installing or Replacing the Power Supply

Your Netfinity server is shipped with a 350-watt power supply that provides redundant power through the use of two internal power modules. If your server load does not exceed 175 watts, and a problem occurs with one of the power modules in the power supply, the other module takes over the load. For power loads above 175 watts, you can install a second, optional, power supply to provide redundant power for the server. The second power supply contains one 175-watt power module. With the optional second power supply installed, if a problem occurs with any of the power modules, the remaining two power modules supply the needed 350 watts of power.

The LEDs on the back of each power supply indicate the status of each of the power modules. If an LED is not on, there is a problem with the power supply module, and the power supply must be replaced.

- To install or remove the optional second power supply, see the instructions that come with the option.
- To replace the 350-watt power supply, contact an IBM service technician to have the system serviced.

If you want to install or remove any other options, do so now. Otherwise, go to “Completing the Installation” on page 76.

Connecting External Options

The information in this section supplements the instructions that come with the external options (SCSI drives, printers, modems, and other serial and parallel devices). To connect external options, see the documentation that comes with the options.

Adding External SCSI Devices

Your server comes with a 16-bit UltraSCSI controller on the system board, which provides two independent SCSI channels. This controller has two 68-pin, shielded, high-density connectors: one internal, on the controller, and one external, on the back of the server. You can use these connectors to install an additional internal SCSI device in your server or to attach up to fifteen external SCSI devices to your server.

The internal SCSI connector provides support for SCSI devices installed inside the server. The external SCSI connector provides support for external SCSI devices.

Notes:

1. If you plan to install both internal and external SCSI devices, you must follow the instructions given in "Installing or Removing Internal Drives" on page 56 in addition to the instructions in this section. Read "Installing or Removing Internal Drives," and then return here.

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

2. Do not exceed the following cable lengths:
 - If you connect one or more Fast SCSI devices to the SCSI controller, the total length of all cables (internal and external) must not exceed 3 meters (9.8 feet).
 - If you do not connect Fast SCSI devices to the SCSI controller, the total length of all cables must not exceed 6 meters (19.7 feet).

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

If you plan to attach an external SCSI device, you might need to order an additional SCSI cable. To use an external device with the Netfinity 5000 server, you must connect it to the external SCSI connector, using a SCSI cable. This SCSI cable must have the proper connector for the SCSI external connector on one end, and the proper connector for the external device on the other end. If a SCSI cable does not come with the external device, or if it is the wrong type, you will need to order one. To select and order the correct SCSI cable for use with the external device, contact your IBM reseller or IBM marketing representative.

Attaching External Options

To attach an external option:

1. Turn off the server and all attached devices.
2. Follow the instructions that come with the option and the illustration in “Input/Output Connectors” on page 12 to connect it to the server.

Adding Security

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

Installing a U-Bolt and Security Cable

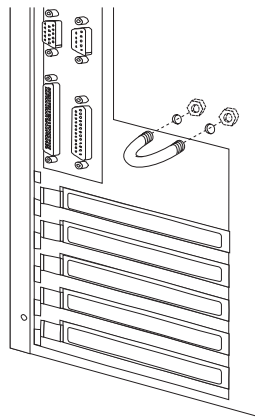
You can help to deter unauthorized removal of your tower model Netfinity 5000 server by installing a U-bolt and security cable on the rear of your server.

Before you begin

- Obtain the following:
 - A U-bolt
 - 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 41 and “Handling Static-Sensitive Devices” on page 42.

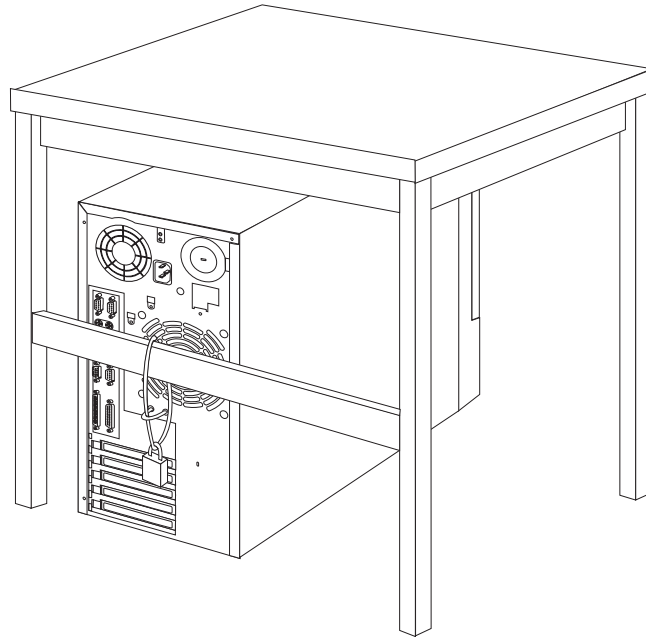
To install a U-bolt and security cable:

1. Remove the server cover. See “Preparing to Install Options” on page 43.
2. Insert the U-bolt through the holes and secure it in place with the nuts.



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

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



Completing the Installation

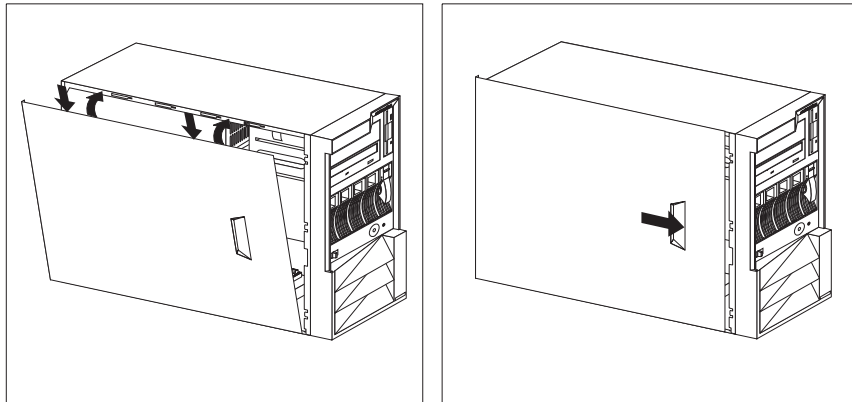
Before you begin

- Complete all the installation procedures for the internal options you have chosen to install.
 - Read “Electrical Safety” on page 41.
-
- If you have a tower model, continue with “Completing the Tower Model Installation.”
 - If you have a rack model, go to “Completing the Rack Model Installation” on page 79.

Completing the Tower Model Installation

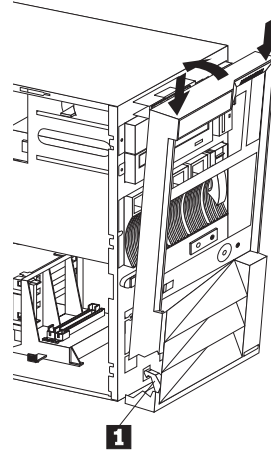
1. Install the cover on the server.
 - a. Align the left-side cover with the left side of the server, about 25 mm (1 inch) from the front of the server; place the bottom of the left-side cover on the bottom rail of the left-side frame.
 - b. Insert the tabs at the top of the cover into the slots at the top of the server side.
 - c. Hold the cover against the server and slide the cover toward the front of the server until the cover clicks into place.

Note: Be sure the front edge of the cover is flat against the server.



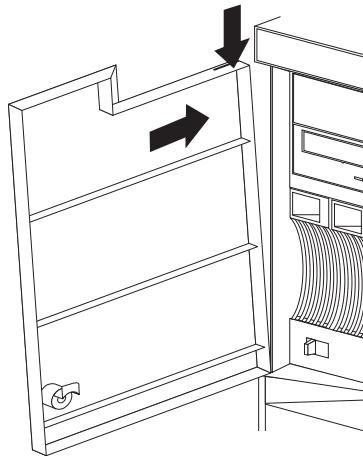
2. Replace the bezel, if it was removed.

- a. Place the bezel tabs **1** in the slots at the bottom front of the server.
- b. Press the top of the bezel toward the server front until the bezel clicks into place.



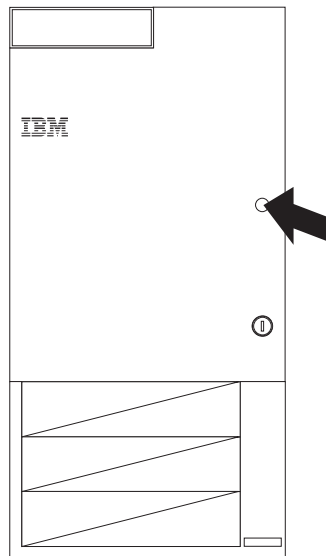
3. Replace the server door, if it was removed.

- a. Set the door on the bottom hinge.
- b. Press the flange downward while pressing the top of the door toward the server, until the flange connects with the top hinge. Release the flange.



Completing the Installation

4. Close and lock the server door.



Attention:

Be sure to maintain a clearance of at least 127 mm (5 inches) on the front and rear of the server to allow for air circulation.

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.

What to do next

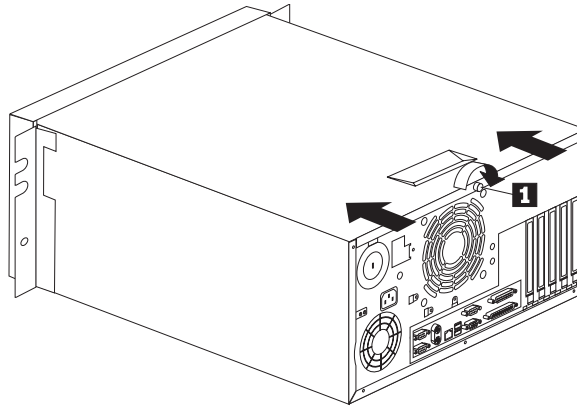
When you have completed installing the covers and cables, go to "Updating the Server Configuration" on page 81.

Completing the Rack Model Installation

1. Replace the top cover:

- a. Align the top cover with the top of the server, about 25 mm (1 inch) from the front of the server.
- b. Hold the cover against the server and slide the cover toward the front of the server until the cover clicks into place.

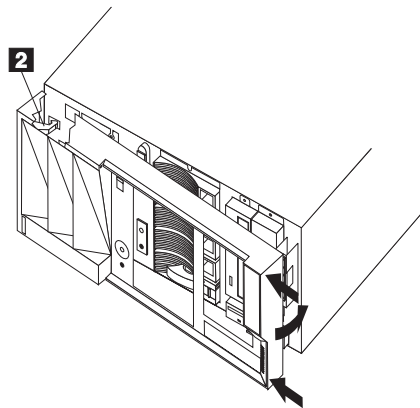
Note: Be sure the front edge of the cover is flat against the server.



- c. Turn the captive thumbscrew **1** until the cover is secured.

2. Replace the bezel, if it was removed.

- a. Place the bezel tabs **2** in the slots at the left front of the server.



- b. Press the right end of the bezel toward the server front until the bezel clicks into place.

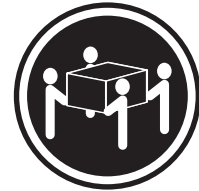
Completing the Installation

3. Attach the monitor, keyboard, and power cables to the corresponding connectors on the server. Refer to the rack documentation for instructions.
4. If you have a modem or fax machine attached to the server, reconnect the telephone line to the wall outlet and the server.

5



≥32 kg (70.5 lbs)

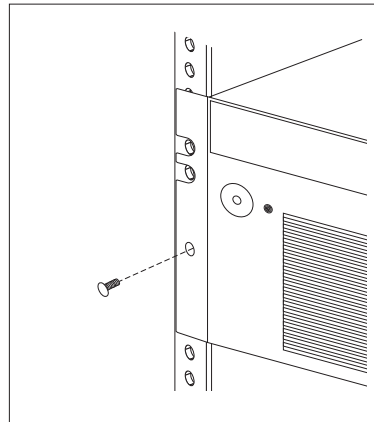


≥55 kg (121.2 lbs)

CAUTION:

Use safe lifting practices when lifting your machine.

5. If you are installing the rack model in the rack for the first time, go to “Installing the Server in the Rack Enclosure” on page 100, and then go to “Updating the Server Configuration” on page 81. Otherwise, continue with the following instructions to secure the rack model in the rack.
 - a. Slide the rack model into the rack.



- b. Locate the screws that you removed in step 3 on page 46.
- c. Insert the screws through the bracket, mounting rail, and cage nut.

What to do next

When you have completed installing the cover and cables, go to “Updating the Server Configuration” on page 81.

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 computer 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 the last (terminated) SCSI device from the external SCSI cable connected to the SCSI connector on the back of the server, the server might not recognize any SCSI devices that are still connected on that SCSI channel (cable). See Chapter 6, "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/Setup Utility programs (see "Start Options" on page 28).
3. When you install an ISA legacy adapter, you must allocate system resources to support it (see "Plug and Play" on page 30).
4. You can find the list of supported hardware and software for your server at <http://www.pc.ibm.com/compat> on the World Wide Web.

Record the new configuration information in Chapter 7, "Server Records and Specifications" on page 159.

What to do next

- Device drivers to install? See the instructions that come with the option to determine if device drivers are required, and, if so, how to install them.
- If you do not need to install any device drivers or update the system configuration, your server is ready to use.

Serial Port Connectors

Serial ports are used to communicate with printers, plotters, external modems, auxiliary terminals, and other computers. Your server provides two serial ports (A and B), and a special type of serial port (Management Port C, described on the next page). You can add more serial ports by installing a serial adapter in one of the expansion slots.

Note: Serial port A can be shared by the system-management processor and operating system. Serial port B is used by the operating system only. Management port C is controlled exclusively by the system-management processor, cannot be used by the operating system, and cannot be configured using the Configuration/Setup Utility program. See the “Advanced System Management Information” section of this *Server Library* for information about configuring serial ports A and C.

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

The serial ports transmit and receive data and commands at a rate of 300 bits per second (bps) up to 115200 bps. The bits-per-second measurement is commonly referred to as the *baud rate*.

Each of the two serial connectors provided on your Netfinity 5000 server uses a 9-pin, D-shell connector.

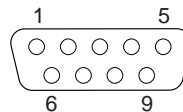


Table 4 shows the pin-number assignments for the serial port connectors. The pin-number assignments conform to the industry standard.

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

Management Port C

Your server has a dedicated systems management I/O port. This port can be used to attach a modem that is dedicated to communication with the system-management processor.

The connector on the back of the server and the pin-number assignments are the same as for the serial ports.

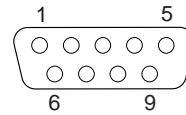
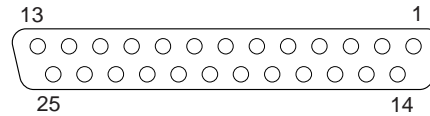


Table 4 on page 82 shows the pin-number assignments for the serial port connectors. The pin-number assignments conform to the industry standard.

Parallel Port Connector

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



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

- Standard Parallel Port (SPP)
- Enhanced Parallel Port (EPP)
- Extended Capability Port (ECP)

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

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

Video Port Connector

The video port is where you can attach a video monitor to your Netfinity 5000 server. Your server provides a 15-pin video port connector.

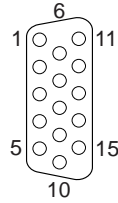


Table 6 shows the pin-number assignments for the video port connector.

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

Keyboard and Mouse Connectors

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

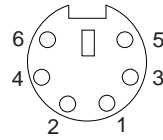


Table 7 shows the pin-number assignments for the keyboard and auxiliary-device port connectors.

<i>Table 7. Keyboard and Auxiliary-Device Port Connectors Pin-Number Assignments</i>	
Pin	Signal
1	Data
2	Not connected
3	Ground
4	+5 V dc
5	Clock
6	Not connected

SCSI Connectors

Your server comes with a 16-bit UltraSCSI controller on the system board, which provides two independent SCSI channels. This controller has two 68-pin, shielded, high-density connectors: one internal, on the controller, and one external, on the back of the server. You can use these connectors to install an additional internal SCSI device in your server or to attach up to fifteen external SCSI devices to your server.

Internal SCSI Connector

A 2-drop, 68-pin (16-bit) cable is installed in your server. One drop is connected to the backplane, the other drop can connect to an additional SCSI removable media device (not a hard disk drive). This cable is connected to the internal connector for the 16-bit UltraSCSI controller. You can use this cable to install an additional internal SCSI device in your server.

External SCSI Connector

To attach an external SCSI device to your server, connect an external SCSI cable from the SCSI device to the SCSI connector on the back of the server. Ensure that the last device on the external SCSI cable is terminated.

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

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

Universal Serial Bus Ports

The universal serial bus (USB) is an emerging serial interface standard for telephony and multimedia devices. Each USB port is a single connector for devices that previously used serial, parallel, keyboard, mouse, and game ports. USB technology uses Plug and Play technology to determine which type of device has been attached to the connector. Each USB device is accessed by a unique USB address. A device called a hub is used to convert a single USB connector into multiple attachment points. A hub has multiple ports where peripherals can be attached. USB provides 12 megabits-per-second (Mbps) bandwidth with a maximum of 63 peripherals and a maximum signal distance of five meters (16 feet 4.9 inches) per segment.

Note: If more than one USB device is to be attached, the devices must be connected to a hub. Your Netfinity 5000 server does not support a keyboard attached to the system USB port.

Your Netfinity 5000 server comes with two USB ports. Table 9 shows the pin-number assignments for the USB port connectors.

Table 9. USB Port Connector Pin-Number Assignments

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

Ethernet Connector

The system board in your Netfinity 5000 server contains an Ethernet *controller*. The controller has an external RJ-45 connector on the rear of the server that is used with a category 3, 4, or 5 twisted-pair cable. The connector enables an Ethernet network to attach to the internal transceiver in your server.

Note: The 100BASE-TX Fast Ethernet standard requires that the cabling in the network be Category 5 or higher.

See “Configuring the Ethernet Controller” on page 32 for additional information about the Ethernet controller.

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

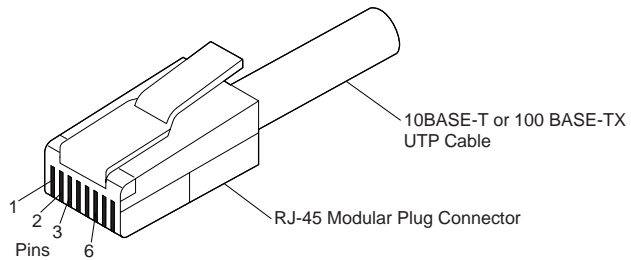


Table 10. Ethernet Connector Pin-Number Assignments

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

Chapter 5. Installing a Server in a Rack Enclosure

This chapter provides instructions for installing a Netfinity 5000 server rack model in a server rack enclosure.

- If you have a rack model, your server comes with the necessary rack mounting hardware. Review the preinstallation information in “Before You Begin” on page 92; then, continue at “Installing the Rack Model in a Rack Enclosure” on page 94.
- If your Netfinity 5000 server is a tower model and you want to install it as a rack model in a server rack enclosure, you must order the Netfinity Rack Mount Kit. This kit contains the appropriate front, top, and bottom covers, in addition to the brackets and the cable-management arm that you need to install the server into the rack. Follow the instructions that are included in the Rack Mount Kit.

This chapter contains:

Before You Begin	92
Installing the Rack Model in a Rack Enclosure	94
Preparing the Server	94
Preparing the Rack Enclosure	96
Installing the Server in the Rack Enclosure	100
Removing the Rack Model from a Rack Enclosure	102

Before You Begin

- You will need the following items:
 - Flat-blade screwdriver
 - 8-inch adjustable wrench or pliers
 - Tape
 - Pencil

Some of the installation procedures require two people.

- Before you begin to install your server in the rack enclosure, review the safety and handling guidelines specified under “Safety Information Statements” on page vii, “Electrical Safety” on page 41, and “Handling Static-Sensitive Devices” on page 42. These guidelines will help you work safely while working with your server and options.
- Review the documentation that comes with your rack enclosure for additional safety, cabling, and operating considerations.
- To ensure cabinet stability, install the servers starting from the bottom of the rack enclosure.
Note: If you are installing different server models in the rack enclosure, install the heaviest models in the lower part of the rack enclosure.
- Ensure that you plan the rack enclosure installation within the guidelines for:
 - Heat generation
 - Electrical requirements
 - Air flow
 - Mechanical loading
- Verify that the rack enclosure can meet the rack model operating parameters, as detailed in Table 11 on page 93.

<p>Size</p> <ul style="list-style-type: none"> - Depth: 560 mm (22.05 in.) - Height: 230 mm (9.06 in.) - Width: 420 mm (16.54 in.) <p>Weight</p> <ul style="list-style-type: none"> • Typical server as shipped: 39 kg (85.8 lb) <p>Environment</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> - Server on: 10° to 35° C (50° to 95° F) Altitude: 0 to 914 m (3000 ft.) - Server on: 10° to 32° C (50° to 90° F) Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.) - Server off: 10° to 43° C (50° to 110° F) Maximum Altitude: 2133 m (7000 ft.) • Humidity: <ul style="list-style-type: none"> - Server on: 8% to 80% - Server off: 8% to 80% • Maximum altitude: 2133 m (7000 ft.) 	<p>Electrical Input</p> <ul style="list-style-type: none"> • Sine-wave input (50 to 60 Hz) is required • Input voltage: <ul style="list-style-type: none"> - Low range: <ul style="list-style-type: none"> - Minimum: 90 V ac - Maximum: 137 V ac - High range: <ul style="list-style-type: none"> - Minimum: 180 V ac - Maximum: 265 V ac - Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> - Minimum configuration as shipped: 0.08 kVA - Maximum configuration: 0.52 kVA <p>Total Power Available for Drives</p> <ul style="list-style-type: none"> • Nominal Operating Current allowed: <ul style="list-style-type: none"> - +5 V dc line: 5.3 A - +12 V dc line: 5.0 A 	<p>Heat Output</p> <ul style="list-style-type: none"> • Approximate heat output in British Thermal Units (Btu) per hour: <ul style="list-style-type: none"> - Minimum configuration: 350 Btu (102 watts) - Maximum configuration: 860 Btu (251 watts) <p>Acoustical Noise Emissions Values</p> <ul style="list-style-type: none"> • Sound power, idling <ul style="list-style-type: none"> - 6.2 bel for open bay system (no hard disk drives installed) - 6.3 bel for system with one hard disk drive installed) • Sound power, operating <ul style="list-style-type: none"> - 6.2 bel for open bay system (no hard disk drives installed) - 6.3 bel for system with one hard disk drive installed) • Sound pressure, idling <ul style="list-style-type: none"> - 47 dBA for open bay system (no hard disk drives installed) - 48 dBA for system with one hard disk drive installed) • Sound pressure, operating <ul style="list-style-type: none"> - 47 dBA for open bay system (no hard disk drives installed) - 48 dBA for system with one hard disk drive installed)
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Table 11. Netfinity 5000 Server Operating Specifications

Installing the Rack Model in a Rack Enclosure

During this procedure, you must install parts on the rack enclosure and the server. This process can be divided into three parts:

- Preparing the server
- Preparing the rack enclosure
- Installing the server into the rack enclosure

Before you begin

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42, and the safety information in your rack enclosure documentation.
- Turn off the server, if it is on.
- Refer to your rack enclosure documentation for additional information on preparing the rack.

Preparing the Server

In this section, you will use the following parts:

- One cable arm bracket
- The inner slide from two slide bracket assemblies
- 6 pan-head short screws (M4 by 5 mm)

5



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:

Use safe lifting practices when lifting your machine.

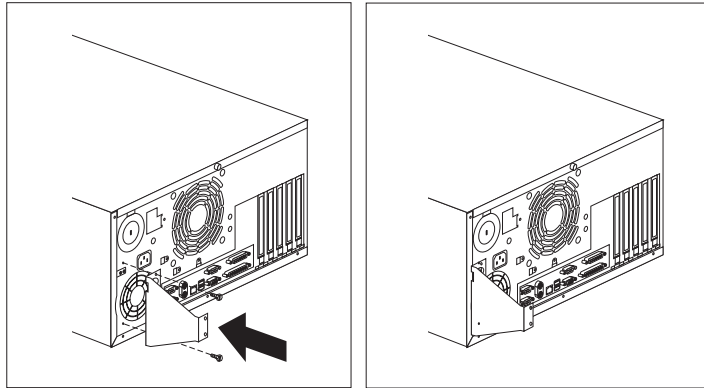
Attention:

To avoid damage to internal components, use only the pan-head short screws (M4 by 5 mm) included with the Rack Mount Kit.

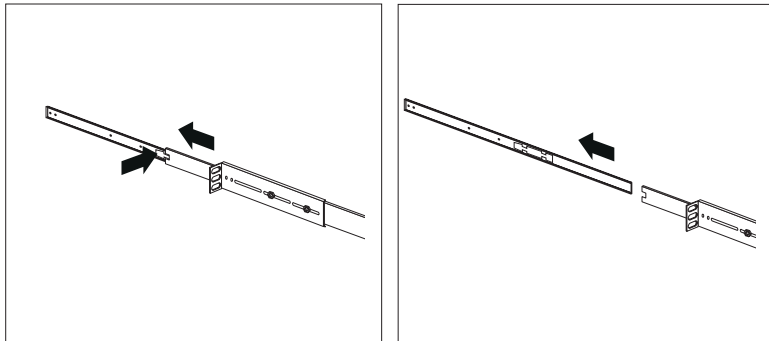
Installing the Rack Model in a Rack Enclosure

To prepare the Netfinity 5000 server for installation in a rack enclosure:

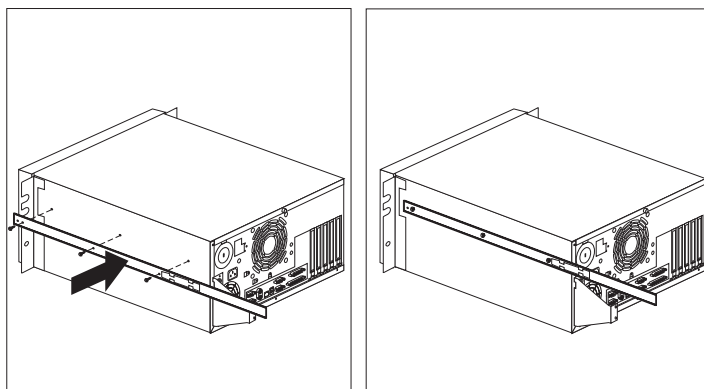
1. Attach the cable-arm bracket to the rear of the server.
 - a. Remove the two screws at the left of the primary power supply.
 - b. Align the cable-arm bracket with the screw holes, keeping the solid arm of the bracket toward the side of the server. Make sure the openings in the bracket align with the power supply LEDs and the fan.
 - c. Attach the bracket with the two screws you removed in step 1a.



2. Attach the inner slide section of each slide rail to the side of the server.
 - a. Pull the inner slide until the safety latch locks.
 - b. Press the safety latch; then, pull the inner slide firmly until it detaches from the outer slide rail.



- c. Align the holes on the inner slide with the holes on sides of the server; then, attach the slide with three pan-head short screws (M4 by 5 mm).



Preparing the Rack Enclosure

In this section, you will use the following parts:

- Two slide bracket assemblies
- Two slide rails (fitted to system unit)
- One cable-management arm
- Ten long screws (M6 by 16 mm)
- Ten cage nuts
- Installation template

Attention:

To ensure cabinet stability, plan the installation of servers in the rack enclosure starting from the bottom.

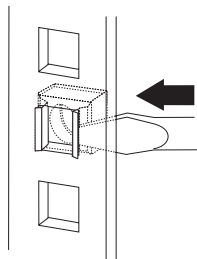
Note: This procedure requires two people.

To attach the mounting hardware to the rack enclosure:

1. Mark the positions of the slide brackets on the mounting rails on the rack enclosure.
 - a. Position the template on the front mounting rail on the rack enclosure, aligning the holes. Secure the template in place with tape.
 - b. Mark the holes for the slide brackets and cage nuts. If you prefer, mark *all* the cage nut positions on the rack at this time.
 - c. Carefully remove the tape from the mounting rails, and attach the template to the rear mounting rails. Mark the locations for the slide brackets and cage nuts.

Notes:

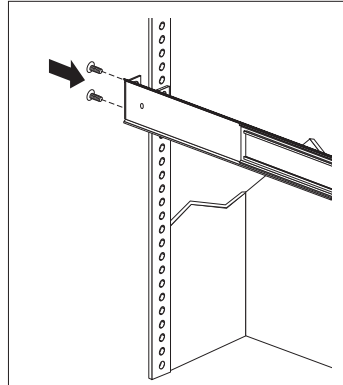
- a. You must align the slide brackets correctly, or the installation cannot be completed.
 - b. The slide rails have four screws each to allow for length adjustment.
2. Install the cage nuts in the marked positions as shown.



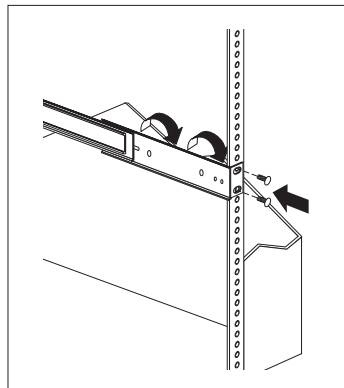
3. Attach the slide rail to the left side of the rack enclosure.
 - a. Extend the outer slide rail until the slide bracket is flush against the outside of the left front mounting rail. Align the slide rail with the cage nuts on the mounting rail.

Installing the Rack Model in a Rack Enclosure

- b. From the front of the rack enclosure, insert two long screws through the slide bracket and mounting rail. Press the slide bracket until it is flush with the outer edge of the mounting rail; then, tighten the screws.

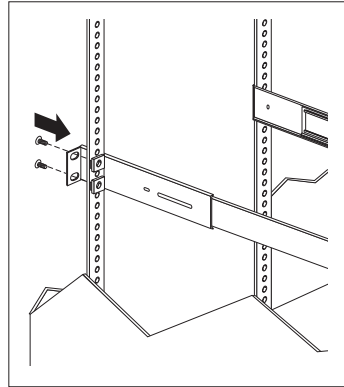


- c. Attach the slide bracket to the left rear side of the rack enclosure.
- 1) Align the holes on the slide bracket with the cage nuts on the rear mounting rail.
 - 2) From the rear of the rack enclosure, insert two long screws through the slide bracket and mounting rail; then, tighten the screws.
 - 3) If it was necessary to adjust the length of the slide rails, tighten the nuts on the slide rail, using pliers, a socket wrench, or an adjustable wrench.

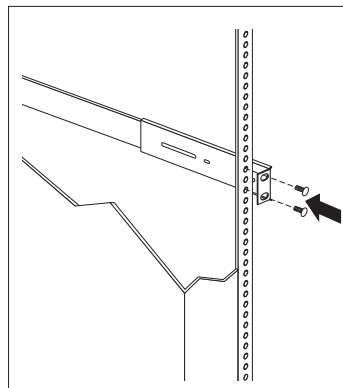


Installing the Rack Model in a Rack Enclosure

4. Attach the slide rail to the right side of the rack enclosure.
 - a. Extend the outer slide rail until the slide bracket is flush against the outside of the right front mounting rail. Align the slide bracket with the cage nuts on the mounting rail.
 - b. From the front of the rack enclosure, insert two long screws through the slide bracket and mounting rail. Press the slide rail so that it is flush with the outer edge of the mounting rail and tighten the screws.

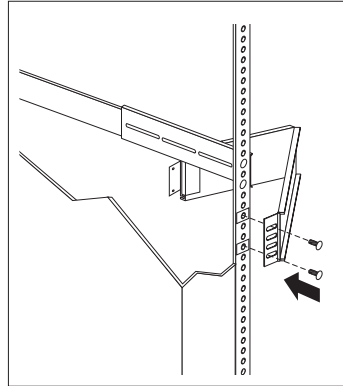


- c. Attach the slide bracket to the right rear of the rack enclosure.
 - 1) Align the holes on the bracket with the cage nuts on the rear mounting rail.



- 2) From the rear of the rack enclosure, insert a long screw through holes in the slide bracket and mounting rail; then, tighten the screws.
5. Attach the cable-management arm to the right rear of the rack enclosure.
 - a. Align the holes on the cable-management arm mounting panel with the cage nuts on the rear mounting rail.

Installing the Rack Model in a Rack Enclosure



- b. From the rear of the rack enclosure, insert a long screw through the holes in the cable-management arm mounting panel and cage nut; then, tighten the screws.

Notes:

- 1) You can choose to wait to attach the cable-management arm to the rack until after you have attached the other end of the cable-management arm to the server.
- 2) To facilitate alignment of the cable-management arm, be sure to insert the screws through the first and fourth holes, as shown.

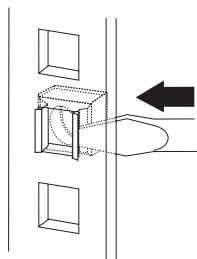
Installing the Server in the Rack Enclosure

In this section, you will use the following parts:

- Four long screws (M6 by 16 mm)
- Two cage nuts
- One cable-management arm
- Cable ties

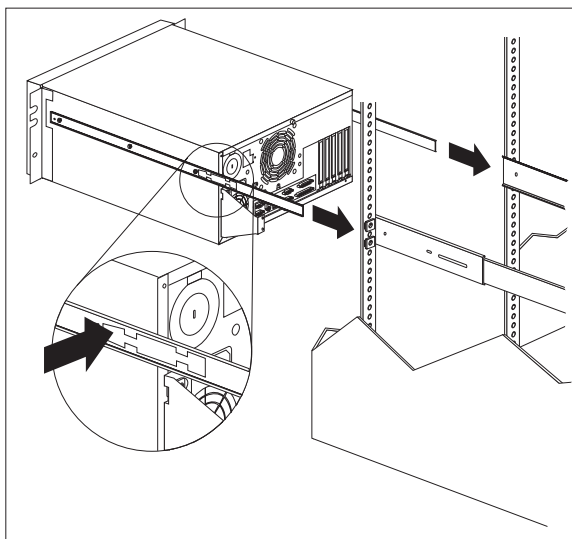
To install the server into the rack enclosure:

1. If you have not done so already, install a cage nut in each front mounting rail in the marked positions, as shown.



2. Position the Netfinity 5000 server horizontally, with the 3.5-inch drive bays on the top.
3. Align the inner slides on the sides of the server with the slide rails; then, slide the server onto the outer slide, until the slide rails click into place.

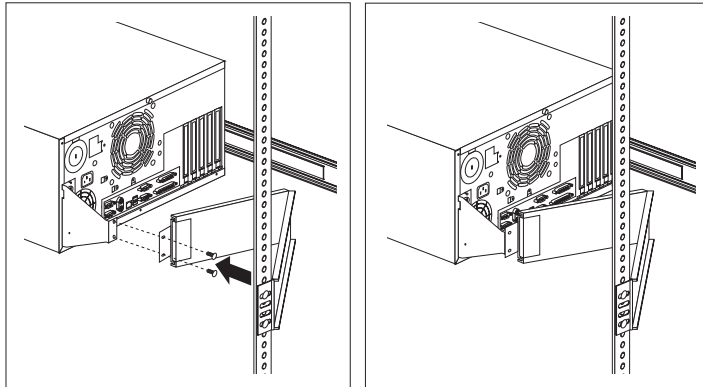
Note: When the rack model is fully extended, safety latches on the slide rails lock into place. This prevents the server from being accidentally pulled out too far and dropped. To release the safety latch, press in.



4. Press the safety latches and slide the rack model about halfway into the rack enclosure.

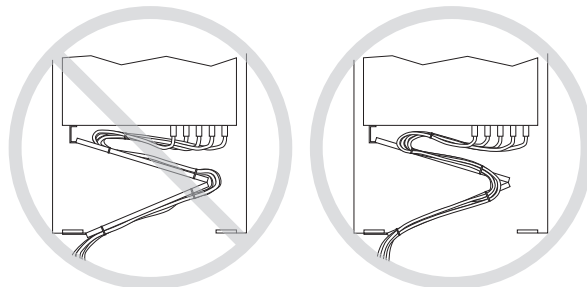
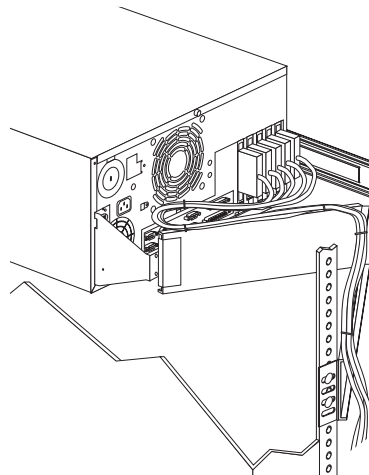
Installing the Rack Model in a Rack Enclosure

5. Attach the cable-management arm to the cable-arm bracket, using two long (M6 by 16 mm) screws.



6. If you have not done so already, attach the cable-management arm to the rack as described in steps 5a on page 98 and 5b on page 99.
7. Attach the monitor, keyboard, and power cables to the corresponding connectors on the server. Refer to the rack enclosure documentation for instructions.
8. Attach the cables to the cable-management arm using the cable ties provided.

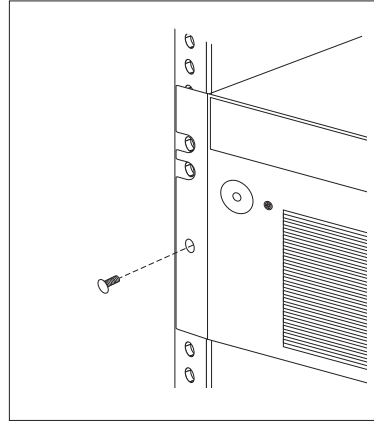
Note: Be sure to route the cables above the top edge or below the bottom edge of the cable-management arm, to avoid overstressing the cables.



9. Secure the rack model in the rack enclosure.

Removing the Rack Model from a Rack Enclosure

- a. Slide the rack model into the rack enclosure.
- b. Secure the server to both sides of the rack enclosure by inserting a long screw (M6 by 16 mm) through the chassis bracket, mounting rail, and cage nut.



10. To complete the installation, refer to the documentation that comes with the rack enclosure.

Removing the Rack Model from a Rack Enclosure

In some configurations, installing options in the rack model might be more convenient if you remove the server from the rack enclosure. For example, you might prefer to remove the server if you are installing an internal drive in a rack model that is installed in the bottom bay in a rack enclosure.

Before you begin

- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Turn off the server.
- Follow any additional installation and safety instructions that come with the rack.

5



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:
Use safe lifting practices when lifting your machine.

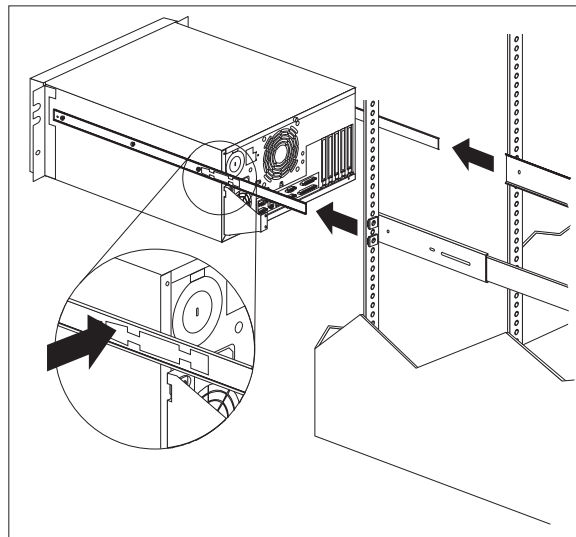
Removing the Rack Model from a Rack Enclosure

To remove the Netfinity 5000 server from a rack enclosure:

1. Remove the screws from each front bracket. Set the screws aside for later use.
2. Slide the server out of the rack.
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.

4. Disconnect all cables and power cords from the rear of the server.
5. Remove the two screws from the cable-arm bracket.
6. Press the safety release latch on each slide rail.



7. Lift the server at a slight angle, and pull it from the slide rails. Then place the server on a flat, nonconductive surface.

Removing the Rack Model from a Rack Enclosure

Chapter 6. Solving Problems

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

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

Note: When you run the diagnostic test programs, a single problem can cause several error messages to occur. When this happens, work to correct the cause of the first error message. After the cause is corrected, the other error messages probably will not occur the next time you run the tests.

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

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Diagnostic Tools Overview

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

- LEDs on the system board, power supplies, and Ethernet adapters
- Diagnostic test programs
- Power-on self-test (POST)
- POST beep codes
- Error messages
- Troubleshooting charts
- Option diskettes

Diagnostic LEDs

When a system error occurs, the relevant LEDs on the system board are lighted to identify where the errors are (see “System Board LEDs” on page 166). When you see the System Error LED illuminated on the operator LED (status) panel on the front of the server, check the LEDs on the power supplies and at any Ethernet adapters, then open the cover and see which LEDs are illuminated on the system board.

Diagnostic Test Programs

The server diagnostics test programs are stored in nonvolatile random-access memory (NVRAM) on the system board. These programs are the primary method of testing the system board, memory, and other standard features of your Netfinity 5000 server. You can also use them to test some external devices.

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

The server diagnostic test programs can identify most problems associated with major components of your server: the system board, Ethernet controller, video controller, RAM, diskette drive, serial port, parallel port, keyboard, and mouse.

You can start the diagnostic test programs from the Startup panel, when the message Press F2 for Diagnostics appears. Test options let you batch groups of tests, specify test parameters (for example, which memory DIMM you want to test), and specify the number of passes that you want to run (one through continuous).

You can also view the server configuration information from the Diagnostic Utility menu. For example, you can view the interrupt request (IRQ) and direct memory access (DMA) assignments, memory usage, device drivers, and so on.

Power-On Self-Test (POST)

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

POST does the following:

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

If you have a power-on password or administrator password set, you must type the password and press **Enter** before POST will continue.

While the memory is being tested, the amount of available memory appears on the screen. These numbers advance as the system progresses through POST and the final number that appears on the screen represents the amount of memory available. If POST finishes without detecting any problems, a single beep sounds and the first screen of your operating system or application program appears.

If POST detects a problem, an error message appears on your screen. A single problem can cause several error messages to appear. When this occurs, work to correct the cause of the first error message. After the cause is corrected, the other error messages probably will not appear the next time you turn on the system.

POST Beep Codes

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

- One beep indicates successful completion of POST.
- More than one beep indicates that POST detected an error. For more information, see “Power-on Self-Test (POST) Beep Codes” on page 120.

Error Messages

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

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

POST Error Messages and Beep Codes

POST error messages and beep codes occur during startup when POST finds a problem with the hardware or detects a change in the hardware configuration. For more information, see pages 120 through 122.

Diagnostic Error Messages

Diagnostic error messages occur when a test finds a problem with the server hardware. These error messages are alphanumeric and they are saved in the Test Log. For more information, see pages 123 through 132.

Software-Generated Error Messages

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

Troubleshooting Charts

The charts under “Troubleshooting Charts” on page 141 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 an Option Diskette. Option Diskettes usually contain option-specific diagnostic test programs or configuration files.

If your optional device or adapter comes with an Option Diskette, follow the instructions that come with the option. Different instructions apply depending on whether the Option Diskette is startable or not.

Diagnostic Test Programs

This section includes useful information about navigating through the diagnostic test programs, as well as procedures for starting and stopping them. These programs are designed to test the IBM Netfinity 5000 server. If you want to test a non-IBM product, refer to the information that comes with that product.

You can start the diagnostic test programs from the Startup panel, when the message Press F2 for Diagnostics appears.

Note: When you run the diagnostic test programs, a single problem can cause several error messages to occur. When this happens, work to correct the cause of the first error message. After the cause is corrected, the other error messages probably will not occur the next time you run the tests.

Navigating Through the Diagnostic Tests

Error messages in the Test Log are stored by diagnostic test session. A diagnostic test session is defined as running one, all, or a selection of tests, one or more times. You can use the following keys to maneuver within the test program:

Enter	Selects an item.
Down Arrow (↓)	Moves the cursor down.
Up Arrow (↑)	Moves the cursor up.
Left Arrow (←)	Toggles test selection between Yes and No.
Right Arrow (→)	Toggles test selection between Yes and No.
Page Down (PgDn)	Moves to the next diagnostic test session in the log (if any).
Page Up (PgUp)	Moves to the previous diagnostic test session in the log (if any).
F1	Displays the appropriate Help information. Use the Up Arrow (↑) or Down Arrow (↓) key to scroll through the information. Pressing F1 from within a Help screen provides a help index from which you can select different categories. Pressing Esc exits Help and returns to where you left off.
Esc	Returns to the previous menu.

Running Diagnostic Test Programs

When you start the diagnostic test programs from the Diagnostic Utility menu, you can select the tests, the way the tests run, and the number of times the tests run.

Notes:

1. To run the diagnostic test programs, you must start the server with the highest level password.

That is, if you enter the power-on password, and an administrator password is set, you cannot run the test programs. You can only view the error messages in the test log.

If an administrator password is set, you must enter the administrator password to run the diagnostic test programs.
2. If the server stops during testing and you cannot continue, restart the server and try running the tests again. If the problem persists, have the system serviced.
3. If the diagnostic tests do not find a problem, see "Troubleshooting" on page 141 and look for the problem symptom.
4. You might have to install a wrap connector on your active parallel, serial, or Ethernet port to obtain accurate test results for these ports. If you do not have a wrap connector, contact your IBM reseller or IBM marketing representative.
5. You might need a scratch diskette to obtain accurate test results when testing the diskette drive.
6. The keyboard and mouse tests assume that a keyboard and mouse are attached to the server.

To start the diagnostic tests:

1. Turn on the server and watch the screen.
If the system is turned on already, shut down your operating system and restart the server.
2. When the message Press F2 for Diagnostics appears, press **F2**.
If a power-on password or administrator password is set, the system prompts you for it. Type in the appropriate password; then, press **Enter**.
3. The Diagnostic Programs screen appears.
4. Select **Extended** or **Basic** from the top of the screen.
5. Select the test you want to run from the list that appears; then, follow the instructions that appear on the screen. The actions available include specifying the options for the tests to be run, such as the number of times to run the test, whether to stop on error, or whether to use a predefined overlay that describes the tests to be run.

When the tests have completed, you can view the Test Log by selecting **Utility** from the top of the screen.

Also, you can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

If the hardware checks out OK but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, refer to the information that comes with the software package.

Viewing the Test Log

If you are already running the diagnostic programs, continue with step 4 in this procedure.

To view the Test Log:

1. Turn on the server and watch the screen.
If the system is turned on already, shut down your operating system and restart the server.
2. When the message Press F2 for Diagnostics appears, press **F2**.
If a power-on password or administrator password is set, the system prompts you for it. Type in the appropriate password; then, press **Enter**.
3. The Diagnostic Programs screen appears.
4. Select **Utility** from the top of the screen.
5. Select **View Test Log** from the list that appears; then, follow instructions on the screen.
6. Press **Esc** to return to the Diagnostic Programs screen.
7. Select **Quit** from the top of the screen; then, select **Exit Diags** to exit from the diagnostic programs. The server restarts.

Power-on Self Test (POST) Messages

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

Notes:

1. The actions for some of the messages require you to run the Configuration/Setup Utility. For information about using these programs, see “Using the Configuration/Setup Utility” on page 22.
2. If a password prompt appears with a POST message, type the administrator or power-on password; then, press **Enter**.

POST Message Table

POST Message	Description
062	<p>The Netfinity 5000 server failed to boot on three consecutive attempts.</p> <p>All caches are disabled. This can be caused by repeatedly turning the Netfinity 5000 server on and then off or resetting the Netfinity 5000 server.</p> <p>Action: Start the Configuration/Setup Utility program and verify that all settings are correct. (See “The Configuration/Setup Utility.”) Use the Cache Control selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the caches. (See “Advanced Setup” on page 28.)</p> <p>If the problem persists, have the system serviced. When the problem is corrected, make sure to enable the caches.</p>
101 102	<p>An error occurred during the system board and microprocessor test.</p> <p>Action: Have the system serviced.</p>
106	<p>An error occurred during the system board and microprocessor test.</p> <p>Action: Have the system serviced.</p>
114	<p>An adapter read-only memory (ROM) error occurred.</p> <p>Action: Remove the options. If you can start the server without the options installed, reinstall each option one at a time and retest after each is reinstalled. When an option fails, replace it.</p> <p>If you cannot isolate and correct the problem, have the system serviced.</p>
129	<p>An error was detected in the L1 cache of one of the microprocessors.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly. 2. If the problem persists, check to see if the system has isolated the problem to a microprocessor: <ul style="list-style-type: none"> • If the System Error LED on the information LED panel is on, check to see if any Microprocessor Error LEDs on the system board are on (see “System Board LEDs” on page 166). <ul style="list-style-type: none"> – If a Microprocessor LED is on, run the diagnostic program for the microprocessor indicated by the LED (if the secondary microprocessor error LED is on, run the Alt. CPU diagnostic program). If the tests fail, replace the microprocessor. – If the microprocessor tests do not fail, have the system serviced. • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the microprocessor error. <p>If the problem persists, have the system serviced.</p>
151	<p>A real-time clock (RTC) error occurred.</p> <p>Action: Have the system serviced.</p>

POST Message	Description
161	<p>The real-time clock battery has failed.</p> <p>Action: Have the system serviced or replace the battery yourself. For additional information, see “Replacing the Battery” on page 157 and “Lithium Battery Notice” on page ix before you attempt to change the battery.</p> <p>You can use the server until you replace the battery. However, you must run the Configuration/Setup utility programs and set the time and date and other custom settings each time you turn on the server.</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>Action: 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 test 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>Action: Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, have the system serviced.</p> <p>The server can be used until the system is serviced, but any application programs that use the date and time will be affected.</p>
164	<p>A change in the memory configuration occurred. This message might appear after you add or remove memory.</p> <p>Note: The server can be used with decreased memory capacity.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. If POST error message 289 also occurred, follow the instructions for that error message first. 2. If you have installed or removed memory, run the Configuration/Setup Utility program; then, exit, saving the new configuration settings. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22. <p>If the message appears again, shut down the Netfinity 5000 server, reseal the memory modules, and restart the Netfinity 5000 server.</p> <ol style="list-style-type: none"> 3. If the problem persists, check to see if the system has isolated the problem to a memory module: <ul style="list-style-type: none"> • If the System Error LED on the information LED panel is on, check the DIMM Error LEDs next to the memory sockets on the system board (see “System Board LEDs” on page 166). If a DIMM Error LED is on, run the diagnostic program for the memory. <ul style="list-style-type: none"> – If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, have the system serviced. – If the memory tests do not fail, have the system serviced. • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error. <p>If the problem persists, have the system serviced.</p>
175	<p>A vital product data (VPD) error occurred.</p> <p>Action: Have the system serviced.</p>

POST Messages

POST Message	Description
176	A security hardware error occurred.
177	Action: Check for indications that someone has tampered with the server. If no one has tampered with the server, have the system serviced.
178	
184	<p>The power-on password information stored in your server has been removed.</p> <p>Action: From the Configuration/Setup Utility program main menu, select System Security. Then, follow the instructions on the screen. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22.</p> <p>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>Action: From the Configuration/Setup Utility program main menu, select Start Options; then, follow the instructions on the screen. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22.</p> <p>If this information cannot be restored, have the system serviced.</p>
186	<p>A system board or hardware error occurred.</p> <p>Action: Have the system serviced.</p>
187	<p>The VPD serial number is not set.</p> <p>Action: The system serial number is set in the VPD EEPROM at the time of manufacturing. If the system board has been replaced, the system serial number will be invalid and should be set. From the main menu of the Configuration/Setup Utility program, select System Information, then select Product Data. If the problem persists, have the system serviced.</p>
188	<p>A vital product data (VPD) error occurred.</p> <p>Action: Have the system serviced.</p>
189	An attempt has been made to access the server with invalid passwords. After three incorrect attempts, the server locks up; that is, the logon data fields are no longer available to the user.
201	<p>An error occurred during the memory controller test. This error can be caused by:</p> <ul style="list-style-type: none">• Incorrectly installed memory• A failing memory module• A processor-board problem• A system board problem <p>Action:</p> <ol style="list-style-type: none">1. If you just installed memory, see “Installing or Removing Memory Modules” on page 54 to verify that the new memory is correct for your server. Verify that the memory modules are installed and seated correctly.2. If the problem persists, check to see if the system has isolated the problem to a memory module:<ul style="list-style-type: none">• If the System Error LED on the information LED panel is on, check the DIMM Error LEDs next to the memory sockets on the system board (see “System Board LEDs” on page 166). If a DIMM Error LED is on, run the diagnostic program for the memory.• If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, have the system serviced.• If the memory tests do not fail, have the system serviced.3. If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error. <p>If the problem persists, have the system serviced.</p>

POST Message	Description
229	<p>An error was detected in the L2 cache of one of the microprocessors.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly. 2. If the problem persists, check to see if the system has isolated the problem to a microprocessor: <ul style="list-style-type: none"> • If the System Error LED on the information LED panel is on, check the Microprocessor Error LEDs next to the microprocessor sockets on the system board (see “System Board LEDs” on page 166). <ul style="list-style-type: none"> – If a Microprocessor LED is on, run the diagnostic program for the microprocessor indicated by the LED. If the tests fail, replace the microprocessor. – If the microprocessor tests do not fail, have the system serviced. • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the microprocessor error. <p>If the problem persists, have the system serviced.</p>
289	<p>An error occurred during POST memory tests and a failing DIMM was disabled.</p> <p>Note: The Netfinity 5000 server can be used with decreased memory.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. If you just installed memory, see “Installing or Removing Memory Modules” on page 54 to verify that the new memory is correct for your server. Verify that the memory modules are installed and seated correctly. Start the Configuration/Setup Utility program (see “The Configuration/Setup Utility” on page 21). In the Advanced Setup menu, select Memory Settings and enable the DIMM. (See “Advanced Setup” on page 28.) 2. If the problem persists, try the DIMM in a different memory socket. If the error occurs in the new location, the DIMM is faulty; replace the failing DIMM. Otherwise, have the system serviced.
301 303	<p>An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.</p> <p>Action: 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>Note: If you have just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least five seconds, and then, turn on the server. If the error message goes away, replace the device.</p>
604	<p>An error occurred during a diskette drive test.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Verify that the Configuration/Setup utility programs correctly reflect the type of diskette drive that you have installed. 2. Run the diagnostic tests. If the diagnostic tests fail, have the system serviced.
662	<p>A diskette drive configuration error occurred.</p> <p>Action: If you removed a diskette drive, make sure that the diskette drive setting is correct in the Configuration/Setup utility programs. If the setting is not correct, change it. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22.</p> <p>If the problem persists, have the system serviced.</p>

POST Messages

POST Message	Description
962	<p>A parallel port configuration error occurred.</p> <p>Action: If you changed a hardware option, make sure that the parallel port setting is correct in the Configuration/Setup utility programs. If the setting is not correct, change it. For information about using the Configuration/Setup utility programs, see "Using the Configuration/Setup Utility" on page 22.</p> <p>If the problem persists, have the system serviced.</p>
11xx	<p>An error occurred during the system-board serial port test.</p> <p>Action: If you have a modem, serial printer, or other serial device attached to your server, verify that the serial cable is connected correctly. If it is, use the following procedure:</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>
1162	<p>The serial port configuration conflicts with another device in the system.</p> <p>Action:</p> <ol style="list-style-type: none">1. Make sure the IRQ and I/O port assignments needed by the serial port are available. (See "The Configuration/Setup Utility" on page 21.)2. If all interrupts are being used by 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 information about removing adapters, see "Installing or Removing Adapters" on page 50. For information about setting interrupts, see "The Configuration/Setup Utility."
1600	<p>POST is unable to communicate with the system-management processor.</p> <p>Action:</p> <ol style="list-style-type: none">1. If the Service Processor Error LED (CR49) on the system board is on, have your system serviced. (See "System Board LEDs" on page 166 for the location of the LED.)2. If the Service Processor Error LED is not on, disconnect the Netfinity 5000 server from all electrical sources, wait for 30 seconds, reconnect the Netfinity 5000 server to the electrical sources, and restart the Netfinity 5000 server. <p>If the problem persists, have the system serviced.</p>
1601	<p>The Advanced System Management controller BIOS needs to be updated.</p> <p>Action:</p> <ol style="list-style-type: none">1. Disconnect the server from all electrical sources, wait for 30 seconds, reconnect the server to the electrical sources, and restart the server.2. If the problem persists, update the Advanced System Management controller BIOS. Refer to the "Getting Help Information" section of this <i>Server Library</i> for information about obtaining updates.
1800	<p>A PCI adapter has requested a hardware interrupt that is not available.</p> <p>Action:</p> <ol style="list-style-type: none">1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup utility programs. If the interrupt resource settings are not correct, change the settings. See "PCI Bus Control" on page 29.2. 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 information about removing adapters, see "Installing or Removing Adapters" on page 50. For information about setting interrupts, see "PCI Bus Control" on page 29.

POST Message	Description
1801	<p>A PCI adapter has requested memory resources that are not available.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup utility programs. If the memory resource settings are not correct, change the settings. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22. 2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. For information about removing adapters, see “Installing or Removing Adapters” on page 50. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.
1802	<p>A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Make sure that the I/O address for the PCI adapter and all other adapters are set correctly in the Configuration/Setup utility programs. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22. 2. If the I/O port resource settings are correct, the PCI adapter might be defective. Have the system serviced.
1803	<p>A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Make sure that the memory address for all other adapters are set correctly in the Configuration/Setup utility programs. If the memory resource settings are not correct, change the settings. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22. 2. If the memory resource settings are correct, the PCI adapter might be defective. Have the system serviced.
1804	<p>A PCI adapter has requested a memory address that is not available.</p> <p>Action: If all memory addresses are being used, you might need to remove an adapter to make memory address space available to the PCI adapter. For information about removing adapters, see “Installing or Removing Adapters” on page 50. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.</p>
1805	<p>A PCI adapter ROM error occurred.</p> <p>Action: Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter 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>Action: Remove the PCI adapter that has the PCI bridge. If you can start the server without the adapter, reinstall and retest the adapter. If the adapter fails, replace it.</p> <p>If you cannot isolate and correct the problem, have the system serviced.</p>

POST Messages

POST Message	Description
1962	<p>No valid startup devices were found. The system cannot find the startup drive or operating system.</p> <p>Action: Be sure that the drive you want to start from is in the startup sequence.</p> <ol style="list-style-type: none">1. Select Start Options from the Configuration/Setup utility program main menu. If you are unable to set the startup sequence, have the system serviced.2. Check the list of startup devices in the Startup device data fields. Is the drive you want to start from in the startup sequence? Yes Exit from this screen; then select Exit Setup to exit the Configuration/Setup menu. Go to step 3. No Follow the instructions on the screen to add the drive; then save the changes and exit the Configuration/Setup menu. Restart the server.3. Is an operating system installed? Yes Turn off the server. Go to step 4. No Install the operating system in your server; follow your operating system instructions to shut down and restart the Netfinity 5000 server.4. During server startup, watch for messages indicating a hardware problem. <p>If the same error message appears, have the system serviced.</p>
2400	<p>An error occurred during the video controller (on the system board) test. 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>Action: Verify that the monitor is connected correctly to the video connector. If the monitor is connected correctly, have the system serviced.</p>
2462	<p>A video memory configuration error occurred.</p> <p>Action:</p> <ol style="list-style-type: none">1. Make sure that the monitor cables are correctly and securely connected to the server.2. If the problem persists, have the system serviced.
5962	<p>An IDE CD-ROM configuration error occurred.</p> <p>Action: Check the signal and power cable connections to the CD-ROM drive. See "System Board Connectors" on page 167 for the locations of the cable connectors on the system board.</p> <p>If the problem persists, have the system serviced.</p>
8603	<p>An error occurred during the mouse (pointing device) and mouse (pointing device) controller test. This error can be caused by the addition or removal of a mouse, or by a failing system board.</p> <p>Note: 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>Action: Ensure that the keyboard and mouse (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 mouse from the server.3. Turn on the server. <p>If the POST error message does not reappear, the mouse is probably failing. See the documentation that comes with the mouse for additional testing information. If the problem remains, have the mouse (pointing device) serviced.</p> <p>If the POST error message reappears, run the diagnostic tests to isolate the problem. If the diagnostic tests do not find a problem and the POST error message remains, have the system serviced.</p>

POST Message	Description
00019501	<p>Processor 1 is not functioning.</p> <p>Action: Replace the primary microprocessor. (The Primary Microprocessor Error LED on the system board will be on. See “System Board LEDs” on page 166 for the location of the LED.)</p> <p>If the problem persists, have the system serviced.</p>
00019502	<p>Processor 2 is not functioning.</p> <p>Action: Replace the secondary microprocessor. (The Secondary Microprocessor Error LED on the system board will be on. See “System Board LEDs” on page 166 for the location of the LED.)</p> <p>If the problem persists, have the system serviced.</p>
00019701	<p>Processor 1 failed the built-in self test.</p> <p>Action: Replace the primary microprocessor. (The Primary Microprocessor Error LED on the system board will be on. See “System Board LEDs” on page 166 for the location of the LED.)</p> <p>If the problem persists, have the system serviced.</p>
00019702	<p>Processor 2 failed the built-in self-test.</p> <p>Action: Replace the secondary microprocessor. (The Secondary Microprocessor Error LED on the system board will be on. See “System Board LEDs” on page 166 for the location of the LED.)</p> <p>If the problem persists, have the system serviced.</p>
01298001	<p>No update data for the processor 1 (the primary microprocessor).</p> <p>Action: Update the system BIOS to a level that supports the microprocessors installed in the server. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates from the World Wide Web.</p>
01298002	<p>No update data for processor 2 (the secondary microprocessor).</p> <p>Action: Update the system BIOS to a level that supports the microprocessors installed in the server. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates from the World Wide Web.</p>
01298101	<p>Bad update data for processor 1 (the primary microprocessor).</p> <p>Action: Update the system BIOS to a level that supports the microprocessors installed in the server. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates from the World Wide Web.</p>
01298102	<p>Bad update data for processor 2 (the secondary microprocessor).</p> <p>Action: Update the system BIOS to a level that supports the microprocessors installed in the server. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates from the World Wide Web.</p>
I9990301	<p>A hard disk drive error occurred.</p> <p>Action: Have the system serviced.</p>
I9990305	<p>POST could not find an operating system.</p> <p>Action: Install an operating system. If you have already installed the operating system, check the drive startup sequence (see “Start Options” on page 28). If the drive sequence is correct, run the diagnostic tests to verify that the hard disk drive is functioning correctly. If there is a problem with the hard disk drive (such as a bad sector), you might have to reinstall the operating system.</p> <p>If you cannot reinstall the operating system, have the system serviced.</p>
I9990650	<p>AC power has been restored.</p> <p>Action: No action is required. This message appears each time AC power is restored to the server after an AC power loss.</p>
Other Numbers	<p>POST found an error.</p> <p>Action: Follow the instructions on the screen.</p>

Power-on Self-Test (POST) Beep Codes

The successful completion of POST is indicated by one beep and the appearance of the first screen of your operating system or application program. More than one beep indicates that POST detected an error.

Beep codes are sounded in a series of beeps. For example, a 1–2–4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

POST Beep Code Descriptions

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

No beeps

If no beep occurs after your server successfully completes POST (that is, after the System POST Complete (OK) light on the information LED panel is illuminated), have the system serviced.

Continuous beep

This indicates that your boot microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the system continues through POST with no errors, have the system serviced. If no video appears, the boot processor has failed; replace the boot processor.

Note: If the Netfinity 5000 server has only one microprocessor installed, that microprocessor is the boot processor. If the Netfinity 5000 server has two microprocessors installed, the microprocessor in the secondary microprocessor connector is the boot processor and the microprocessor in the primary microprocessor connector is the application processor.

One short beep

If one beep occurs after your Netfinity 5000 server successfully completes POST (that is, after the System POST Complete (OK) light on the information LED panel is illuminated), then POST has no configuration or functional errors to report. One beep also occurs after your server completes POST if you enter an incorrect power-on password.

Two short beeps

This beep combination indicates that POST encountered an error. The Configuration/Setup Utility program will display additional information; follow the instructions displayed. See “Power-on Self Test (POST) Messages” on page 112 for explanations of any POST error messages.

Three short beeps

This beep combination indicates a system memory error. This combination occurs only if the video BIOS cannot display the error message. The cause may be a failing memory module or a faulty memory socket. Try the identified DIMM (LED is illuminated) in a different memory socket. If the error occurs in the new location, replace the failing DIMM. Otherwise, have the system serviced.

Repeating short beeps

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

Ensure that:

1. Nothing is resting on the keyboard and pressing a key.
2. No key is stuck.
3. The keyboard cable is connected correctly to the keyboard and to the correct connector on the server.

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.

Note: If you have just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least five seconds, and then, turn on the server. If the error message goes away, replace the device.

One long and one short beep

This beep combination indicates that POST encountered an error on a video adapter. If the integrated video adapter on the system board is being used, have the system serviced. If an optional video adapter is being used, replace the failing video adapter.

One long and two short beeps

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

One long and three short beeps

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

Two long and two short beeps

This beep combination indicates that POST does not support the optional video adapter. This beep combination occurs when a video adapter is installed that is incompatible with your server. Replace the optional video adapter with one that is supported by the Netfinity 5000 server or use the integrated video controller on the system board.

POST Beep Code Table

Beep Code	Description
1-1-2	Microprocessor register test has failed.
1-1-3	CMOS write/read test has failed.
1-1-4	BIOS ROM checksum has failed.
1-2-1	Programmable Interval Timer test has failed.
1-2-2	DMA initialization has failed.
1-2-3	DMA page register write/read test has failed.
2-1-1	Secondary DMA register test has failed.
2-1-2	Primary DMA register test has failed.
2-1-3	Primary interrupt mask register test has failed.
2-1-4	Secondary interrupt mask register test has failed.
2-2-1	Interrupt vector loading has failed.
2-2-2	Keyboard controller test has failed.
2-2-3	CMOS power failure and checksum checks have failed.
2-2-4	CMOS configuration information validation has failed.
2-3-2	Screen memory test has failed.
2-3-3	Screen retrace tests have failed.
2-3-4	Search for video ROM has failed.
2-4-1	Screen test indicates the screen is operable.
3-1-1	Timer tick interrupt test has failed.
3-1-2	Interval timer channel 2 test has failed.
3-1-3	RAM test has failed above address hex 0FFFF.
3-1-4	Time-of-Day clock test has failed.
3-2-1	Serial port test has failed.
3-2-2	Parallel port test has failed.
3-2-3	Math Coprocessor test has failed.
3-2-4	Comparison of CMOS memory size against actual has failed.
3-3-2	Critical SM bus error.
Action: Have the system serviced.	
1-2-4	RAM refresh verification has failed.
1-3-1	First 64 Kb RAM test has failed.
1-3-2	First 64 Kb RAM parity test has failed.
3-3-1	A memory size mismatch has occurred.
Action: Reseat the memory modules. If the problem persists, have the system serviced.	
3-3-3	No memory in system.
Action: Install or reseat the memory modules. If the problem persists, the cause may be a failing memory module or a faulty memory socket. Try the identified DIMM (LED is illuminated) in a different memory socket. If the error occurs in the new location, replace the failing DIMM. Otherwise, have the system serviced.	
2-3-1	Screen initialization has failed.
Action: Reseat the optional video adapter, if any. If the problem persists, have the system serviced.	

Diagnostic 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.

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.

Diagnostic Message Tables

The following pages contain the error codes that you might receive in the diagnostic program detailed test log and summary log when running the diagnostic programs for your Netfinity 5000 server.

The format for the codes is:

fff-ttt-iii-date-cc-text message

where:

- fff** is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.
- ttt** is the three-digit failure code that indicates the exact test failure that was encountered. (These codes are for trained service personnel and are not listed here. They can be found in the *IBM Netfinity 5000 Hardware Maintenance Manual*, which is available for purchase.)
- iii** is the three-digit device ID. (These codes are for trained service personnel and are not listed here. They can be found in the *IBM Netfinity 5000 Hardware Maintenance Manual*, which is available for purchase.)
- date** is the date that the diagnostic test was run and the error recorded.
- cc** is the check digit that is used to verify the validity of the information.
- text message** is a message that the diagnostic program generates that indicates the reason for the problem. More information about the text message follows.

Text Messages

The text message format is:

Function Name: Result (test specific string)

where:

Function Name is the name of the function being tested when the error occurred. This corresponds to the function code (fff) given in the previous list.

Result can be one of the following:

Passed This result occurs when the diagnostic test completes without any errors.

Failed This result occurs when the diagnostic test discovers an error.

Diagnostic Messages

Aborted This result occurs when the user ends the diagnostic test before it is complete.

Warning This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

Test Specific String This is additional information that the user can use to analyze the diagnostic problem.

Failed Diagnostic Messages

The following tables display the primary hardware failure messages that the diagnostics might display.

Function: Core System Messages (001)

Result	Test Specific String
Failed	System board. Action: Have the system serviced.

Function: Video System Messages (005)

Result	Test Specific String
Failed	Processor and system boards. Action: Have the system serviced.

Function: Serial Port Messages (011)

Result	Test Specific String
Failed	On system board. Action: Have the system serviced.
Failed	On system board external loopback failure, assure loopback plug is attached. Action: <ol style="list-style-type: none">1. Make sure the loopback plug is attached, and rerun the test.2. Retry the test with a different loopback plug, if available. If the problem persists, have the system serviced.

Function: Parallel Port Messages (014)

Result	Test Specific String
Failed	On system board. Action: Have the system serviced.
Failed	On system board external loopback failure, assure loopback plug is attached. Action: <ol style="list-style-type: none">1. Make sure the loopback plug is attached, and rerun the test.2. Retry the test with a different loopback plug, if available. If the problem persists, have the system serviced.

Function: USB Port Interface Messages (015)

Result	Test Specific String
Failed	System board. Action: Have the system serviced.

Function: PCI Interface Messages (020)

Result	Test Specific String
Failed	System board. Action: Have the system serviced.

Function: SCSI Interface Messages (030)

Result	Test Specific String
Failed	Internal SCSI interface. Action: Have the system serviced.

Function: Power Supply Messages (075)

Result	Test Specific String
Failed	Voltage sensed by the system is out of range. Action: Have the system serviced.

Function: Microprocessor Error Messages (089)

Result	Test Specific String
Failed	<p>Secondary microprocessor in socket number U21.</p> <p>Note: The Secondary Microprocessor Error LED will be on. See "System Board Illustration" on page 166 for the location of the LED.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Reseat the secondary microprocessor (in connector U6). 2. If the problem persists, replace the secondary microprocessor. <p>If the problem persists, have the system serviced.</p>
Failed	<p>Microprocessor in socket number U2.</p> <p>Note: The Primary Microprocessor Error LED will be on. See "System Board Illustration" on page 166 for the location of the LED.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Reseat the primary microprocessor (in connector U2). 2. If the problem persists, replace the primary microprocessor. <p>If the problem persists, have the system serviced.</p>

Function: System-Management Processor Messages (165)

Result	Test Specific String
Failed	System-management processor on system board. Action: Have the system serviced.

Function: Thermal System Messages (175)

Function	Test Specific String
Failed	Fan #1 Note: The FAN1 LED on the system board will also be on. Action: Replace fan 1. If the problem persists, have the system serviced.
Failed	Fan #2 Note: The FAN2 LED on the system board will also be on. Action: Replace fan 2. If the problem persists, have the system serviced.
Failed	Temperature sensed on system board is out of range. Action: If one of the FAN LEDs on the system board is on, replace the indicated fan. If the problem persists, have the system serviced.

Function: Status Display Messages (180)

Result	Test Specific String
Failed	Information LED panel. Action: Have the system serviced.
Failed	Diagnostics LED panel. Action: Have the system serviced.
Failed	LED on system board. Action: Have the system serviced.
Failed	LED on hot-swap SCSI backplane. Action: Have the system serviced.

Function: System Memory Messages (201)

Result	Test Specific String
Failed	x MB DIMM location J22 Note: x is the size in megabytes of the DIMM. Action: 1. Reseat the DIMM in DIMM socket J22. 2. If the problem persists, replace the DIMM. If the problem persists, have the system serviced.
Failed	x MB DIMM location J17 Note: x is the size in megabytes of the DIMM. Action: 1. Reseat the DIMM in DIMM socket J17. 2. If the problem persists, replace the DIMM. If the problem persists, have the system serviced.

Result	Test Specific String
Failed	<p>x MB DIMM location J16</p> <p>Note: x is the size in megabytes of the DIMM.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Reseat the DIMM in DIMM socket J16. 2. If the problem persists, replace the DIMM. <p>If the problem persists, have the system serviced.</p>
Failed	<p>x MB DIMM location J15</p> <p>Note: x is the size in megabytes of the DIMM.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Reseat the DIMM in DIMM socket J15. 2. If the problem persists, replace the DIMM. <p>If the problem persists, have the system serviced.</p>

Function: System Cache Messages (202)

Result	Test Specific String
Failed	<p>Microprocessor in socket number U2 (primary).</p> <p>Note: The Primary Microprocessor Error LED will be on. See "System Board Illustration" on page 166 for the location of the LED.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Reseat the primary microprocessor (in connector U2). 2. If the problem persists, replace the primary microprocessor. <p>If the problem persists, have the system serviced.</p>
Failed	<p>Microprocessor in socket number U21 (secondary).</p> <p>Note: The Secondary Microprocessor Error LED will be on. See "System Board Illustration" on page 166 for the location of the LED.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Reseat the secondary microprocessor (in connector U21). 2. If the problem persists, replace the secondary microprocessor. <p>If the problem persists, have the system serviced.</p>

Function: Diskette Drive Messages (206)

Result	Test Specific String
Failed	<p>Internal diskette drive bay.</p> <p>Action: Have the system serviced.</p>

Function: CD-ROM Messages (215)

Result	Test Specific String
Failed	<p>On system board.</p> <p>Action: Have the system serviced.</p>

Function: Hard Disk Drive Messages (217)

Result	Test Specific String
Failed	<p>BIOS drive #1.</p> <p>Note: On a server that is not using RAID, this message indicates the physical hard disk drive that failed. In a RAID configuration, this message indicates the logical disk that failed rather than a specific hard disk drive. You will need to use your knowledge of the RAID arrays on the server to determine which hard disk drive or drives failed.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Replace the hard disk drive or drives. 2. If the problem persists, have the system serviced.
Failed	<p>BIOS drive #2.</p> <p>Note: On a server that is not using RAID, this message indicates the physical hard disk drive that failed. In a RAID configuration, this message indicates the logical disk that failed rather than a specific hard disk drive. You will need to use your knowledge of the RAID arrays on the server to determine which hard disk drive or drives failed.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Replace the hard disk drive or drives. 2. If the problem persists, have the system serviced.
Failed	<p>BIOS drive #3.</p> <p>Note: On a server that is not using RAID, this message indicates the physical hard disk drive that failed. In a RAID configuration, this message indicates the logical disk that failed rather than a specific hard disk drive. You will need to use your knowledge of the RAID arrays on the server to determine which hard disk drive or drives failed.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Replace the hard disk drive or drives. 2. If the problem persists, have the system serviced.
Failed	<p>BIOS drive #4.</p> <p>Note: On a server that is not using RAID, this message indicates the physical hard disk drive that failed. In a RAID configuration, this message indicates the logical disk that failed rather than a specific hard disk drive. You will need to use your knowledge of the RAID arrays on the server to determine which hard disk drive or drives failed.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Replace the hard disk drive or drives. 2. If the problem persists, have the system serviced.
Failed	<p>BIOS drive #5.</p> <p>Note: On a server that is not using RAID, this message indicates the physical hard disk drive that failed. In a RAID configuration, this message indicates the logical disk that failed rather than a specific hard disk drive. You will need to use your knowledge of the RAID arrays on the server to determine which hard disk drive or drives failed.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Replace the hard disk drive or drives. 2. If the problem persists, have the system serviced.

Function: Keyboard Messages (301)

Result	Test Specific String
Failed	On system board keyboard test failed. Action: <ol style="list-style-type: none"> 1. Replace the keyboard. 2. If the problem persists, replace the keyboard cable. If the problem persists, have the system serviced.

Function: Pointing Device (Mouse) Messages (302)

Result	Test Specific String
Failed	On system board pointing device test failed. Action: Replace the pointing device (mouse). If the problem persists, have the system serviced.

Function: Ethernet Messages (405)

Result	Test Specific String
Failed	On system board. Action: Have the system serviced.
Failed	On system board external loopback failure, assure loopback plug is attached. Action: <ol style="list-style-type: none"> 1. Make sure the loopback plug is attached, and rerun the test. 2. Retry the test with a different loopback plug, if available. If the problem persists, have the system serviced.

Failed Diagnostic Messages That Prevent Proper Testing

The following tables display failures that occur during diagnostics that prevent proper testing of the hardware.

Function: Microprocessor Messages (089)

Result	Test Specific String
Failed	Test setup error: Primary microprocessor in socket number U2 is installed but not functioning; check system error log. Action: <ol style="list-style-type: none"> 1. Update the BIOS. See the "Getting Help Information" section of this <i>Server Library</i> for information about obtaining updates. 2. If the problem persists, replace the primary microprocessor and run the microprocessor diagnostic program again. If the problem persists, have the system serviced.
Failed	Test setup error: Secondary microprocessor in socket number U21 is installed but not functioning; check system error log. Action: <ol style="list-style-type: none"> 1. Update the BIOS. See the "Getting Help Information" section of this <i>Server Library</i> for information about obtaining updates. 2. If the problem persists, replace the secondary microprocessor and run the microprocessor diagnostic program again. If the problem persists, have the system serviced.

Diagnostic Messages

Result	Test Specific String
Failed	<p>Test setup error: Invalid microprocessor in socket number U2 or BIOS setup problem.</p> <p>Action:</p> <ol style="list-style-type: none">1. Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.2. If the problem persists, replace the primary microprocessor and run the microprocessor diagnostic program again. <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: Invalid microprocessor in socket number U21 or BIOS setup problem.</p> <p>Action:</p> <ol style="list-style-type: none">1. Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.2. If the problem persists, replace the secondary microprocessor and run the microprocessor diagnostic program again. <p>If the problem persists, have the system serviced.</p>
Warning	<p>Test setup error: Secondary microprocessor not installed or BIOS setup problem.</p> <p>Action:</p> <ol style="list-style-type: none">1. Verify that the secondary microprocessor is installed and seated correctly.2. If the problem persists, update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.3. If the problem persists, replace the secondary microprocessor and run the microprocessor diagnostic program again. <p>If the problem persists, have the system serviced.</p>

Function: System Memory Messages (201)

Result	Test Specific String
Failed	<p>Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected.</p> <p>Action: Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.</p> <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: Unknown hardware problem associated with microprocessor in socket number U5.</p> <p>Action:</p> <ol style="list-style-type: none">1. Update the BIOS and run the diagnostic program again. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.2. If the problem persists, replace the primary microprocessor. <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: Unknown hardware problem associated with microprocessor in socket number U6.</p> <p>Action:</p> <ol style="list-style-type: none">1. Update the BIOS and run the diagnostic program again. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.2. If the problem persists, replace the secondary microprocessor. <p>If the problem persists, have the system serviced.</p>

Result	Test Specific String
Failed	<p>Test setup error: Corrupt BIOS in ROM.</p> <p>Action: Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.</p> <p>If the problem persists, have the system serviced.</p>

Function: System Cache Messages (202)

Result	Test Specific String
Failed	<p>Test setup error: No L2 cache detected on microprocessor socket U2 or BIOS setup problem.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Update the BIOS and run the diagnostic program again. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates. 2. If the problem persists, replace the primary microprocessor. <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: No L2 cache detected on microprocessor socket U21 or BIOS setup problem.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Update the BIOS and run the diagnostic program again. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates. 2. If the problem persists, replace the secondary microprocessor. <p>If the problem persists, have the system serviced.</p>
Warning	<p>Test setup error: Cache is disabled. Use system setup to enable before retrying the test.</p> <p>Action: Use the Cache Control selection in the Advanced Setup menu of the Configuration/Setup Utility to enable the cache. (See “Advanced Setup” on page 28.)</p> <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: Corrupt DMI BIOS. Information in BIOS is not as expected.</p> <p>Action: Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.</p> <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: BIOS cannot access VPD information.</p> <p>Action: Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.</p> <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: Unknown hardware problem associated with microprocessor in socket number U2.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates. 2. If the problem persists, replace the primary microprocessor and run the diagnostic program again. <p>If the problem persists, have the system serviced.</p>

Diagnostic Messages

Result	Test Specific String
Failed	<p>Test setup error: Unknown hardware problem associated with microprocessor in socket number U21.</p> <p>Action:</p> <ol style="list-style-type: none">1. Update the BIOS. See the “Getting Help Information” section of this <i>Server Library</i> for information about obtaining updates.2. If the problem persists, replace the secondary microprocessor and run the diagnostic program again. <p>If the problem persists, have the system serviced.</p>
Failed	<p>Test setup error: Cannot allocate memory due to unknown memory problem.</p> <p>Action: Have the system serviced.</p>

SCSI Messages

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

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

SCSI Message Table

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

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>Action: Verify that:</p> <ul style="list-style-type: none"> • The external SCSI devices are turned on. External SCSI devices must be turned on before you turn on the system. • The cables for all external SCSI devices are connected correctly. • If you have attached an external SCSI device to the server, the external SCSI termination is set to automatic. • The last device in each SCSI chain is terminated correctly. See "Installing or Removing Internal Drives" on page 56 for more information about SCSI termination. • The SCSI devices are configured correctly. <p>If the above are correct, run the diagnostic tests for additional information about the failing device. If the error recurs, have the system serviced.</p>

Ethernet Controller Messages

The integrated Ethernet controller might display messages from the following device drivers:

- Novell NetWare or IntraNetWare Server ODI
- NDIS Adapter for level 2.01 (OS/2)
- NDIS Adapter for level 4.0 (Windows NT)
- SCO UNIX LLI

Novell NetWare or IntraNetWare Server ODI Driver Messages

This section contains the error messages for the Novell NetWare or IntraNetWare 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: Reload the driver using the correct keyword.

PCNTNW-NW-054 The adapter did not respond to the initialization command.

Explanation: The adapter did not respond when the driver tried to initialize it.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) setting in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29). If the Ethernet adapter is enabled, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

PCNTNW-NW-058 The adapter did not respond to the initialization command.

Explanation: The interrupt request (IRQ) setting might not be valid or the EEPROM information might be incorrect.

Action: Make sure the IRQ settings are correct in the Configuration/Setup utility programs. See "PCI Bus Control" on page 29 for information on setting the interrupt requests. If the IRQ settings are correct, have the system serviced.

PCNTNW-NW-066 The cable might be disconnected from the adapter.

Explanation: The cable might be disconnected from the server Ethernet port.

Action: Verify that a cable is connected to the Ethernet 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 adapter could not be found.

Action: If you installed an Ethernet adapter, such as an IBM Netfinity 10/100 Fault Tolerant Adapter, as part of Ethernet redundancy (failover), make sure that the adapter is seated correctly. If the adapter is seated correctly, have the system serviced.

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: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29).

Make sure that the interrupt request numbers are set correctly. If you are using an ISA adapter, make sure resources are reserved as ISA Legacy in the Configuration/Setup utility programs (see "Plug and Play" on page 30.)

PCNTNW-NW-075 The Multiple Link Interface Driver (MLID) cannot be registered with the Link Support Layer (LSL).

Explanation: An error occurred while the driver was trying to register with the LSL.

Action: Check the version of the NetWare or IntraNetWare Operating System. Make sure that this driver is correct for the version of NetWare or IntraNetWare that you are using. Restart the server.

PCNTNW-NW-079 The Multiple Link Interface Driver (MLID) did not initialize MSMTx Free Count.

Explanation: The MSMTx Free Count is not initialized correctly.

Action: Restart the server. If the problem persists, have the system serviced.

PCNTNW-NW-086 The driver parameter block is too small.

Explanation: The driver parameter block is too small.

Action: Restart the server. If the problem persists, have the system serviced.

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 problem persists, have the system serviced.

PCNTNW-NW-091 The hardware configuration conflicts.

Explanation: You tried to load a new frame type for the existing controller. The hardware assumptions made in doing so are incorrect. This error can also occur if you try to specify a mode (such as, redundancy) that conflicts with another specified mode.

Action: Make sure that your hardware configuration matches the software settings. See "PCI Bus Control" on page 29 for information on viewing and changing interrupt requests.

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 necessary, message is for information only.

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 must be set. You entered an address without the local bit set. The driver has set the local bit.

Action: None necessary, message is for information only.

PCNTNW-NW-164 The device was not found.

Explanation: The driver cannot find an Ethernet controller in the server.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29). If the Ethernet adapter is enabled, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

PCNTNW-NW-165 The device was not found at IOADDRESS.

Explanation: The Ethernet controller cannot be found at the I/O address specified.

Action: The Ethernet controller does not require a parameter for the I/O address. Remove the I/O address parameter.

PCNTNW-NW-167 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29).

If the problem persists, go to "Diagnostic Test Programs" on page 109 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: None necessary, message is for information only.

NDIS 2.01 (OS/2) Driver Messages

This section contains the error messages for the NDIS 2.01 (OS/2) drivers. The explanation and recommended action are included with each message.

PCNTND-1 Unable to open the Protocol Manager.

Explanation: The NDIS stack is not configured correctly.

Action: Check and correct your configuration.

PCNTND-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-7 A Protocol Manager device error occurred.

Explanation: The NDIS stack is not configured correctly.

Action: Check and correct your configuration.

PCNTND-8 Bad status for the Protocol Manager.

Explanation: The NDIS stack is not configured correctly in the PROTOCOL.INI file.

Action: Check and correct your configuration.

PCNTND-9 Cannot find the PROTOCOL.INI entry.

Explanation: The NDIS stack is not configured correctly in the PROTOCOL.INI file.

Action: Check and correct your configuration.

PCNTND-10 The Protocol Manager Input Output Control (IOCTL) failed.

Explanation: The NDIS stack is not configured correctly in the PROTOCOL.INI file.

Action: Check and correct your configuration.

PCNTND-11 Protocol Manager registration failed.

Explanation: The NDIS stack is not configured correctly.

Action: Check and correct your configuration.

PCNTND-15 Device not found.

Explanation: The driver cannot find an Ethernet controller in the server.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see “PCI Bus Control” on page 29). If the Ethernet adapter is enabled, go to “Diagnostic Test Programs” on page 109 to run the diagnostic utility.

PCNTND-16 PCI scan specified, device not found.

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see “PCI Bus Control” on page 29). If the Ethernet adapter is enabled, go to “Diagnostic Test Programs” on page 109 to run the diagnostic utility.

PCNTND-21 The adapter failed the checksum test.

Explanation: The driver cannot find an Ethernet controller.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see “PCI Bus Control” on page 29). If the Ethernet adapter is enabled, go to “Diagnostic Test Programs” on page 109 to run the diagnostic utility.

PCNTND-23 WARNING: PCNET IRQ found = xx

Explanation: The interrupt request (IRQ) setting (xx) in the PROTOCOL.INI file does not match the hardware IRQ setting.

Action: Remove the IRQ setting from the PROTOCOL.INI file or change the IRQ setting in the PROTOCOL.INI file to match the IRQ setting shown in the **PCI Routing** selection of the System Information menu in the Configuration/Setup Utility. (See “PCI Routing” on page 23.)

PCNTND-24 WARNING: PCNET IRQ does not match PROTOCOL.INI.

Explanation: The interrupt request (IRQ) setting in the PROTOCOL.INI file does not match the hardware IRQ setting.

Action: Remove the IRQ setting from the PROTOCOL.INI file or change the IRQ setting in the PROTOCOL.INI file to match the IRQ setting shown in the **PCI Routing** selection of the System Information menu in the Configuration/Setup Utility. (See “PCI Routing” on page 23.)

PCNTND-25 PCI scan specified, PCI bus not found!

Explanation: The driver cannot locate the PCI bus on your server.

Action: Go to “Diagnostic Test Programs” on page 109 to run the diagnostic utility.

PCNTND-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 the PROTOCOL.INI file.

PCNTND-33 PCNET device with specified IOBASE is already in use.

Explanation: The specified I/O address number is already in use by another Ethernet controller or device.

Action: Remove the I/O address setting in the PROTOCOL.INI file.

NDIS 4.0 (Windows NT) Driver Messages

This section contains the error messages for the NDIS 4.0 drivers. The explanation and recommended action are included with each message.

PermaNet(tm) Server: No Secondary Adapter Found. Grouping Mode is disabled.

Explanation: The failover option requires an adapter that is compatible with the device driver of the Ethernet controller on the system board. No such adapter was found.

Action: Make sure the correct adapter is installed.

PermaNet(tm) Server: Problem Occurs on the Primary Adapter. Switching over to the Secondary Adapter.

Explanation: The system detected a problem with the primary Ethernet connection and has transferred all network traffic to the secondary Ethernet controller.

Action: Identify the cause of the failure on the primary Ethernet connection. Restoring the operational state of the primary connection will cause the network traffic to automatically transfer to the primary Ethernet controller.

PermaNet(tm) Server: Switching back to Primary Adapter.

Explanation: The primary Ethernet connection is now operating correctly. Network traffic will automatically transfer to the primary Ethernet controller.

Action: None needed, message is for information only.

UNIX Messages

This section contains the error messages for the SCO UNIX LLI driver.

pnt0-2 PCI search specified, PCI device not found!

Explanation: The driver cannot locate the Ethernet controller on the PCI bus.

Action: Run the NETCONFIG program to search for another Ethernet controller.

Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29).

If the problem persists, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

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.

Modify the interrupt request (IRQ) settings in the Configuration/Setup utility programs, or run the NETCONFIG program to match the hardware settings.

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.

pnt0-11 Device not found!

Explanation: The driver cannot find an Ethernet controller.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29). If the Ethernet adapter is enabled, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

pnt0-12 Device failed checksum test!

Explanation: The driver cannot find an Ethernet controller.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29). If the Ethernet adapter is enabled, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

pnt0-13 add_intr_handler failed! Interrupts already enabled.

Explanation: The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.

Action: Modify your hardware settings.

Run the NETCONFIG program to match the hardware settings.

pnt0-14 Cannot locate hardware.

Explanation: The SunSoft Solaris driver cannot find any Ethernet controller.

Action: Verify that the PCI Ethernet device type is set to the default (enabled) position in the Configuration/Setup utility programs (see "PCI Bus Control" on page 29). If the Ethernet adapter is enabled, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

pnt0-15 No more devices to open.

Explanation: The SunSoft Solaris driver cannot find any more Ethernet controllers.

Action: Verify that additional Ethernet adapters are present or replace the Ethernet adapter that fails to respond. If the problem persists, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

pnt0-17 Device fault...Reset initiated!

Explanation: The SunSoft Solaris driver has been reset due to a device fault.

Action: Verify that additional Ethernet adapters are present or replace the Ethernet adapter that fails to respond. If the problem persists, go to "Diagnostic Test Programs" on page 109 to run the diagnostic utility.

pnt0-19 IRQ found for PCnet hardware does not match space.c (or pnt.conf)!

Explanation: This is a warning message referring to the interrupt request (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 the NETCONFIG program to match the hardware settings.

pnt0-20 add_intr_handler failed! Unknown interrupt type.

Explanation: The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.

Action: Modify your hardware settings.

Run the NETCONFIG program to search for another Ethernet controller.

pnt0-21 add_intr_handler failed! Out of range interrupt number.

Explanation: The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.

Action: Modify your hardware settings.

Run the NETCONFIG program to search for another Ethernet controller.

pnt0-22 add_intr_handler failed! Out of range IPL.

Explanation: The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.

Action: Modify your hardware settings.

Run the NETCONFIG program to search for another Ethernet controller.

pnt0-23 add_intr_handler failed! Vector already occupied.

Explanation: The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.

Action: Modify your hardware settings.

Run the NETCONFIG program to search for another Ethernet controller.

pnt0-24 add_intr_handler failed! Vector already shared at different IPL.

Explanation: The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.

Action: Modify your hardware settings.

Run the NETCONFIG program to search for another Ethernet controller.

pnt0-26 The DMA number is not necessary for PCI device.

Explanation: The 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.

Explanation: The specified I/O address is already in use.

Action: Run the NETCONFIG program to modify your hardware settings.

pnt0-31 I/O address is not necessary for the PCI device.

Explanation: The I/O address specified is not required.

Action: Remove the assigned I/O address specified for the Ethernet controller.

Troubleshooting

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

Note: When a procedure requires you to open the cover of the server, be sure to read “Electrical Safety” on page 41 first.

Troubleshooting Charts

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

- Remove the software or device that you just added.
- Run the diagnostic tests 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.
The CD-ROM drive tray is 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.
The CD-ROM drive is not recognized.	Verify that: <ol style="list-style-type: none"> 1. The primary IDE channel is enabled in the Configuration/Setup utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive.

Diskette Drive

Problems	Action
The diskette drive in-use light stays on, or the system bypasses the diskette drive.	If there is a diskette in the drive, verify that: <ol style="list-style-type: none"> 1. The diskette drive is enabled in the Configuration/Setup utility programs. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette is inserted correctly in the drive. 4. The diskette contains the necessary files to start the system. 5. Your software program is OK. See “Software Problem” on page 146. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, have the system serviced.

Monitor Self-Tests

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

Troubleshooting

Monitor Problems	Action
The screen is blank.	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 power cord is plugged into the monitor and a working electrical outlet.3. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.4. 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.
The monitor works when you turn on the system, but goes blank when you start some application programs.	Verify that the primary monitor cable is connected to the video port. To find the video port, see "Input/Output Connectors" on page 12. Be sure that you installed the necessary device drivers for the applications.
The screen flickers.	Set the monitor for the highest, noninterlaced refresh rate available. To reset the refresh rate, use a utility program, such as AnyView Professional or WinMode.
Wavy, unreadable, rolling, distorted screen, or screen jitter.	If the monitor self-tests show the monitor is OK, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor. Note: <ol style="list-style-type: none">1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).2. Non-IBM monitor cables might cause unpredictable problems.3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM reseller or IBM marketing representative. If the problem still exists, have the monitor and system serviced.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS with the correct language. See the "Getting Help Information" section of this <i>Server Library</i> for information about obtaining updates for the BIOS. If the problem still exists, have the system serviced.
General Problems	Action
Problems such as broken cover latch, broken door lock, or indicator lights not working.	Have the system serviced.

General Problems	Action
The server does not power on.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The power cables are properly connected to the server. 2. The power outlet functions properly. 3. The type of memory installed is correct. 4. You have not installed more options than the power supply supports. If you just installed an option, remove it, and restart the server. If the server now powers on, you installed more options than the power supply supports. 5. The LEDs on the power supply are on. See "Status Indicators" on page 9 for more information about the power supply LEDs. <p>If the problem still exists, have the system serviced.</p>
The system stops responding during startup	<p>If information on the monitor suggests a PCI problem (the system is hung at the PCI configure checkpoint, which is 0x1e):</p> <ol style="list-style-type: none"> 1. Restart the server and press Alt+F1 when the Press F1 for Configuration/Setup and Press F2 for Diagnostics messages appear. This will bypass PCI initialization (except video) and go directly to the Configuration/Setup Utility program. 2. Disable the defective PCI adapter. This should enable the server to complete a normal startup. 3. Restart the server. <p>If the problem still exists, or there was no indication of PCI problems, have the system serviced.</p>
Intermittent Problems	Action
A problem occurs only occasionally and is difficult to detect.	<p>Verify that:</p> <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. Ensure that the SCSI buses and devices are configured correctly and that the last external device in the external SCSI bus is terminated correctly. See "SCSI Devices" on page 58. <p>If the items above are correct, have the system serviced.</p>
Microprocessor Problems	Action
The server emits a continuous tone during POST.	<p>The startup (boot) microprocessor is not working properly. If your server contains two microprocessors, the microprocessor in the secondary microprocessor socket is the startup microprocessor.</p> <ol style="list-style-type: none"> 1. Verify that the startup microprocessor is seated properly. 2. If your server contains two microprocessors, remove the startup microprocessor and restart the server. If the server starts properly, replace the old startup microprocessor. 3. Replace the startup microprocessor. Restart the server. <p>If the problem still exists, have the system serviced.</p>

Keyboard, Mouse, or Pointing-Device Problems	Action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> 1. Make sure that the keyboard cable is properly connected to the system. 2. Make sure that the system and the monitor are turned on. 3. Try using another keyboard. <p>If the items above are correct, have the system serviced.</p>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device. <p>If the problem still exists, have the server and the device serviced.</p>
Memory Problems	Action
The amount of memory displayed is less than the amount of memory installed.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The memory modules are seated properly. 2. You have installed the correct type of memory (see “Working with Memory Modules” on page 54). 3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22. 4. All banks of memory on the DIMMs are enabled (see “Advanced Setup” on page 28). The Netfinity 5000 server might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled. <p>If the above items are correct, run the memory test from the Diagnostic Utility menu. 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 or replace the failing DIMM.</p>
Option Problems	Action
An IBM option that used to work does not work now.	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the system. <p>If the problem still exists, have the server and option serviced.</p>
An IBM option that was just installed does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The option is designed for the system. 2. You followed the installation instructions that come with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. For information about using the Configuration/Setup utility programs, see “Using the Configuration/Setup Utility” on page 22. <p>If the problem still exists, have the server and option 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 problem still exists, 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 by the Configuration/Setup Utility program and none of the serial ports are disabled. <p>Note: The management C connector is the same as a serial port connector, but it is used only by the integrated system-management processor and is not available for use by the operating system. This port does not appear in the Configuration/Setup utility program menus; it can be configured using Netfinity Manager.</p> <ol style="list-style-type: none"> 2. The serial-port adapter, if you installed one, is seated properly. <p>If the problem still exists, have the system serviced.</p>
A serial device does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The device is designed for the server. See the "Getting Help Information" section of this <i>Server Library</i> for information on compatible devices. 2. The serial port is enabled and is assigned a unique address. 3. Make sure that the device is not connected to the management port C. <p>Note: The management C connector is the same as a serial port connector, but it is used only by the integrated system-management processor and is not available for use by the operating system. This port does not appear in the Configuration/Setup Utility program menus; it can be configured using Netfinity Manager.</p>
Universal Serial Bus (USB) Port Problems	Action
The number of serial buses displayed is less than the number of serial buses installed.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. Each bus 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 USB device does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port. <p>Note: If a standard (non-USB) keyboard is attached to the keyboard port, then the USB is disabled and no USB device will work during POST.</p> <ol style="list-style-type: none"> 2. The correct USB device driver is installed. 3. Your operating system supports USB devices. <p>If the problem still exists, have the system serviced.</p>

Printer Problems	Action
The printer does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The printer is turned on and is online. 2. The printer signal cable is connected to the correct serial or parallel port on the system. For the location of the serial or parallel port, see "Input/Output Connectors" on page 12. <p>Note: Non-IBM printer cables might cause unpredictable problems.</p> <ol style="list-style-type: none"> 3. You have assigned the printer port correctly in your operating system or application program. 4. You have assigned the printer port correctly using the Configuration/Setup utility programs. <p>If the items above are correct and the printer still does not work, run the tests described in the documentation that comes with your printer. If the tests show that the printer is OK, have the system serviced.</p>
Software Problem	Action
Suspected software problem	<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>Note: If you have just installed an adapter or memory, you might have a memory address conflict.</p> <ol style="list-style-type: none"> 2. The software is designed to operate on your system. 3. Other software works on your system. 4. The software that you are using works on another system. <p>If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase.</p>
Netfinity Advanced System Management service problems	Action
Netfinity Advanced System Management service reports a general monitor failure	<p>If the Service Processor Error LED (CR49) on the system board is on, have your system serviced. See "System Board LEDs" on page 166 for the location of the LED.</p> <p>Note: Initially, the Service Processor Error LED lights for one minute, then the server restarts in an attempt to clear up the error. If the Service Processor Error LED is lighted for longer than one minute, a reboot did not resolve the error.</p> <p>If the Service Processor Error LED (CR49) is not on, disconnect the Netfinity 5000 server from all electrical sources, wait for 30 seconds, reconnect the Netfinity 5000 server to the electrical sources, and restart the Netfinity 5000 server.</p> <p>If a problem still exists, have the system serviced.</p>

Note: If you cannot find the problem in the troubleshooting charts, go to "Running Diagnostic Test Programs" on page 110 to test the system. If you already have run the diagnostic tests, or if running the tests does not reveal the problem, have the system serviced.

Troubleshooting the 10/100 Mbps Ethernet Controller

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

Network Connection Problems

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

- Make sure that the cable is installed correctly.

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

If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.

If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable.

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

- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet lights on the information panel.

These lights indicate whether a problem exists with the connector, cable, or hub.

 - The Ethernet Link Status light illuminates when the Ethernet receives a LINK pulse from the hub. If the light is off, there might be a bad connector or cable, or a problem with the hub.
 - The Ethernet Transmit/Receive Activity light illuminates when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet Transmit/Receive Activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.
 - The Ethernet Speed 100 Mbps light illuminates when the Ethernet LAN speed is 100 Mbps.
- Make sure that you are using the correct device drivers, supplied with your server.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and Netfinity 5000 server are using the same protocol.
- Test the Ethernet.

10/100 Mbps Ethernet Controller Troubleshooting Chart

You can use the following troubleshooting chart to find solutions to 10/100 Mbps Ethernet problems that have definite symptoms.

Controller Problem	Action
The server stops running when loading device drivers.	<p>The PCI BIOS interrupt settings are incorrect.</p> <p>Check the following:</p> <ul style="list-style-type: none"> Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program. <p>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. (See "Resolving Configuration Conflicts" on page 150.)</p> <ul style="list-style-type: none"> For NetWare and IntraNetwork, do not use IRQ 14 or 15 for PCI devices. IRQ 14 is used for IDE devices (CD-ROM drive). If the IDE CD-ROM in your system is disabled, reserve IRQ 14 as ISA Legacy in the Plug and Play menu of the Configuration/Setup Utility program. (See "Plug and Play" on page 30.) IRQ 15 should be reserved for ISA legacy devices. Make sure that you are using the most recent device driver available from the World Wide Web. (See the "Getting Help Information" section of this <i>Server Library</i> for World Wide Web addresses.) Run the network diagnostic program. <p>If the problem still exists, have the system serviced.</p>
Ethernet Link Status light does not light.	<p>Check the following:</p> <ul style="list-style-type: none"> Make sure that the hub is turned on. Check all connections at the Ethernet and the hub. Check the cable. A crossover cable is required unless the hub has an X designation. Use another port on the hub. If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub. If you manually configured the duplex mode, make sure that you also manually configure the speed. Run diagnostics for the LEDs. <p>If the problem still exists, have the system serviced.</p>
The Ethernet Transmit/Receive Activity light does not light.	<p>Check the following:</p> <p>Note: The Ethernet Transmit/Receive Activity LED illuminates only when data is sent to or by this Ethernet controller.</p> <ul style="list-style-type: none"> Make sure that you have loaded the network device drivers. The network might be idle. Try sending data from this workstation. Run diagnostics on the LEDs. The function of this LED can be changed through device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers.
Data is incorrect or sporadic.	<p>Check the following:</p> <ul style="list-style-type: none"> Make sure that you are using Category 5 cabling when operating the server at 100 Mbps. Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.

Controller Problem	Action
<p>The Ethernet stopped working when another adapter was added to the server.</p>	<p>Check the following:</p> <ul style="list-style-type: none"> • Make sure that the cable is connected to the Ethernet. • Make sure that your PCI system BIOS is current. • Reseat the adapter (see “Working with Adapters” on page 49). • Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the Configuration/Setup Utility program. <p>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. (See “Resolving Configuration Conflicts” on page 150.)</p> <p>If the problem still exists, have the system serviced.</p>
<p>The Ethernet stopped working without apparent cause.</p>	<p>Check the following:</p> <ul style="list-style-type: none"> • Run diagnostics for the Ethernet controller. • Try a different connector on the hub. • Reinstall the device drivers (see your operating-system documentation and your ServerGuide instructions, if you used ServerGuide to install your operating system). <p>If the problem still exists, have the system serviced.</p>

Resolving Configuration Conflicts

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

Resolving Memory-Address Conflicts

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

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

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

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

Changing the Software Configuration Setup

The best way to resolve memory-address conflicts is to change the software configuration by changing the addresses that the EMS device driver defined. The SVGA video memory occupies 8 Kb (1 Kb = approximately 1000 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. For information about using the Configuration/Setup utility programs, see "Using the Configuration/Setup Utility" on page 22.

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 that comes 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.

Identifying Problems Using Status LEDs

Your Netfinity 5000 server has LEDs to help you identify problems with some server components. These LEDs are part of the diagnostics built into the Netfinity 5000 server. By following the path of lights, you can quickly identify the type of system error that occurred.

Status LEDs are located on the following components:

- Operator LED panel
For more information, see “Status Indicators” on page 9.
- Hard disk drive trays
For more information, see “Server Controls” on page 7.
- Power supply
For more information, see “Power Supply LEDs.”
- System board
See “System Board LEDs” on page 166 for locations of the LEDs on the system board.

Power Supply LEDs

The AC Power LEDs on the power supply provide status information about the power supply. See “Status Indicators” on page 9 for the location of these LEDs.

The following table describes the AC Power LEDs.

AC Power LED	Description and Action
On	The power supply is on and operating correctly.
Off	<p>There is an AC power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> 1. There is no AC power to the power supply. <p>Actions: Verify that:</p> <ul style="list-style-type: none"> • The power cord is properly connected to the Netfinity 5000 server. • The power outlet functions properly. <ol style="list-style-type: none"> 2. The power supply has failed. <p>Action: Replace the power supply.</p> <p>If the problem persists, have the system serviced.</p>

LED Diagnostics

The diagnostics built into your Netfinity 5000 server allow you to quickly identify the type of system error that occurred. When the System Error LED on the information LED panel is illuminated, use the following information to isolate the problem. An error message usually appears on the display monitor as well.

- If the System Error LED on the information LED panel on the front of the Netfinity 5000 server is on, a system error was detected. Check the LEDs on the power supplies and at any Ethernet adapters, then open the cover and check to see which of the LEDs on the system board inside the Netfinity 5000 server are on. (See “System Board LEDs” on page 166 for the location of the LEDs.)

System Board LED	Description
Service Processor Error LED on	An error has occurred in the service processor. Actions: If the problem persists, have the system serviced.
NMI LED on	A non-maskable interrupt occurred. The PCI 1 or PCI 2 LED will probably also be on. Actions: <ol style="list-style-type: none"> 1. If the PCI 1 or PCI 2 LED is on, follow the instructions for those LEDs. 2. If the PCI 1 or PCI 2 LED is not on, restart the Netfinity 5000 server. If the problem persists (the NMI LED stays on), have the system serviced.
SMI LED on	A system-management interrupt occurred. This is an indication of service processor activity, and is not an error. Actions: No action is required.
PCI 1 LED on	An error occurred on PCI bus 1. An adapter in PCI slot 5 or the system board caused the error. Actions: Check the error log for additional information. If the error log indicates a problem with the integrated Ethernet controller, have your system serviced. If the problem persists, have the system serviced.
PCI 2 LED on	An error occurred on PCI Bus 2. An adapter in PCI slot 1, 2, 3, or 4 or the system board caused the error. Actions: <ol style="list-style-type: none"> 1. Check the error log for additional information. 2. If you cannot correct the problem from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus 2 (PCI slots 1–4) and restarting the Netfinity 5000 server after each adapter is removed. If the problem persists, have the system serviced.
DIMM 1 Error LED on	The DIMM in DIMM slot 1 has failed. Action: Replace the DIMM in DIMM slot 1.
DIMM 2 Error LED on	The DIMM in DIMM slot 2 has failed. Action: Replace the DIMM in DIMM slot 2.
DIMM 3 Error LED on	The DIMM in DIMM slot 3 has failed. Action: Replace the DIMM in DIMM slot 3.
DIMM 4 Error LED on	The DIMM in DIMM slot 4 has failed. Action: Replace the DIMM in DIMM slot 4.

Identifying Problems Using Status LEDs

System Board LED	Description
FAN 1 LED on	<p>Fan 1 has failed or is operating too slowly.</p> <p>Note: A failing fan can also cause the TEMP and DASD 1 LEDs to be on.</p> <p>Action: Replace fan 1.</p>
FAN 2 LED on	<p>Fan 2 has failed or is operating too slowly.</p> <p>Note: A failing fan can also cause the TEMP and DASD 1 LEDs to be on.</p> <p>Action: Replace fan 2.</p>
TEMP LED on	<p>The system temperature has exceeded the maximum rating.</p> <p>Actions:</p> <ol style="list-style-type: none"> 1. Check to see if a fan has failed. If it has, replace the fan. 2. Make sure the room temperature is not too hot. (See Table 11 on page 93) <p>If the problem persists, have the system serviced.</p>
Integrated Voltage Regulator Error LED on	<p>The voltage regulator for the primary microprocessor slot has failed.</p> <p>Actions: Have the system serviced.</p>
Secondary Processor VRM Error LED on	<p>The voltage regulator module (VRM) for the secondary microprocessor slot has failed.</p> <p>Actions:</p> <ol style="list-style-type: none"> 1. Turn off the Netfinity 5000 server, reseal the VRM, and restart the Netfinity 5000 server. 2. If the problem persists, replace the VRM. <p>If the problem persists, have the system serviced.</p>
Primary Microprocessor Error LED on	<p>The microprocessor in the primary microprocessor slot has failed.</p> <p>Actions:</p> <ol style="list-style-type: none"> 1. Turn off the Netfinity 5000 server, reseal the VRM, and restart the Netfinity 5000 server. and restart the Netfinity 5000 server. 2. If the problem persists, replace the microprocessor. <p>If the problem persists, have the system serviced.</p>
Secondary Microprocessor Error LED on	<p>The microprocessor in the secondary microprocessor slot has failed.</p> <p>Actions:</p> <ol style="list-style-type: none"> 1. Turn off the Netfinity 5000 server, reseal the microprocessor, and restart the Netfinity 5000 server. 2. If the problem persists, replace the microprocessor. <p>If the problem persists, have the system serviced.</p>
Power Supply 1 LED on	<p>The primary power supply has failed.</p> <p>Action: Have the primary power supply replaced.</p>
Power Supply 2 LED on	<p>The secondary power supply has failed.</p> <p>Action: Replace the secondary power supply.</p>

Identifying Problems Using Status LEDs

System Board LED	Description
DASD 1 LED on	<p>A hot-swap hard disk drive has failed.</p> <p>Actions:</p> <ol style="list-style-type: none">1. Check the error log for additional information. If the error log indicates a temperature problem and the fans are working correctly, have the system serviced.2. If the amber Hard Disk Status LED on one of the hot-swap hard disk drives is on, replace the hard disk drive.

- System Error LED on the information LED panel on the front of the Netfinity 5000 server is off. The diagnostics have not detected a system error.

Recovering BIOS

If your BIOS has become corrupted, such as from a power failure during a flash update, you can recover your BIOS using the recovery boot block and a BIOS flash diskette.

Note: You can obtain a BIOS flash diskette from one of the following sources:

- Use the ServerGuide program to make a BIOS flash diskette.
- Download a BIOS flash diskette from the World Wide Web. Go to <http://www.pc.ibm.com/support/>, select IBM Server Support, and make the selections for your server.
- Contact your IBM service representative.

The flash memory of your server contains a protected area that cannot be overwritten. The recovery boot block is a section of code in this protected area that enables the server to start up and to read a flash diskette. The flash utility automatically recovers the system BIOS from the BIOS recovery files on the diskette.

To recover the BIOS:

1. See “Preparing to Install Options” on page 43 through “Preparing a Tower Model” on page 44 or through “Preparing a Rack Model” on page 46 for instructions on powering off the server and removing the cover. Then, refer to the system-board diagram inside your server for the location of the switch block.
2. Locate switch 5 (see “System Board Switches” on page 168).
3. Set switch 5 on the switch block to On, to set boot block recovery mode.
4. Insert the BIOS flash diskette in the diskette drive.
5. Restart the server.

Nothing appears on the display monitor, but the diskette drive activity indicates that BIOS recovery is under way. Recovery is complete when the system beeps and the Post Complete light on the operator LED panel is on.

6. Remove the flash diskette from the diskette drive.
7. Turn the server off.
8. Set switch 5 to Off, to return to normal startup mode.
9. Restart the server. The system should start up normally.

Checking the System for Damage

This section provides instructions on what to do if your system might be damaged.

After Dropping It

Look for loose cables and obvious damage. If any cables are loose, reconnect them securely. If there is obvious damage to the system, have it serviced.

If you see no damage, turn on the system. If it works correctly, the system probably did not suffer any damage.

If the system does not work correctly, turn it off and check the adapters and memory modules to ensure that they are connected correctly. Go to “Electrical Safety” on page 41 and follow the instructions for opening your system; then, reseat all adapters and memory modules.

If the system still does not work correctly, run the diagnostic tests from diagnostic utility menu. For information about running tests, see “Running Diagnostic Test Programs” on page 110.

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.

Replacing the Battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions and the requirements in the “Lithium Battery Notice” on page ix.

2



CAUTION:

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

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

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

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

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

To order replacement batteries, call 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Before you begin, be sure you have:

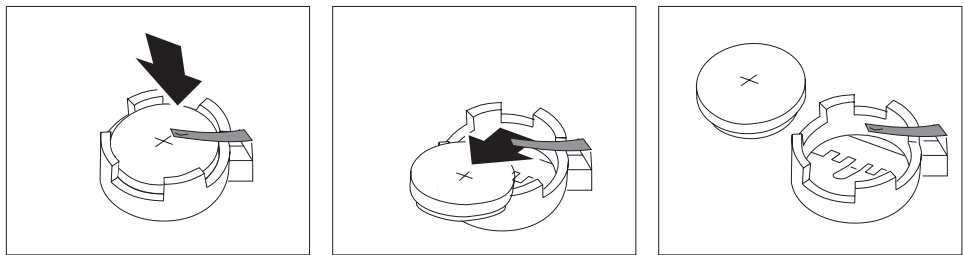
- Read “Electrical Safety” on page 41 and “Handling Static-Sensitive Devices” on page 42.
- Followed any special handling and installation instructions supplied with the replacement battery.
- Removed the server side cover (see “Preparing to Install Options” on page 43).

Note: After you replace the battery, you must reconfigure your system and reset the system date and time.

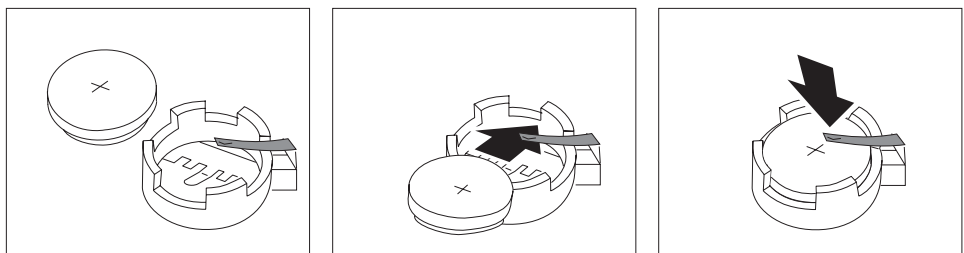
Replacing the Battery

To replace the battery:

1. Locate the battery on the system board (see “System Board Illustration” on page 166).
2. Remove the battery:
 - a. Use one finger to lift the battery clip over the battery.
 - b. Use one finger to slightly slide the battery toward the front of the server. The spring mechanism behind the battery will push it out toward you as you slide it forward.
 - c. Use your thumb and index finger to pull the battery from under the battery clip.
 - d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



3. Insert the new battery:
 - a. Tilt the battery so that you can insert it into the front of the socket, under the battery clip.
 - b. As you slide it under the battery clip, press the battery down into the socket.



4. Reinstall the server covers and complete the installation (see “Completing the Installation” on page 76).
5. Start the Configuration/Setup Utility program and reset configuration parameters as needed.
 - To reset the system date and time, go to “Date and Time” on page 24.
 - To reset the power-on password, go to “Using the Power-on Password Menu” on page 25.
 - To reconfigure your system, follow the instructions given in “The Configuration/Setup Utility” on page 21 (all models).

Chapter 7. Server Records and Specifications

Whenever you add options to your server, be sure to update the information in this section. Accurate, up-to-date records make it easier to add other options and, if the need should arise, to report a hardware problem.

In addition to server records, this chapter contains specifications. These specifications include product dimensions, environmental operating requirements, system board layout, and jumper settings.

This chapter contains:

Record the Identification Numbers	160
Installed Device Records	161
System Board Illustration	166
System Board LEDs	166
System Board Connectors	167
System Board Switches	168
Bypassing an Unknown Power-on Password	169
Changing Jumper Positions	170
Two-Pin Jumper Blocks	170
SCSI Jumpers	171
DASD Backplane Jumper Block Location	172
Power Cords	172

Record the Identification Numbers

Record the Identification Numbers

Record and retain the following information.

Product Name	IBM Netfinity 5000
Machine Type	8659
Microprocessor Type	_____
Model Number	_____
	<input type="checkbox"/> with preinstalled hard disk drive
	<input type="checkbox"/> without preinstalled hard disk drive
Serial Number	_____
Key Serial Number	_____

Table 12. Server Identification Numbers

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 on the front bezel. On the tower model, the identification numbers are located near the bottom of the front bezel. On the rack model, the model number is located to the right of the 5.25-inch drive bays.

Note: Two keys are provided with your tower model server. Store the keys in a safe place. If you lose the keys, you must order a replacement door lock mechanism and keys from IBM.

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.

Record in the following table the types and SCSI IDs for drives or devices attached to your server. If you attach a drive or other device to an adapter, be sure to record the descriptive information appropriately.

Location	Drive or Device Description
	Internal Devices
Bay A	_____
Bay B	<u>5.25-Inch CD-ROM Drive</u>
Bay C	<u>3.5-Inch 1.44MB Diskette Drive</u>
Bay 1	_____
Bay 2	_____
Bay 3	_____
Bay 4	_____
Bay 5	_____
	External Devices
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____
SCSI ID	_____

Table 13. Internal and External Drives and Devices

Installed Device Records

Table 14 (Page 1 of 3). Configuration/Setup Program Defaults and Changes

Option	Default Value	New Value	Additional Information
System Summary			
Microprocessor	_____	_____	_____
Microprocessor Speed	_____	_____	_____
Secondary Microprocessor	_____	_____	_____
Math Coprocessor	Internal	_____	_____
System Memory	640 KB	_____	_____
Extended Memory	63 MB	_____	_____
Cache Size (internal)	512 KB	_____	_____
Shadow ROM	384 KB	_____	_____
System ROM	F0000h — FFFFFh	_____	_____
Diskette Drive A	1.44 MB 3.5-inch diskette drive	_____	_____
Primary Master Device	[CD-ROM]	_____	_____
Mouse	[Installed]	_____	_____
System Memory Type	Registered SDRAM	_____	_____
Note: Both microprocessors must have the same cache size and type, and the same clock speed.			
System Information			
Product Data			
Machine Type/Model	_____	_____	_____
Flash EEPROM Revision Level	_____	_____	_____
System Board Identifier	_____	_____	_____
System Serial Number	_____	_____	_____
BIOS Date	_____	_____	_____
BIOS Revision Number	_____	_____	_____
SP ROM Date	_____	_____	_____
SP ROM Revision Level	_____	_____	_____
Diagnostics Revision Level	_____	_____	_____
Diagnostics Date	_____	_____	_____
Diagnostics Version	_____	_____	_____
SCSI BIOS Version	_____	_____	_____
System Card Data			
Model	_____	_____	_____
SubModel	_____	_____	_____
System Serial Number	_____	_____	_____
DASD Backplane	_____	_____	_____
Power Backplane	_____	_____	_____
Power Supply 1	_____	_____	_____
Power Supply 2	_____	_____	_____
PCI Routing			
Planar SCSI INT_A	IRQ11	_____	_____
Planar SCSI INT_B	IRQ15	_____	_____
Planar Ethernet INT_A	IRQ9	_____	_____
Planar Video INT_A	IRQ9	_____	_____
Planar USB INT_A	IRQ10	_____	_____
Note: The screen displays INT_A, INT_B, INT_C, and INT_D for each PCI slot. The default value for each is not routed .			

Table 14 (Page 2 of 3). Configuration/Setup Program Defaults and Changes

Option	Default Value	New Value	Additional Information
Devices and I/O Ports			
Serial Port Setup			
Serial Port A	[Port 3F8, IRQ4.]	_____	_____
Serial Port B	[Port 2F8, IRQ3.]	_____	_____
Parallel Port Setup			
Parallel Port	[Port 378]	_____	_____
Parallel Port Mode	[Standard]	_____	_____
Parallel Port DMA	[None]	_____	_____
Mouse	[Installed]	_____	_____
Diskette Controller	[Enabled]	_____	_____
Diskette Drive A	1.44 MB 3.5-inch diskette drive	_____	_____
Video Setup			
Video Controller	S3 Incorporated 86C775/86C785	_____	_____
Video Memory	1024 KB	_____	_____
IDE Setup			
Primary IDE Channel	[Enabled]	_____	_____
Master Device	[Enabled]	_____	_____
Type	CD-ROM	_____	_____
Size	650 MB	_____	_____
Transfer selection	Autoconfigure	_____	_____
Transfer Mode	PIO mode 3	_____	_____
LBA	Supported	_____	_____
System Security			
Power-On Password			
Power-On Password	[On]	_____	_____
Allow Unattended Boot	[On]	_____	_____
Administrator Password			
Administrator Password		_____	_____
User Change Power-On Password	[No]	_____	_____
System Owners Name		_____	_____
Start Options			
Keyboard NumLock State	[On]	_____	_____
Keyboard Speed	[Fast]	_____	_____
Disketteless Operation Mode	[Disabled]	_____	_____
Displayless Operation Mode	[Disabled]	_____	_____
Keyboardless Operation Mode	[Disabled]	_____	_____
First Startup Device	[CD-ROM]	_____	_____
Second Startup Device	[Diskette Drive 0]	_____	_____
Third Startup Device	[Hard Disk 0]	_____	_____
Fourth Startup Device	[Network]	_____	_____
Power On Self Test	[Quick]	_____	_____
Virus Detection	[Enabled]	_____	_____
Note: The Virus Detection test checks for changes to the boot sector.			

Installed Device Records

<i>Table 14 (Page 3 of 3). Configuration/Setup Program Defaults and Changes</i>			
Option	Default Value	New Value	Additional Information
Advanced Setup			
Core Chipset Control			
PCI Bus Control			
Primary Bus MLT	[30h]	_____	_____
Secondary Bus MLT	[30h]	_____	_____
System SCSI Boot Precedence	[Disabled]	_____	_____
Planar SCSI ChA IRQ	[Autoconfigure]	_____	_____
Planar SCSI ChB IRQ	[Autoconfigure]	_____	_____
Planar Ethernet IRQ	[Autoconfigure]	_____	_____
Planar Video IRQ	[Autoconfigure]	_____	_____
Planar USB IRQ	[Autoconfigure]	_____	_____
Slot PCI Interrupt Routing		_____	_____
Device Enable/Disable			
Planar SCSI	[Enable]	_____	_____
Planar Video	[Enable]	_____	_____
Planar Ethernet	[Enable]	_____	_____
Slot 5	[Enabled]	_____	_____
Slot 4	[Enabled]	_____	_____
Slot 3	[Enabled]	_____	_____
Slot 2	[Enabled]	_____	_____
Slot 1	[Enabled]	_____	_____
Cache Control			
Processor Cache Type	[Write-Back]	_____	_____
Processor 1 Cache State	[Enabled]	_____	_____
Processor 1 Cache Size	512 KB	_____	_____
Memory Settings	[Enabled]	_____	_____
Note: The screen displays Row 0 and Row 1 for each bank. The default value for each is Enabled .			
ISA I/O Recovery Timer Delay	[Full Delay]	_____	_____
Svc. Processor Hardware Interrupt	[Autoconfigure]	_____	_____
Plug and Play			
Adapter Configuration	[Enabled]	_____	_____
Memory Resources	[Plug and Play]	_____	_____
I/O Port Resources	[Plug and Play]	_____	_____
DMA Resources	[Plug and Play]	_____	_____
Interrupt Resources	[Plug and Play]	_____	_____
Note: For each of these, the screen displays a list of the resources. The default value for each is Plug and Play .			

The following table shows the defaults for system memory and extended memory in your server. Record changes to existing memory and upgrades here.

<i>Table 15. RAM Default Settings and Changes</i>			
Option	Default Value	New Value	Additional Information
System Memory	640 KB	_____	_____
Extended Memory	63 MB	_____	_____
Connector J15	_____	_____	64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/>
Connector J16	_____	_____	64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/>
Connector J17	_____	_____	64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/>
Connector J22	_____	_____	64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/>
Total Memory	_____	_____	_____

Record expansion slot configuration information for your server in the following table.

<i>Table 16. Expansion Slot Configuration Information</i>						
Slot	Type	IRQ	DMA	I/O Port	ROM/RAM Address	Option Description and Additional Information
5	PCI	_____	_____	_____	_____	_____
4	PCI	_____	_____	_____	_____	_____
3	PCI	_____	_____	_____	_____	_____
2 ¹	Shared	_____	_____	_____	_____	_____
1 ¹	Shared	_____	_____	_____	_____	_____

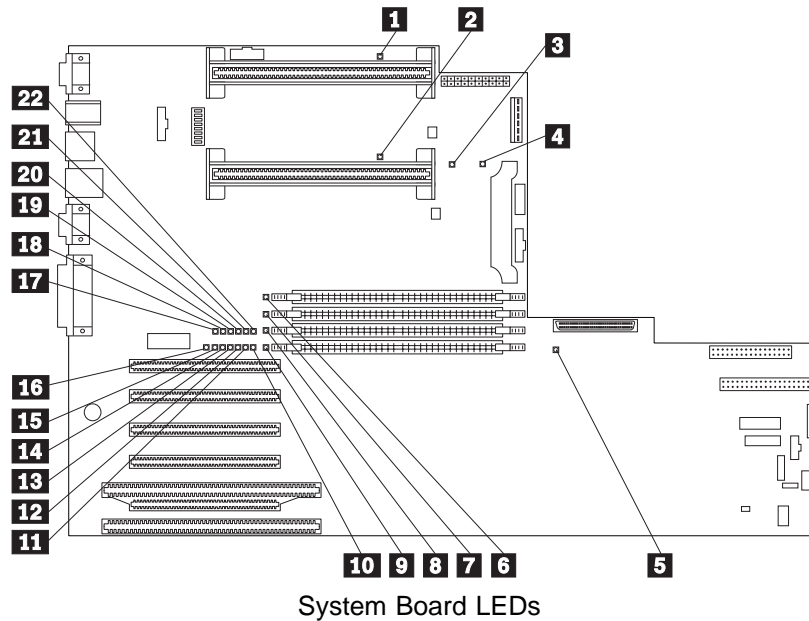
Notes:

- Slots 1 and 2 are shared by adjacent PCI and ISA connectors.
- Before setting values, review “Resolving Configuration Conflicts” on page 30 and follow the instructions for avoiding configuration conflicts.
- Slots 1–4 are on PCI bus 2; slot 5 is on PCI bus 1.

System Board Illustration

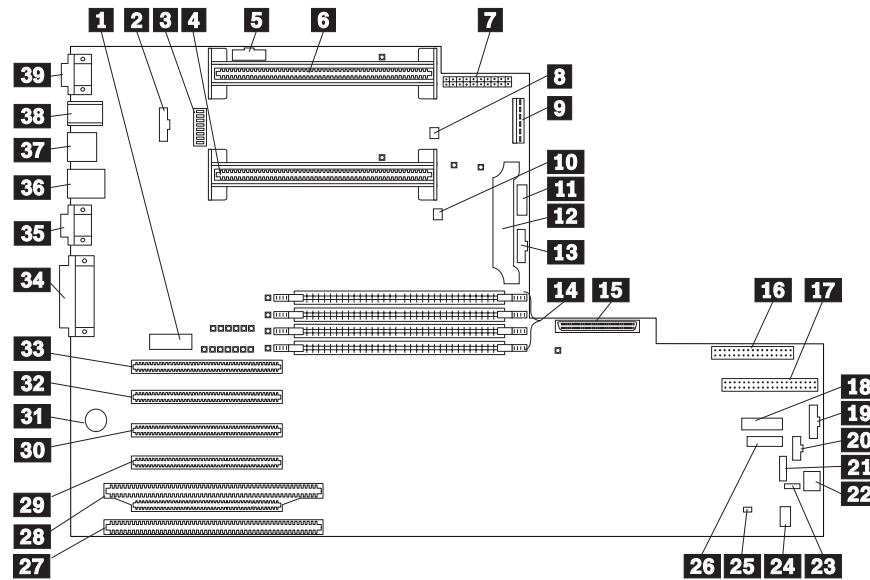
The following illustrations show some of the system board components. Refer to the label inside the system cover for detailed information.

System Board LEDs



- | | | | |
|-----------|---|-----------|---|
| 1 | Microprocessor 1 error LED (CR1) | 11 | Non-maskable interrupt (NMI) error LED (CR28) |
| 2 | Microprocessor 2 error LED (CR5) | 12 | PCI 2 error LED (CR27) |
| 3 | Integrated voltage regulator error LED (CR4) | 13 | PCI 1 error LED (CR26) |
| 4 | Voltage regulator module (VRM) error LED (CR12) | 14 | Reserved (CR25) |
| 5 | Service Processor error LED (CR49) | 15 | DASD error LED (CR24) |
| 6 | DIMM 1 error LED (CR13) | 16 | Temperature error LED (CR23) |
| 7 | DIMM 2 error LED (CR14) | 17 | Fan 1 (DASD) error LED (CR15) |
| 8 | DIMM 3 error LED (CR21) | 18 | Fan 2 (rear) error LED (CR16) |
| 9 | DIMM 4 error LED (CR22) | 19 | Reserved (CR17) |
| 10 | System-management interrupt (SMI) LED (CR29) | 20 | Reserved (CR18) |
| | | 21 | Power supply 1 error LED (CR19) |
| | | 22 | Power supply 2 error LED (CR20) |

System Board Connectors



System Board Connectors

- | | | | |
|-----------|---|-----------|---|
| 1 | Systems management adapter connector (J21) | 22 | Reserved (J37) |
| 2 | Fan 2 connector (J6) | 23 | Reserved (J36) |
| 3 | System switch block (SW1) | 24 | Reserved (J41) |
| 4 | Microprocessor 2 connector (U21) | 25 | Reserved (J39) |
| 5 | Reserved (J1) | 26 | Reserved (J32) |
| 6 | Microprocessor 1 connector (U2) | 27 | ISA connector (J40) |
| 7 | Power connector (J3) | 28 | PCI/ISA connector, PCI bus 2 (J38) |
| 8 | Reserved (J8) | 29 | PCI connector, PCI bus 2 (J33) |
| 9 | Power connector (J4) | 30 | PCI connector, PCI bus 2 (J30) |
| 10 | Reserved (J12) | 31 | Battery |
| 11 | Power supply data connector (J10) | 32 | PCI connector, PCI bus 2 (J28) |
| 12 | Voltage regulator module (VRM) connector (U20) | 33 | PCI connector, PCI bus 1 (J24) |
| 13 | Fan 1 connector (J13) | 34 | Parallel/SCSI connectors (J19) |
| 14 | DIMM 1 (J15), DIMM 2 (J16), DIMM 3 (J17), and DIMM 4 (J22) connectors | 35 | Video port and Management C port connectors (J11) (Management C port connector is above the video connector.) |
| 15 | SCSI connector (J18) | 36 | USB 1 and USB 2 port connectors (J9) (USB 2 is below USB 1) |
| 16 | Diskette drive connector (J23) | 37 | Ethernet connector (J7) |
| 17 | IDE connector (J3) | 38 | Mouse and keyboard connectors (J5) (The mouse connector is above the keyboard connector) |
| 18 | Operator LED panel (J29) | 39 | Serial port A and B connectors (J2) (Serial port B is below serial port A) |
| 19 | Reserved (J31) | | |
| 20 | Power-on switch panel (J34) | | |
| 21 | RS-485 connector (J35) | | |

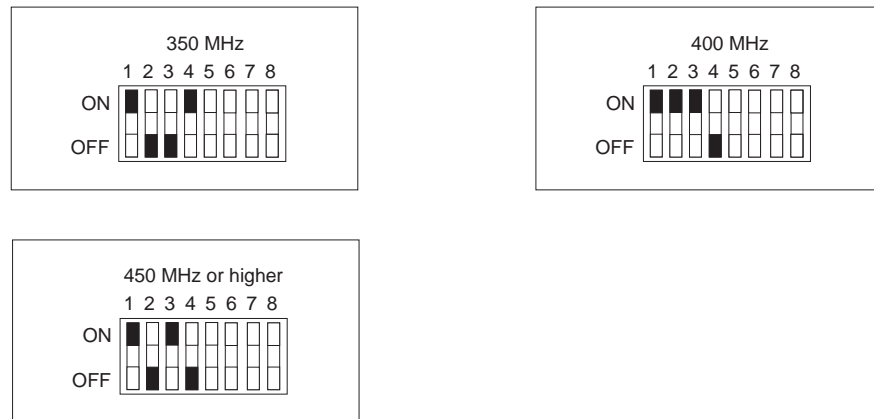
System Board Switches

The following table provides the system switch identifiers and descriptions of these switches. The system switch block is identified by key **3** in the illustration at “System Board Connectors” on page 167.

Note: Turn off the server and disconnect the power cord before moving any switches.

<i>Table 17. System Board Switch Block SW1</i>	
Identifier	Switch Description
1	Switches 1, 2, 3, and 4 in combination specify the frequency for the microprocessor. See Table 18 on page 169 for details.
2	Switches 1, 2, 3, and 4 in combination specify the frequency for the microprocessor. See Table 18 on page 169 for details.
3	Switches 1, 2, 3, and 4 in combination specify the frequency for the microprocessor. See Table 18 on page 169 for details.
4	Switches 1, 2, 3, and 4 in combination specify the frequency for the microprocessor. See Table 18 on page 169 for details.
5	<p>When On, perform BIOS recovery using boot block (boot block recovery).</p> <p>The recovery boot block is in a protected area of flash memory that cannot be overwritten. When the BIOS becomes corrupted (for example, if a power failure occurs during a flash update), the recovery boot block can be used to restore the BIOS. The code in the recovery boot block enables the server to start up and read a flash diskette. The flash utility automatically recovers the system BIOS from the BIOS recovery files on the diskette. When the flash is complete, the switch must be moved to the Off position.</p> <p>The default setting is Off (disabled).</p>
6	<p>When On, sets the host bus speed to 66 MHz. When Off, the host bus speed is 100 MHz.</p> <p>The default setting is Off.</p>
7	<p>Power-on override.</p> <p>When On, overrides the power-on switch and forces power-on mode. The system will always boot without the use of the power-on switch.</p> <p>The default setting is Off (disabled).</p>
8	<p>When On, bypass the power-on password. When Off, require the user to enter the power-on password at startup if one is set.</p> <p>The default setting is Off.</p>

Table 18. Switch Settings for Microprocessor Speed



Bypassing an Unknown Power-on Password

When a power-on password is set, POST does not complete until you enter the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- Enter the administrator password at the power-on prompt, if an administrator password has been set. (If necessary, see “Using the Administrator Password Menu” on page 27 for details.) Start the Configuration/Setup Utility programs and change the power-on password. See “Using the Power-on Password Menu” on page 25.
- Change switch 8 on the system switch block to On (Bypass Power-On Password). See “System Board Connectors” on page 167 for the location of the switch block.

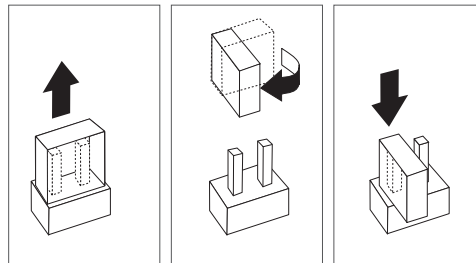
Changing Jumper Positions

The DASD backplane, which is the Netfinity 5000 SCSI backplane, contains two-pin jumper blocks, which are behind the daughterboard (SAF-TE) on the DASD backplane. Jumper block J4 controls the addressing of the SCSI hard disk drive hot-swap bays. See “SCSI Jumpers” on page 171 for details.

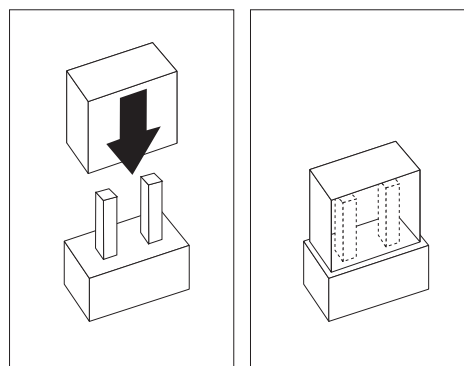
Two-Pin Jumper Blocks

Covering both pins with a jumper specifies one function of the jumper block. Covering one pin only or removing the jumper entirely changes the function of the jumper block. 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 Install Options” on page 43).
3. Locate the jumper block, removing any adapters or components that may hinder access to the jumper block.
4. Do one of the following:
 - Remove a jumper by performing either action:
 - Lift the jumper straight off the pin block.
 - 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.



- Place a jumper by aligning the holes in the bottom of the jumper with the two pins on the pin block, and then sliding the jumper onto these pins.



5. Replace any components or adapters that you might have removed.
6. Reinstall the server cover and connect the cables (see “Completing the Installation” on page 76 for instructions).

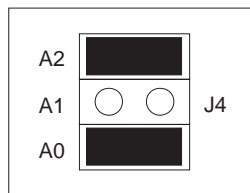
SCSI Jumpers

The option jumper block on the DASD (SCSI) backplane defines the SCSI IDs for hot-swap drives. See the illustration in “DASD Backplane Jumper Block Location” on page 172 for the location of the option jumper block.

Table 19 summarizes the settings for the DASD backplane SCSI option jumper block (J4).

Pins	Description
1-2 (A0)	Removing the jumper from these two pins reverses the SCSI IDs on the backplane. For the tower model, these two pins are jumpered; for the rack model, the jumper usually is removed.
3-4 (A1)	Reserved. No jumper.
5-6 (A2)	These pins are always jumpered.

Tower Addressing



Rack (Reversed) Addressing

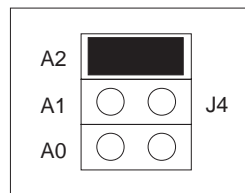


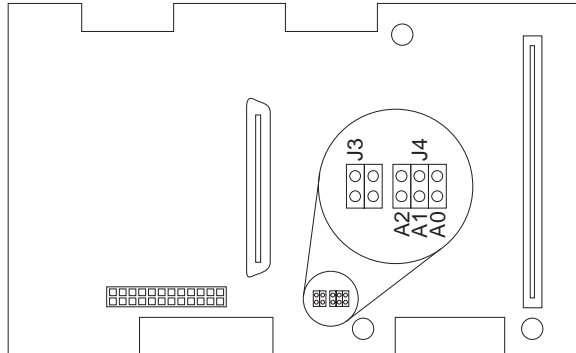
Table 20 shows the SCSI IDs that you can use for hot-swap drives.

J4 Pins 1-2 (A0)	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5
Jumpered (tower orientation)	0	1	2	3	4
Jumper removed, DASD enclosure not rotated	4	3	2	1	0
Jumper removed, DASD enclosure rotated for rack orientation	0	1	2	3	4

Notes: When the DASD enclosure on a tower model has been rotated for rack-mount orientation and the jumper has been removed, the bays correspond to the rack model illustration on page 56.

DASD Backplane Jumper Block Location

The following illustration shows the location of the DASD backplane SCSI option jumper block (J4).



Power Cords

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

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

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

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

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

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
62X1045	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

Glossary

This glossary includes terms and definitions from the following publications.

The American National Dictionary for Information Systems, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42 Street, New York, NY 10036. Definitions are identified by the symbol (A).

The ANSI/EIA Standard 440-A: *Fiber Optic Terminology*. Copies may be purchased from the Electronic Industries Association, 2001 Pennsylvania Avenue, N.W., Washington DC 20006. Definitions are identified by the symbol (E).

The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). These definitions are identified by the symbol (I). Definitions from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T), indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

A

adapter. A printed circuit board that modifies the system unit to allow it to operate in a particular way.

address. (1) A value that identifies a register or a particular part of storage. The value is represented by one or more characters. (2) The location in the storage of a computer where data is stored. (3) To refer to a specific storage location by specifying the value that identifies the location.

application. The use to which an information processing system is put; for example, a payroll application, an airline reservation application, a network application.

application program. (1) A program that is specific to the solution of an application problem. Synonymous with application software. (T) (2) A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll. (3) A program used to connect and communicate with stations on a network, enabling users to perform application-oriented activities.

architecture. See computer architecture.

attenuation. A decrease in magnitude of current, voltage, or power of a signal in transmission between points.

AWG. American Wire Gauge.

B

back up. To copy information, usually to diskette or tape, for safekeeping.

backup. Pertaining to a system, device, file, or facility that can be used in the event of a malfunction or loss of data.

BBS. Bulletin board system.

BIOS. Basic Input/Output System.

BIOS (Basic Input/Output System). Code that controls basic hardware operations such as interactions with diskette drives, hard disk drives, and the keyboard.

bit. Either of the digits 0 or 1 when used in the binary numeration system. Synonymous with binary digit. (T)

bridge. A functional unit that interconnects two local area networks that use the same logical link control protocol but may use different medium access control protocols.

buffer. (1) A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (A) (2) A portion of storage used to hold input or output data temporarily.

bus. One or more conductors used for transmitting signals, data, or power. See also address bus and data bus.

byte. A string that consists of a number of bits, usually 8, that are treated as a unit and represent a character.

C

cable. The physical medium for transmitting signals; it includes copper conductors and optical fibers.

cache. A buffer storage that contains frequently accessed instructions and data; it is used to reduce access time.

CD-ROM. Compact disc read only memory. High-capacity read-only memory in the form of an optically read compact disc. See also CD.

client. A functional unit that receives shared services from a server. (T)

clock. A device that generates periodic, accurately spaced signals used for purposes such as timing, regulation of the operations of a processor, or generation of interrupts. (T)

code. A collection of instructions that is in a form that can be read and processed by a computer.

collision. An unwanted condition that results from concurrent transmissions on a channel. (T)

compatibility. The capability of a hardware or software component to conform to the interface requirements of a given computer without adversely affecting its functions.

configuration. The manner in which the hardware and software of an information processing system are organized and interconnected. (T)

configure. To set up a computer for operation by describing to the system the devices, optional features, and programs installed in the computer.

connector. An electrical part used to join two or more other electrical parts. (Contrast with port.)

control. The determination of the time and order in which the parts of a computer and the devices that contain those parts perform the input, processing, storage, and output functions.

controller. A device that coordinates and controls the operation of one or more input/output devices, such as workstations, and synchronizes the operation of such devices with the operation of the system as a whole.

crossover cable. A type of 10BASE-T cable in which the transmit and receive data pairs are wired so that the transmit pair is terminated at the pin positions used by the receive pair at the opposite end of the cable. A crossover cable is used to connect the 10BASE-T port on an Ethernet controller to a 10BASE-T port on a repeater that does not perform the crossover function.

D

DASD. Direct access storage device.

data. (1) A re-interpretable representation of information in a formalized manner suitable for communication, interpretation, or processing. Operations can be performed upon data by humans or by automatic means. (T) (2) Any representations such as characters or analog quantities to which meaning is or might be assigned. (A)

device. A mechanical, electrical, or electronic piece of equipment designed to serve a special purpose or perform a special function.

device driver. A file that contains the code needed to use an attached device.

diagnostic. Pertaining to the detection and isolation of errors in programs and faults in equipment.

digital. (1) Pertaining to data in the form of digits. (A) (2) Contrast with analog.

DIMM. Dual inline memory module.

direct access storage device (DASD). A nonvolatile-storage device, such as a diskette drive, hard disk drive, or CD-ROM drive, in which access time is effectively independent of the location of the data on the storage medium.

direct memory access (DMA). The transfer of data between memory and input/output devices without microprocessor intervention.

disk array. Two or more hard disks interconnected to increase security, performance, or reliability.

diskette. A small magnetic disk enclosed in a jacket. (T)

diskette drive. The mechanism used to seek, read, and write data on diskettes. It can be installed in, or attached to, a computer.

display. A component capable of displaying information on a viewing surface; for example, a cathode ray tube or a gas panel.

DMA. Direct memory access.

duplex. Pertaining to communication in which data can be sent and received at the same time. Synonymous with full-duplex (FDX).. Contrast with half-duplex (HDX).

E

ECC. Error correcting code.

ECP. Extended Capability Port. An IEEE 1284 standard signalling method for high speed bidirectional parallel communication between a computer and a peripheral device, that uses the hardware in the port to assist in the data transfer. It can use direct memory addressing (DMA) channels to move its data, and requires the peripheral device to control the handshaking. ECP is generally used for printers and scanners. See also EPP.

EDO. Extended data output.

EEPROM. Electrically erasable programmable read-only memory.

EISA. Extended industry standard architecture.

electrically erasable programmable read-only memory (EEPROM). EPROM that can be reprogrammed while it is in the computer.

extended industry standard architecture (EISA). An expansion bus architecture used in a network server that provides compatibility among hardware components.

EPP. Enhanced Parallel Port. An IEEE 1284 standard signalling method for high speed bidirectional parallel communication between a computer and a peripheral device, that uses the hardware in the port to generate handshaking, strobing, and so forth. It controls all the transfers to and from the peripheral device, and is generally used for non-printer peripherals such as CD-ROM, tape, or hard disk drives. See also ECP.

F

file. A named set of records stored or processed as a unit. (T)

flash memory. See electrically erasable programmable read-only memory (EEPROM).

frame. (1) A data structure that consists of fields, predetermined by a protocol, for the transmission of user data and control data. The composition of a frame, especially the number and types of fields, may vary according to the type of protocol. (T)

frequency. The rate of signal oscillation, expressed in hertz.

H

half-duplex. In data communication, pertaining to transmission in only one direction at a time. Contrast with duplex.

hard disk. A rigid magnetic disk such as the internal disks used in the system units of personal-computer systems and in external hard disk drives.

hard disk drive. A disk drive that reads and writes data on rigid disks and can be installed in or connected to a computer.

hardware. (1) All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (2) The equipment, as opposed to the programming, of a computer. (3) Contrast with software.

hexadecimal. Pertaining to a system of numbers to the base 16; hexadecimal digits range from 0 through 9 and A through F, where A represents 10 and F represents 15.

hot swap. (1) A hard disk subsystem feature of servers and storage enclosures that enables you to remove and replace hard disk drives without turning off the system. (2) To replace a hard disk drive while the system is turned on.

I

IEEE. Institute of Electrical and Electronics Engineers.

IEEE Standard 802.3. A series of standards that define a type of LAN that uses an access method called carrier sense multiple access with collision detection (CSMA/CD) over cabling of various types. The cabling types defined by the standard are thick coaxial (10BASE5), thin coaxial (10BASE2), unshielded twisted pair (10BASE-T), and optical fiber (10BASE-F).

initialization. Preparation of a system, device, or program for operation.

input/output. Pertaining to a device, process, or channel involved in data input, data output, or both.

instruction. A statement that specifies an operation to be performed by a microprocessor, and that identifies data involved in the operation.

Internet Packet Exchange (IPX). The routing protocol used to connect Novell's servers or any workstation or router that implements IPX with other workstations. Although similar to TCP/IP, it uses different packet formats and terminology. See also TCP/IP and Xerox Network Systems (XNS).

Internet Protocol (IP). A protocol used to route data from its source to its destination in an Internet environment.

I/O. Input/output.

IPX. Internet Packet Exchange.

IRQ. Interrupt request.

ISA. Industry standard architecture

J

jumper. A connector between two pins on a network adapter that enables or disables an adapter option, feature, or parameter value.

L

LAN. Local area network.

LED. Light-emitting diode.

link segment. In simple terms, a single cable or interconnected cables that connect a device to a 10BASE-T repeater. The cables in a link segment are unshielded twisted-pair cables that conform to the cabling specifications in IEEE Standard 802.3 10BASE-T.

load. To bring all or part of a computer program into memory from auxiliary storage so that the computer can run the program.

local area network (LAN). (1) A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T) (2) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network.

logical. (1) Pertaining to content or meaning as opposed to location or actual implementation. (A) (2) Pertaining to a view or description of data that does not depend on the characteristics of the computer system or the physical storage. (A) (3) Contrast with physical. (A)

M

math coprocessor. In personal-computer systems, a microprocessor that supplements the operations of the system microprocessor, enabling the computer to perform complex mathematical operations in parallel with other operations.

MAU. Medium attachment unit.

Mbps. Megabits per second.

Mbps. Million bits per second.

MBps. Megabytes per second.

MDI. Medium Dependent Interface.

MDI port. The port that acts as the electrical and mechanical interface between the twisted-pair link segment and the medium attachment unit.

MDI-X. A port on a 10BASE-T repeater that performs the crossover function.

medium. A physical material in or on which data may be represented.

megabyte. (1) For processor storage and real and virtual memory, 2²⁰ or 1 048 576 bytes. (2) For disk storage capacity and transmission rates, 1 000 000 bytes.

memory. Addressable storage space in the computer that is used for temporary storage of instructions and data while a program is running, or for permanent storage of microcode. Contrast with auxiliary storage.

menu. A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T)

microprocessor. A processor whose elements have been miniaturized into one or a few integrated circuits. (T)

modem (modulator/demodulator). (1) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities. (T) (A) (2) A device that converts digital data from a computer to an analog signal that can be transmitted on a telecommunication line, and converts the analog signal received to data for the computer.

N

NDIS. Network Driver Interface Specification.

NetBIOS. Network BIOS. An operating system interface for application programs used on IBM personal computers that are attached to the IBM Token-Ring Network. See also BIOS.

network. (1) An arrangement of nodes and connecting branches. (T) (2) A configuration of data processing devices and software connected for information interchange.

node address. The address of an adapter on a LAN.

nonvolatile. (1) Pertaining to a storage device whose contents are not lost when power is cut off. (T) (2) Contrast with volatile.

O

ODI. Open-Data Link Interface.

operating system. Software that controls the execution of programs and that may provide services such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominantly software, partial hardware implementations are possible. (T)

P

pack. Two or more hard disks interconnected to increase security, performance, or reliability. Commonly referred to as a disk array.

packet. In data communication, a sequence of binary digits, including data and control signals, that is transmitted and switched as a composite whole. The data, control signals, and possibly error control information are arranged in a specific format. (I)

parallel port. An access point through which a computer transmits or receives data that consists of several bits sent simultaneously on separate wires. Contrast with serial port.

PCI. Peripheral component interconnect.

performance. One of the two major factors, together with facility, on which the total productivity of a system depends. Performance is largely determined by a combination of throughput, response time, and availability.

physical. (1) Pertaining to actual implementation or location as opposed to conceptual content or meaning. (A) (2) Contrast with logical. (A)

pin. One of the conducting contacts of an electrical connector.

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

POST. Power-on self-test.

power-on self-test (POST). A series of diagnostic tests that are run automatically by a device when the power is turned on.

processing. The performance of logical operations and calculations on data, including temporary retention of data in microprocessor storage while the data is being operated on.

processor. A functional unit that interprets and executes instructions. A processor consists of at least an instruction control unit and an arithmetic and logic unit. (T) See microprocessor and central processing unit.

program. (1) A sequence of instructions that a computer can interpret and execute. (2) To design, write, modify, and test computer programs. (I) (A)

prompt. A visual or audible message sent by a program to request the user's response. (T)

R

RAID. Redundant array of independent disks.

RAM. Random access memory.

random access memory (RAM). (1) A storage device in which data can be written and read. (2) A storage device into which data is written and from which data is read in a nonsequential manner.

RAS. Reliability, availability, and serviceability.

read. To acquire or interpret data from a storage device, from a data medium, or from another source.

read-only memory (ROM). Memory in which stored data cannot be modified by the user except under special conditions. See also EEPROM, EPROM, and PROM.

record. (1) A set of data treated as a unit. (2) A set of one or more related data items grouped for processing.

refresh. (1) To recharge a memory location in volatile memory with an electric current so that it retains a state or binary value. (2) In computer graphics, the process of repeatedly producing a display image on a display surface so that the image remains visible.

register. (1) An integrated circuit that contains 8, 16, or 32 storage locations, each of which can store 1 bit of binary data. See also binary. (2) An area that stores binary data while it is being processed by the computer.

repeater. A device used to amplify or reshape signals.

resolution. In video monitors, a measure of the sharpness of an image, expressed as the number of lines and columns on the monitor screen or the number of pels per unit of area.

ROM. Read-only memory.

S

SCSI. Small computer system interface.

segment. A section of cable between components or devices. A segment may consist of a single patch cable, several patch cables that are connected, or a combination of building cable and patch cables that are connected.

serial port. An access point through which a computer transmits or receives data, one bit at a time. Contrast with parallel port.

server. (1) A functional unit that provides shared services to workstations over a network. (2) In a network, a data station that provides facilities to other stations.

SIMM. Single-inline memory module.

slot. (1) A position in a device used for removable storage media. (2) One of several receptacles in the rear panel of the system unit into which a user can install an adapter.

small computer system interface (SCSI). A standard input/output interface used by personal computers.

SMP. symmetric multiprocessing.

socket. A receptacle for a microchip.

software. (1) All or part of the programs, procedures, rules, and associated documentation of a computer. Software is an intellectual creation that is independent of the medium on which it is recorded. (2) Contrast with hardware.

startup sequence. In personal computers, the order that the computer uses to search the direct access storage devices for an operating system.

storage. A functional unit into which data can be placed, in which it can be retained, and from which it can be retrieved.

straight-through cable. A type of 10BASE-T cable in which the transmit and receive data pairs are wired so that each signal wire is terminated at the same pin position at each end of the cable. A straight-through cable is used to connect the 10BASE-T port on an Ethernet controller to a 10BASE-T port on a repeater that performs the crossover function.

subsystem. In computers, a secondary or subordinate system, usually capable of operating independently of a controlling system, and usually having a single purpose, such as displaying video or reading from and writing to hard disks. A subsystem can be integrated into the system board or on an adapter.

SVGA. Super video graphics array.

symmetric multiprocessing. In personal-computer systems, a multiprocessing design that enables two or more microprocessors to run concurrently and work independently, with each microprocessor capable of performing any task.

system board. In a system unit, the main circuit board that supports a variety of basic system devices, such as a keyboard or a mouse, and provides other basic system functions.

T

token. In a local area network, the symbol of authority passed successively from one data station to another to indicate the station temporarily in control of the transmission medium. Each data station has an opportunity to acquire and use the token to control the medium. A token is a particular message or bit pattern that signifies permission to transmit.

transceiver. A physical device that connects a host interface to a local area network, such as Ethernet. Ethernet transceivers contain electronics that apply signals to the cable and sense collisions.

Transmission Control Protocol (TCP). A communications protocol used in Internet and in any network that follows the U.S. Department of Defense standards for inter-network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It assumes that the Internet protocol is the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of protocols that allow cooperating computers to share resources across a heterogeneous network.

transmit. To send information from one place for reception elsewhere. (A)

twisted pair. A transmission medium that consists of two insulated electrical conductors twisted together to reduce noise. (T)

U

unshielded twisted pair (UTP). See telephone twisted pair.

utility program. (1) A computer program in general support of computer processes; for example, a diagnostic program, a trace program, a sort program. (2) A program designed to perform an everyday task such as copying data from one storage device to another.

V

virtual. Pertaining to a functional unit that appears to be real, but whose functions are accomplished by other means.

volatile. (1) Pertaining to a storage device whose contents are lost when power is cut off. (2) Contrast with nonvolatile.

W

write. To make a permanent or transient recording of data in a storage device or on a data medium.

10BASE-F. 10 Mbps baseband fiber optic. Dual fiber point-to-point cabling with no defined maximum node count. Maximum fiber optic cable distance is 0.5–2 km, depending on system configuration. Covered by section 16, 17, and 18 drafts of the IEEE 802.3 Ethernet standards.

10BASE-T. 10 Mbps baseband twisted pair. Point-to-point twisted-pair cabling and repeaters to provide network services. There is no maximum node count. Maximum cable distance is 100 m. Covered by section 14 of the IEEE 802.3 Ethernet standards.

10BASE2. 10 Mbps baseband 200 m. A low-cost version of 10BASE5, commonly known as Cheapernet. The maximum number of nodes per cable segment is 30.

10BASE5. 10 Mbps baseband 500 m. Commonly known as Ethernet. The maximum number of nodes per cable segment is 100.

100BASE-TX. An IEEE 802.3 standard for baseband Ethernet data transmission at 100 Mbps over two pairs of Category 5 unshielded balanced cable or 150 Ohm shielded balanced cable.

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