



Netfinity 8500R

Hardware Information



Netfinity 8500R

Hardware Information

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 Information" section of this *Server Library*.

First Edition (September 1999)

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This publication could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time.

This publication was developed for products and services offered in the United States of America and the United Kingdom. It is possible that this publication may contain reference to, or information about, IBM products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that IBM intends to announce such IBM products, programming, or services in your country.

Requests for technical information about IBM products should be made to your IBM reseller or IBM marketing representative.

No part of this publication may be reproduced or distributed in any form or by any means without prior permission in writing from the International Business Machines Corporation.

© Copyright International Business Machines Corporation 1999. All rights reserved.

Note to U.S. Government Users — Documentation related to restricted rights — Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

Contents

Safety Information	vii
Lithium battery notice	ix
Laser compliance statements	x
About this book	xi
How this book is organized	xi
Notices used in this book	xii
Related publications	xii
Chapter 1. Introducing your Netfinity 8500R server	1
Features at a glance	3
What your IBM Netfinity 8500R server offers	4
Reliability, availability, and serviceability features	6
Controls and indicators	8
Front panel	11
Input/output connectors and expansion slots	12
Power supplies	14
Chapter 2. Arranging your workspace	17
Comfort	17
Glare and lighting	18
Air circulation	18
Electrical outlets and cable lengths	18
Chapter 3. Configuring your server	19
Accessing server programs	20
Configuration overview	20
The Configuration/Setup Utility program	21
Using the Configuration/Setup Utility main menu	22
Using the System Partition	32
Configuring options	33
Resolving configuration conflicts	34
Using the SCSISelect Utility program	35
Chapter 4. Installing options	39
Before you begin	41
Understanding the Netfinity 8500R server design	46
Preparing to install options	49
Installing DIMMs and memory boards	54
Working with the processor housing assembly	58
Working with adapters	70
Installing internal drives	81
Replacing a hot-swap power supply	86
Replacing a hot-swap fan	90
Completing the installation	92
Connecting external options	96
Chapter 5. Installing the server in and removing the server from the rack enclosure	103
Before you begin	103

Installing the server in the rack enclosure	104
Removing the server from the rack enclosure	115
Chapter 6. Solving problems	119
Diagnostic tools overview	120
Diagnostic programs	122
Diagnostic error message tables	125
Power-on self-test (POST) beep codes	133
POST error codes and messages	135
System-monitoring messages	150
Troubleshooting	152
SCSI messages	158
Resolving configuration conflicts	159
Identifying problems through status indicators	159
Checking the system for damage	163
Replacing the battery	164
Chapter 7. Server records and specifications	169
Recording the identification numbers	170
Recording installed devices	170
Specifications	181
Changing jumper settings	183
Advanced System Management PCI adapter component locations	187
I/O board component locations	188
I/O function card component locations	189
I/O function card jumpers	190
Memory board component locations	191
Processor-controller board component locations	193
Processor-controller board jumpers	194
Processor-daughterboard component locations	196
SCSI backplane component locations	197
Additional server boards	197
Index	199

Tables

1.	Memory installation requirements	55
2.	Memory expansion	55
3.	PCI adapter information	73
4.	Automatically assigned SCSI IDs	82
5.	Serial port pin-number assignments	98
6.	Parallel port pin-number assignments	98
7.	Video port pin-number assignments	99
8.	Keyboard and auxiliary-device port pin-number assignments	100
9.	68-Pin SCSI port pin-number assignments	100
10.	USB connector pin-number assignments	101
11.	10/100 Mbps Ethernet connector pin-number assignments	102
12.	Advanced System Management Interconnect bus connector pin-number assignments	102
13.	IBM Netfinity 8500R server identification numbers	170
14.	Internal drives and devices	171
15.	External drives and devices	171
16.	Configuration/Setup Utility program defaults and changes	172
17.	System memory	179
18.	System specifications	181
19.	Acoustical noise emission values	182
20.	I/O function card jumpers	190
21.	Processor-controller board jumper	195

Safety Information



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

Electrical current from power, telephone, and communication cables is hazardous.

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.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Lithium battery notice

2



CAUTION:

When replacing the lithium 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 statements

Some IBM PC Server and Netfinity 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 laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



DANGER

Some laser products 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 configure your IBM Netfinity 8500R server and how to install and remove options. This book also provides information to help you solve many simple problems that might occur.

How this book is organized

Chapter 1, "Introducing your Netfinity 8500R server," provides detailed information about the features of your server. This chapter also provides a general introduction to using your server.

Chapter 2, "Arranging your workspace," contains 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 and resolving configuration conflicts.

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

Chapter 5, "Installing the server in and removing the server from the rack enclosure," contains instructions for installing a Netfinity 8500R server in a rack and for removing a Netfinity 8500R server from a rack.

Chapter 6, "Solving problems," includes an overview of the diagnostic tools, instructions for testing the server, error codes and messages, and troubleshooting charts. This chapter also contains information about checking the server for damage and replacing the battery.

Chapter 7, "Server records and specifications," provides a section to record and update important information about your server, including serial numbers, key number, and device records. Whenever you add options to your server, be sure to update the information in these records. In addition to server records, this chapter contains the server specifications, such as product dimensions, environmental operating requirements, the system-board layout, jumper locations and settings, and switch settings. This chapter also contains instructions for setting jumpers and switches.

An index follows these chapters.

To find the meanings of various computer-related terms, you can access the IBM *Dictionary of Computing* at the following World Wide Web address:

<http://www.ibm.com/networking/nsg/nsgmain.htm>

Notices used in this book

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

- **Notes**

These notices provide important tips, guidance, or advice.

- **Attention**

These notices indicate possible damage to programs, devices, or data. An attention notice is placed just *before* the instruction or situation in which damage could occur.

- **Caution**

These notices indicate situations that are potentially hazardous to you. A caution notice is placed just *before* descriptions of potentially hazardous procedure steps or situations.

- **Danger**

These notices indicate situations that are potentially lethal or extremely hazardous to you. A danger notice is placed just *before* descriptions of potentially lethal or extremely hazardous procedure steps or situations.

Related publications

In addition to this book, the following publications come with your Netfinity 8500R server:

- The *Safety Information* booklet contains important safety instructions in a multilingual format.
- The “Start Here” section of this *Server Library* contains detailed information about setting up your server, attaching cables, and installing an operating system.
- The “Express Setup and Installation” section of this *Server Library* contains fast-path installation instructions for experienced users.
- The “ServerGuide and Netfinity Manager Information” section of this *Server Library* describes the IBM ServerGuide and IBM Netfinity Manager™ products, and how to use them.
- The “Advanced System Management Information” section of this *Server Library* describes the features and functions of the Advanced System Management PCI adapter, and how to use the Advanced System Management Netfinity Manager services.
- The “Getting Help, Service, and Information” section of this *Server Library* provides instructions on how to obtain service and technical assistance for your Netfinity 8500R server and other IBM products that you might plan to use. This chapter also contains information about other publications, products, warranties, and services that IBM offers. Also included are fax numbers, toll-free telephone numbers, and access information for electronic bulletin boards, online services, and the World Wide Web.
- The “Legal Information” section of this *Server Library* contains trademark information and the legal and safety requirements for the Netfinity 8500R server.

The *IBM Netfinity 8500R Server Hardware Maintenance Manual*, part number 37L5123, is available for purchase. This manual contains error codes, advanced diagnostic procedures, and a parts catalog for most models. This manual is intended for the trained service technicians. (Diagnostic diskettes are not included.)

IBM Netfinity Rack Power Distribution Unit (PDU) Installation Instructions, part number 30F6966-0, is available for purchase. This manual contains instructions for installing an optional server rack power distribution unit (PDU).

IBM Netfinity 9308 Enterprise Rack Planning Guide, part number 37L7055-0, is available for purchase. This manual contains planning instructions for installing an optional server rack.

IBM Netfinity 9308 Enterprise Rack Installation Guide, part number 37L6645-0, is available for purchase. This manual contains instructions for installing an optional server rack.

IBM Netfinity Rack-to-Tower Conversion Kit Installation Instructions, part number 37L7012-0, is available for purchase. This manual contains instructions for converting a rack model server to the optional tower configuration.

The following publications pertain to the Ethernet adapters or controllers that are supported by the server. They are available for purchase.

- *IBM LAN Technical Reference IEEE 802.2 and NETBIOS APIs*, SC30-3587
- *IBM Transmission Control Protocol/Internet Protocol Version 2.1.1 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 Windows 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.

Related publications

Chapter 1. Introducing your Netfinity 8500R server

We appreciate your decision to purchase an IBM® Netfinity® 8500R high-performance server. It is ideally suited for networking environments that require superior processor 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 8500R server comes with a three-year limited warranty and IBM Netfinity/PC Server 90-Day Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your Netfinity 8500R server model and other IBM server products at the following World Wide Web address:

<http://www.ibm.com/pc/us/netfinity/>

Your server serial number and model number are located near the bottom of the front bezel and on the front panel. Write these numbers in the spaces provided in "Recording the identification numbers" on page 170. You will need these numbers when you register your server with IBM. After you register your server, you can receive information about updates, performance tips, and compatibility. To register your server, go to the following World Wide Web address:

<http://www.ibm.com/pc/register>

For service, assistance, or additional information on IBM Netfinity/PC Server 90-Day Start Up Support and the World Wide Web, see the "Getting Help, Service, and Information" section of this *Server Library*.

If you have not yet set up your server, see the "Start Here" section of this *Server Library* for detailed information about attaching cables and installing an operating system. Before you set up your server, be sure to read the information on IBM ServerGuide™ in the "ServerGuide and Netfinity Manager Information" section of this *Server Library*.

To find the meanings of various computer-related terms, you can access the IBM *Dictionary of Computing* at the following World Wide Web address:

<http://www.ibm.com/networking/nsg/nsgmain.htm>

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

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

This chapter contains:

Features at a glance	3
What your IBM Netfinity 8500R server offers	4
Reliability, availability, and serviceability features	6
Controls and indicators	8
Front panel	11
Input/output connectors and expansion slots	12
Power supplies	14

Features at a glance

The following table summarizes the features of the Netfinity 8500R server.

<p>Processors</p> <ul style="list-style-type: none"> • Intel® Pentium® III Xeon™ processor with Streaming SIMD Extensions • Expandable to eight 550 MHz Pentium III Xeon processors • 100 MHz Front Side Bus (FSB) • 16 KB of level-1 cache memory • 512 KB, 1 MB, or 2 MB of level-2 cache with error checking and correction (ECC) memory integrated into processor • Upgradable processor speeds when available <p>Memory</p> <ul style="list-style-type: none"> • One memory board standard <ul style="list-style-type: none"> – Sixteen 168-pin, dual inline memory-module (DIMM) connectors – Supports up to 8 GB • Expandable to 16 GB • 100 MHz, PC100, registered synchronous dynamic random-access memory (SDRAM) with ECC • Support for 128 MB, 256 MB, and 512 MB DIMMs • Support for a second memory board (optional) <p>Diskette drive</p> <ul style="list-style-type: none"> • Supports one diskette drive • Standard: One 3.5-inch, 1.44 MB <p>Hard disk drives</p> <ul style="list-style-type: none"> • Two half-high, 3.5-inch drive bays • Supports up to two internal hard disk drives <p>CD-ROM drive</p> <ul style="list-style-type: none"> • Standard: Integrated drive electronics (IDE) 	<p>Expansion-slot connectors</p> <p>Supports up to 14 adapters:</p> <ul style="list-style-type: none"> • 12 available PCI slot connectors <ul style="list-style-type: none"> – Eight 64-bit, 33 MHz, hot-plug PCI slot connectors – Four 64-bit, 66 MHz, hot-plug PCI slot connectors • Standard: I/O integrated function card • Standard: Advanced System Management PCI adapter <p>Upgradable features</p> <ul style="list-style-type: none"> • Advanced System Management PCI adapter upgrades (when available) • Diagnostics upgrades (when available) • Memory upgrades (when available) • POST/BIOS upgrades (when available) to update electrically erasable programmable read-only memory (EEPROM) on the I/O integrated function card <p>Security features</p> <ul style="list-style-type: none"> • Chassis-intrusion detector (tower option only) • Power-on and administrator passwords • Security-error indicator (tower option only) • Selectable drive-startup sequence • Side cover lock (tower option only) • Unattended start mode <p>SCSI features</p> <ul style="list-style-type: none"> • Wide Ultra-2 SCSI (LVD) controller¹ <ul style="list-style-type: none"> – One external connector – One internal connector • Two bays available for internal SCSI hard disk drives 	<p>Power supplies</p> <ul style="list-style-type: none"> • Standard: Three hot-swap power supplies • 750 Watts each • Auto-sensing function • Built-in overload and surge protection • Automatic restart after a loss of power • Redundant power available <p>Predictive Failure Analysis™ (PFA) alerts</p> <ul style="list-style-type: none"> • Fans • Power supplies • Memory • Hard disk drives • Processors <p>Integrated functions</p> <ul style="list-style-type: none"> • I/O integrated function card • Voltage regulators for processors • Two serial ports • Two Universal Serial Bus (USB) ports • One parallel port • Mouse port • Keyboard port • Video port • Wake on LAN™ capability • Alert on LAN™ capability • Advanced System Management PCI adapter <ul style="list-style-type: none"> – Full-duplex 10/100 Mbps Ethernet controller for system management use – Advanced System Management Interconnect port – Two serial ports • ServeRAID™ adapter support • Built-in programmable read-only memory (PROM) based diagnostics
--	--	--

¹ LVD = low-voltage differential

What your IBM Netfinity 8500R server offers

The unique design of your IBM Netfinity 8500R server takes advantage of advancements in data storage, networking, and memory management. Your server offers:

- Impressive performance processing

Your Netfinity 8500R server supports up to eight Intel Pentium III Xeon processors. You can install multiple processors in your server to enhance performance and provide SMP capability.

- 100 MHz Front Side Bus (FSB)

The FSB is the processor external bus. This bus is the interface between the processors and the processor controller board. The FSB is also known as the processor/host bus.

- Large system memory

The memory bus in your server supports up to 16 GB of system memory. The memory controller provides support for 100 MHz, synchronous dynamic random-access memory (SDRAM) with error checking and correction (ECC). The memory controller provides ECC support for up to 32 industry-standard, 168-pin, single connector, 8-byte, dual inline memory modules (DIMMs).

- Advanced System Management support

With the Advanced System Management service, you can configure system management events, such as power-on self-test (POST), loader, and operating-system timeouts or critical temperature, voltage, and tamper alerts.

The Advanced System Management PCI adapter generates all alerts, timeouts, and other system management information. The adapter then forwards this information to other systems on the Ethernet or Token-Ring network (or uses its modem to forward this data using a serial connector).

For more information on the features and functions of the Advanced System Management PCI adapter, refer to the “Advanced System Management Information” section of this *Server Library*.

For an illustration of the Advanced System Management PCI adapter, see “Advanced System Management PCI adapter component locations” on page 187.

- IBM ServerGuide™

Your *Netfinity Server Library* includes a copy of IBM ServerGuide. You can use the ServerGuide compact discs (CDs) to help you simplify server installation.

You can use the programs on the ServerGuide CDs to:

- Create System Partitions
- Configure supported hardware directly from the CD.
- Automate some of the network operating system (NOS) installation steps, through an easy-to-use wizard.
- Detect the supported hardware installed in your server; then, install thoroughly tested device drivers for that hardware.
Note: Some of these system-specific device drivers are newer than the device drivers included with off-the-shelf NOS packages.
- Provide a Replicated Installation path for installing Microsoft Windows NT Server 4.0 on multiple servers.
- Install popular application programs directly from the CD.
- Install IBM Update Connector™. Once this program has been installed, you can connect to IBM², and receive any available device drivers, basic input/output system (BIOS), and program updates. (This requires Windows NT Server 4.0, and TCP/IP access to the Internet.)
- And more.

See “Using the System Partition” on page 32 for additional information on System Partitions. For more information on ServerGuide, refer to the “ServerGuide and Netfinity Manager Information” section of this *Server Library*.

If you decide not to use ServerGuide to assist you with the installation of your NOS, you must download system-specific NOS installation instructions and device drivers from the World Wide Web at:

http://www.ibm.com/pc/support/netfinity/netfinity_support.html

- Diagnostic programs

Your server comes with built-in read-only memory (ROM) based diagnostic programs that test the standard features of your server. You can also use these programs to test some external devices. For more information, see “Diagnostic programs” on page 122.

Your IBM Netfinity 8500R server is designed to be cost-effective, powerful, and flexible. It uses peripheral component interconnect (PCI) bus architecture to provide compatibility with a wide range of existing hardware devices and software applications.

As always, your IBM server meets stringent worldwide certifications for power, electromagnetic compatibility (EMC), and safety. See the “Legal Information” section of this *Server Library* for additional information.

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

Reliability, availability, and serviceability features

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

The following is an abbreviated list of the RAS features on the IBM Netfinity 8500R server. Many of these features are explained in the following chapters of this book.

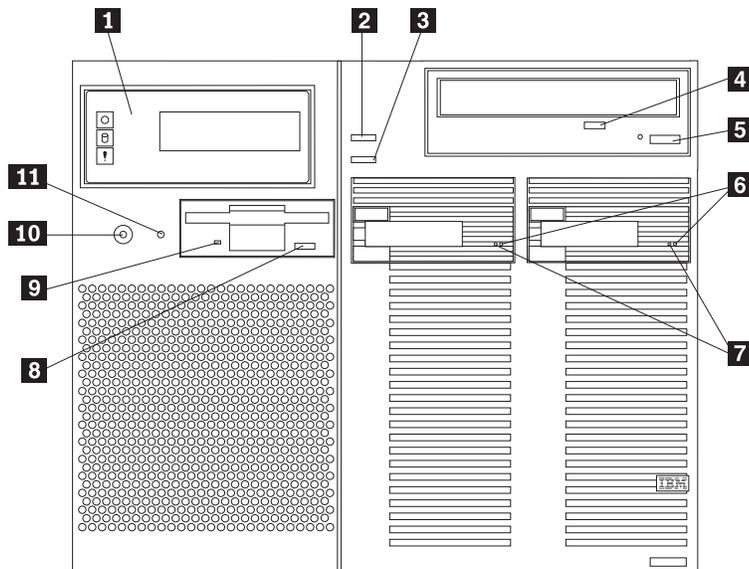
- Reliability features
 - Cooling fans with speed-sensing capability
 - ECC FSBs
 - ECC L2 cache
 - ECC memory
 - Parity checking on the SCSI bus and PCI buses
 - Power Managed - Advanced Configuration and Power Interface (ACPI) level
 - Power-on self-test (POST)
- System management monitoring via Intra-Integrated Circuit (I²C) bus
- Availability features
 - Advanced Desktop Management Interface (DMI) features
 - Automatic error retry/recovery
 - Automatic server restart
 - Automatic restart after power failure
 - Built-in, menu-driven configuration programs
 - Built-in, menu-driven small computer system interface (SCSI) configuration programs
 - Built-in, menu-driven setup programs
 - Hot-swap hard disk drives
 - Hot-plug PCI
 - Hot-plug USB keyboard and mouse
 - Menu-driven diagnostic programs on diskette
 - Netfinity Manager™ and LANDesk® enabled
 - Netfinity Server Management
 - Predictive Failure Analysis™ (PFA) alerts
 - Programmable read-only memory (PROM) based diagnostics
 - Redundant and hot-plug cooling
 - Redundant and hot-plug power
 - ServeRAID™ adapter support
 - Standard Netfinity Advanced System Management PCI Adapter provides control for remote system management
 - Upgradable POST, BIOS, diagnostics, and Netfinity Advanced System Management PCI Adapter microcode
 - Wake on LAN capability

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

- Serviceability features
 - Alert on LAN™ capability
 - Built-in, menu-driven EEPROM-based diagnostics
 - Customer support center 24 hours per day³
 - Error codes and messages
 - Front panel messages
 - LED card diagnostics
 - Processor serial number access
 - Standard cables present detection
 - Standby voltage for system management features and monitoring
 - System error logging (POST and Netfinity Advanced System Management PCI Adapter)
 - Vital product data (VPD), including serial number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance of your server.

Controls and indicators

The most commonly used controls and status indicators are on the front of your server. See “System component status indicators” on page 161 for additional information on status indicators.



- 1 Front panel:** The lights and messages on this panel give status information for your server. See “Front panel” on page 11 for more information.
- 2 Scroll button:** Press this button to select an action to perform on a system-monitoring message; then, press the Enter button to perform the action. You can select:
 - **Keep** to retain the message on the front panel and enable the system error light to continue to flash
 - **Remind** to retain the message on the front panel and enable the system error light to flash slowly
 - **Clear** to clear the message from the front panel and enable the system error light to stop flashing
- 3 Enter button:** Press this button to perform an action on system-monitoring messages that appear on the front panel.
- 4 CD-ROM drive in-use light:** When this light is on, the CD-ROM drive is being accessed.
- 5 CD-ROM eject/load button:** Press this button to eject or retract the CD-ROM tray so that you can insert or remove a CD.
- 6 Hard disk status light:** This light only operates in a ServeRAID environment. Each of the hot-swap drives has a Hard Disk Drive Status light. When the amber light for a hard disk drive is on continuously, the drive has failed. When the light flashes slowly (one flash per second), the drive is being

rebuilt. When the light flashes rapidly (three flashes per second), the ServeRAID controller is identifying the drive.

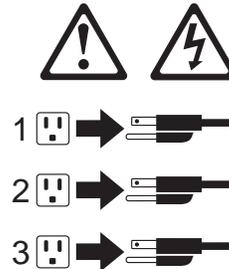
- 7 Hard disk in-use light:** Each hot-swap hard disk drive has a Hard Disk In-Use light. When the green light for a hard disk drive is on, the drive is being accessed.
- 8 Diskette-eject button:** Press this button to eject a diskette from the drive.
- 9 Diskette drive in-use light:** When this light is lit, the diskette drive is being accessed.
- 10 Power control button:** Press this button to manually turn the server on or off.

5



CAUTION:

The Power Control 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 server can be activated in several ways:

- You can turn the server on by pressing the Power Control button on the front of the server.
- The server can also be powered on by the Advanced System Management PCI adapter, Wake on LAN, Wake on Real-Time Clock Alarm, or Wake on Ring.

Note:

To enable the wakeup features, you must install the appropriate software and hardware in your server. For complete details, refer to the documentation that comes with your Ethernet adapter.

Controls and indicators

The server can be deactivated as follows:

- Pressing the Power Control button causes an immediate shutdown of the server, and places the server in standby mode. This feature can be used if the operating system hangs.

Note: After turning off the server, wait at least five seconds before pressing the Power Control button to power on the server again.

- Disconnecting all of the server power cords from the electrical outlet will shut off all power to the server.

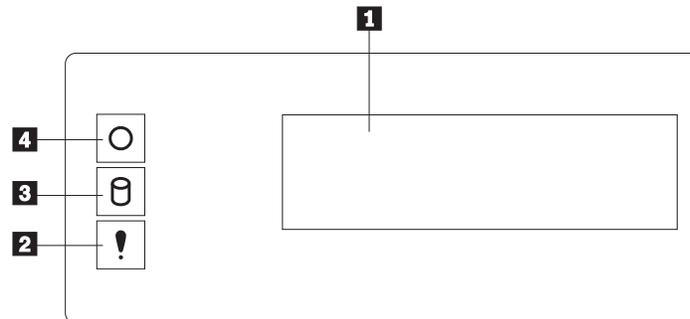
Note: Wait about 15 seconds after disconnecting the power cords for your system to stop running. Watch for the System Power light on the front panel to stop flashing or illuminating.

- The server can also be powered off by the Advanced System Management PCI adapter.

11 Reset button: Press this button to reset the system and run the power-on self-test (POST).

Front panel

The front panel on the front of the server contains status lights and system messages.



- 1 Information message panel:** System monitor information appears on this display. The Advanced System Management PCI adapter monitors system functions and generates the messages. See “System-monitoring messages” on page 150 for more information.

When the server is in standby mode (the system power supply is turned off and ac current is present), the information message panel can display system monitor information.

- 2 System error light:** This amber light is on when a system error occurs. Information about the condition displays on the information message panel.
- 3 SCSI hard disk drive in-use light:** This green light is on when there is activity on a hard disk drive.

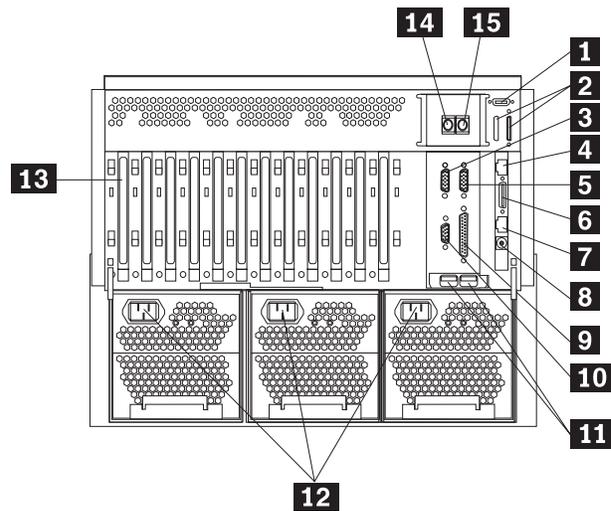
Attention: If the System Power Light is off, it does not mean there is no electrical current present in the server. To remove all electrical current from the server, you must unplug the server power cords.

- 4 System Power Light:** When this green light is on, system power is present in the server. When this light flashes, the server is in standby mode (ac current is present). When this light is off, it indicates either power supply failure or an ac power failure, or the power cords have been disconnected.

Input/output connectors and expansion slots

Input/output (I/O) connectors provide ports for transferring information into and out of your server. You can connect a variety of I/O devices to your server, including a monitor, keyboard, mouse, and printer. For more information on the ports and their specific technologies, see “Connecting external options” on page 96.

At the rear of your server is an I/O function card that provides access to some I/O connectors. Adapters installed in expansion slots might also provide I/O connectors. The following illustration shows the expansion slots and the I/O connectors (ports) on the I/O function card, chassis, and the Advanced System Management PCI adapter.



- 1 External connector knockouts for Advanced System Management PCI adapter token-ring option:** The chassis has an external connector knockout that can be used when you install the Advanced System Management PCI adapter token-ring option.
- 2 External SCSI device connector:** External SCSI devices attach here. The knockout for a second external SCSI connector is not used.
- 3 Serial port A connector:** Serial signal cables for modems and other serial devices connect here to the 9-pin serial port A connector. See “Devices and I/O ports” on page 24 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.
- 4 Advanced System Management PCI adapter 10/100 Mbps Ethernet port connector:** This connector attaches the Advanced System Management PCI adapter to a network hub for remote communication.

Note: The Advanced System Management PCI adapter 10/100 Mbps Ethernet connector cannot be accessed from the network operating system. The connector is dedicated to connecting your Advanced System Management PCI adapter to an Ethernet network through a service-processor interface, such as Netfinity Manager.

- 5 Serial port B connector:** Serial signal cables for modems and other serial devices connect here to the 9-pin serial port B connector. See “Devices and I/O ports” on page 24 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.

- 6 Advanced System Management PCI adapter dual serial port connector:** This connector can be used to attach to a *Y-cable* that is shipped with your server. This Y-cable can be used to attach to a modem that is dedicated to communication with the Advanced System Management PCI adapter.
- 7 Advanced System Management Interconnect port connector:** This connector is used to attach other compatible service processors for remote access.
- 8 Advanced System Management external power connector:** This connector is not used.
- 9 Parallel port connector:** A signal cable for a parallel device, such as a printer connects here.
- 10 Video port connector:** The monitor signal cable connects here.
- 11 Universal Serial Bus connectors:** You can attach I/O devices to these two Universal Serial Bus (USB) connectors. You need a 4-pin cable to connect devices to USB 1 or 2. A hot-plug keyboard-and-mouse option can be cabled or uncabled from the USB connectors without error or loss of service. Review your operating-system documentation to determine whether your operating system supports USB devices.
- Note:** If a standard (non-USB) keyboard is attached to the keyboard port, the USB ports are disabled while the power-on self-test (POST) is running, and no USB devices will work during POST.
- 12 Power supply connectors:** The three system power cords connect here.
- 13 PCI expansion slots:** Your server has twelve 64-bit, PCI expansion slots. All PCI slots support hot-plug PCI adapters.
- 14 Keyboard port connector:** The keyboard cable connects here.
- 15 Mouse port connector:** The mouse cable connects here. This port sometimes is called an auxiliary-device or pointing-device port.
- Note:** For pin assignments and other details about these connectors, see “Connecting external options” on page 96.

Power supplies

Your server comes with three hot-swap power supplies. The power supplies can provide up to 550 watts each at 110 V ac input power, and 750 watts each at 220 V ac input power.

13



DANGER

Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.

- 1. If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
- 2. If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
 - a. 13 amps or less, connect each power cord to a separate branch circuit.**
 - b. 14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
 - c. 20 amps or greater, you may connect up to three power cords to the same branch circuit.**

In addition to the power supplies, your server comes with three 220 V ac power cords, and three 110 V ac power cords (U.S. only). Be sure to select the appropriate power cord voltage for your server environment. All three power cords must have the same voltage.

If you connect the three:

- 220 V ac power cords to the power supplies, the three power supplies support redundancy and hot-swap capability.
- 110 V ac power cords to the power supplies, the three power supplies do not support redundancy if the system configuration exceeds any of these conditions:
 - More than six processors
 - More than 24 memory DIMMs
 - More than eight PCI adapters

For servers with redundant power, the loss of a single power supply will not affect the server operation. Replace a power supply that has failed as soon as convenient to help maintain the redundant power and cooling capability. When a power supply has failed and the Power Good light is on, the dc power LED on the power supply is off. See “Power supply LEDs” on page 160 for more information

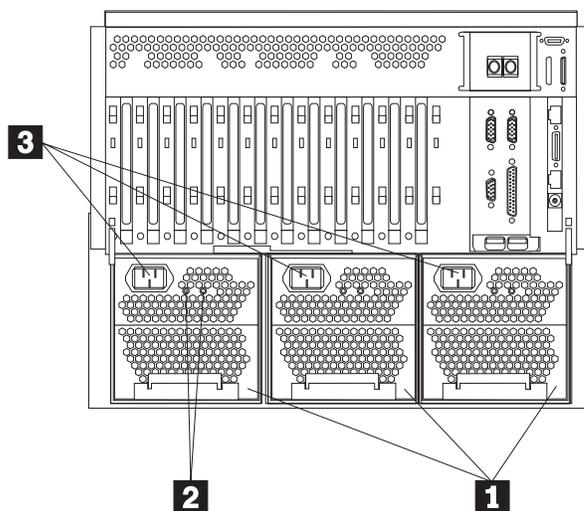
on the dc power LEDs. See “Replacing a hot-swap power supply” on page 86 for complete details on the power supplies.

Attention: To ensure proper server operation, be sure to connect all three 220 V ac power cords or all three 110 V ac power cords to the power supplies.

Notes:

1. Your server also comes with three 220 V ac power cords for connection to the server rack power distribution unit (PDU). Refer to *IBM Netfinity Rack Power Distribution Unit (PDU) Installation Instructions* for additional information on installing a PDU. See Chapter 5, “Installing the server in and removing the server from the rack enclosure” on page 103 for additional information on installing a server rack.
2. Power cords vary by country. For complete details about power cords for use in your country or region, refer to “Power cords” in the “Legal Information” section of this *Server Library* or see <http://www.ibm.com/pc/support> on the World Wide Web.

The following illustration shows the power supplies in your server. Your server might differ slightly from this illustration.



- 1 **Power supplies:** See “Replacing a hot-swap power supply” on page 86 for information on power supply requirements and for instructions on installing additional power supplies.
- 2 **AC and DC power lights:** These lights provide status information about the power supplies. These adjacent lights are located on the power supplies; the ac power light is located closest to the power supply connector. During normal operation, both the ac and dc power lights are on. For any other combination of lights, see “Power supply LEDs” on page 160.
- 3 **Power supply connectors:** The three system power cords connect here. For additional details on power cords, refer to the information at the beginning of this section.

Power supplies

Chapter 2. Arranging your workspace

This chapter contains information about 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.

See the “Getting Help, Service, and Information” section of this *Server Library* for information about obtaining ergonomic and environmental information from the World Wide Web.

This chapter contains:

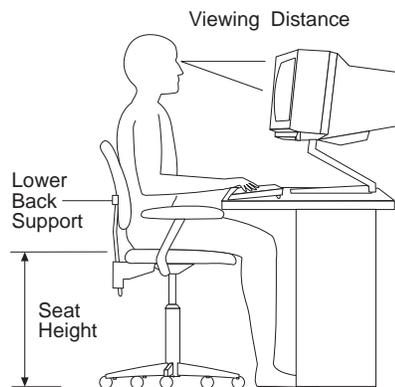
Comfort	17
Glare and lighting	18
Air circulation	18
Electrical outlets and cable lengths	18

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. Leave at least 305 mm (12 inches) of space at the front and rear of your server to allow the server's cooling system to work properly.

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 cords directly into electrical outlets.
- Keep power cords and cables neatly routed away from walkways and other areas where they might get kicked accidentally.

For more information about power cords, refer to the “Getting Help, Service, and Information” section of this *Server Library*.

Chapter 3. Configuring your server

This chapter provides information on the Configuration/Setup Utility program that comes with your server. In addition, this chapter provides information on the System Partition and the SCSISelect Utility program.

The Configuration/Setup Utility program is part of the IBM Netfinity® *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.

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

This chapter contains:

Accessing server programs	20
Configuration overview	20
The Configuration/Setup Utility program	21
Using the Configuration/Setup Utility main menu	22
System summary	23
System information	23
Devices and I/O ports	24
Date and time	24
System security	25
Start options	28
Advanced setup	29
Error logs	32
Save settings	32
Restore settings	32
Load default settings	32
Exit setup	32
Using the System Partition	32
Configuring options	33
Resolving configuration conflicts	34
Resolving hardware configuration conflicts	34
Resolving software configuration conflicts	35
Using the SCSISelect Utility program	35
Starting the SCSISelect Utility program	35
SCSISelect Utility program choices	36

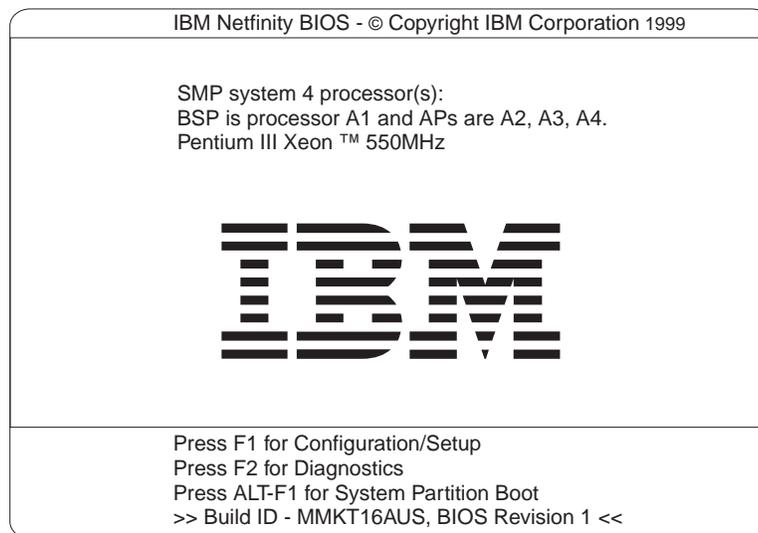
Accessing server programs

After you start the server, several prompts appear on the IBM logo screen.

- To access the Configuration/Setup Utility program, press F1 when the prompt Press F1 for Configuration/Setup appears. See “The Configuration/Setup Utility program” on page 21 and “Using the Configuration/Setup Utility main menu” on page 22 for additional information.
- To access the Diagnostic Utility program, press F2 when the prompt Press F2 for Diagnostics appears. For information on running the diagnostics programs, see “Diagnostic programs” on page 122.
- To access the utility programs in the System Partition, press Alt+F1 when the prompt Press Alt+F1 for System Partition Boot appears. See “Using the System Partition” on page 32 for additional information.

The IBM logo screen is similar to the following illustration.

Note: Your screen might look slightly different, depending on the BIOS version that comes with your server, and the hardware configuration.



Configuration overview

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

Your server supports PCI adapters and SCSI devices. Because of this flexibility, you can choose from among many adapters and devices.

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 programs:

- Configuration/Setup Utility

With the built-in Configuration/Setup Utility program, you can configure I/O functions, such as serial and parallel port assignments; change interrupt request (IRQ) settings; and change the startup sequence for drives that you install. You also can use this 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 attach to the SCSI controller. You can use SCSISelect to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive.

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

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

2. Set jumpers or switches on server components.

See “Changing jumper settings” on page 183 and “I/O function card jumpers” on page 190.

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.

See the installation instructions that come with the software.

6. Resolve configuration conflicts.

See “Resolving configuration conflicts” on page 34.

The Configuration/Setup Utility program

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

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 from the Configuration/Setup Utility program, configuration information is stored in electrically erasable programmable read-only memory (EEPROM). While the server is off, the configuration information remains available for the next system startup.

Always run the Configuration/Setup Utility program if you add, remove, or relocate any hardware option, or if you receive an error message instructing you to do so.

Using the Configuration/Setup Utility main menu

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”) before making any changes.

Attention: Maintaining a record of your configuration information is especially important if you need to move the Clear CMOS register contents jumper, which erases all configuration information (see “I/O function card jumpers” on page 190 for details).

To start the Configuration/Setup Utility program:

1. Ensure that there is no diskette in the diskette drive. If the diskette drive contains a diskette, remove it.
2. Turn on the server and watch for the IBM logo screen.

If the server is turned on already, shut down your operating system and restart the server.

3. After you start the server, several prompts appear on the IBM logo screen. When the prompt Press F1 for Configuration/Setup appears, press F1.

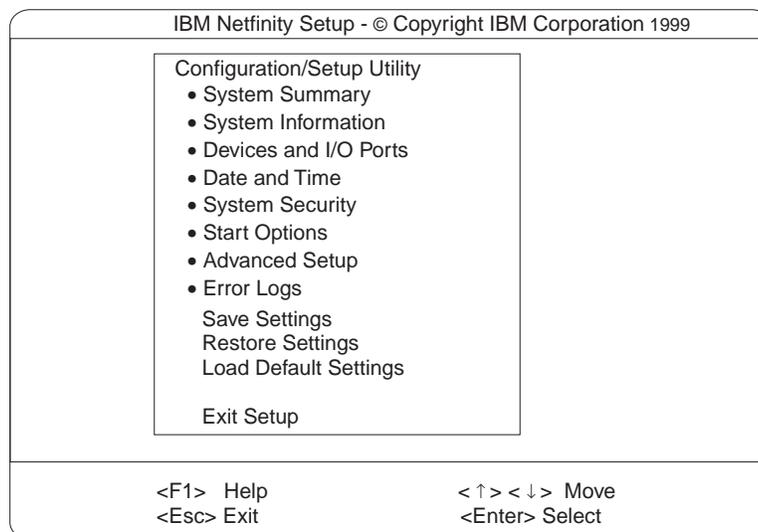
The Configuration/Setup Utility main menu appears. For information on the menu, see “Using the Configuration/Setup Utility main menu.”

Note: If you enter the power-on password and an administrator (supervisor-level) password is also set, a limited version of the menu appears. To see the full menu, you must restart the server and enter the administrator password when you are prompted to enter a password. See “System security” on page 25 for additional information.

Using the Configuration/Setup Utility main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the following screen.

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



Pressing F1 displays Help information for a selected menu item.

To change configuration settings:

1. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the menu item for the configuration setting that you want to change; then, press Enter.
2. Use the Up Arrow (↑) or Down Arrow (↓) key to choose the appropriate setting for the selected menu item; then, press Enter.
3. Repeat steps 1 through step 2 for each setting that you want to change. Press Esc to return to the Configuration/Setup Utility main menu.
4. After making changes, you can select:
 - **Save Settings** to save the selected changes.
 - **Restore Settings** to delete the changes and restore the previous settings.
 - **Load Default Settings** to cancel the changes and restore the factory settings.

Note: The Configuration/Setup Utility main menu selections do not save settings, restore settings, or load default settings for the PCI Slot/Device Information choice. To save settings, or restore settings for the PCI Slot/Device Information choice, you *must* use the menu selections available from the PCI Slot/Device Information choice.

5. To exit from the Configuration/Setup Utility main menu, select **Exit Setup**. If you made any changes and did not save them with the **Save Settings** choice, the system prompts you to save or discard the changes when you attempt to exit from the Configuration/Setup Utility main menu.

System summary

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

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

The **System Summary** choice appears on the full Configuration/Setup Utility main menu and on the limited Configuration/Setup Utility main menu.

System information

Select this choice to display information on your Netfinity 8500R server. Changes that you make on other menus might appear on this summary screen. You cannot edit any fields. The System Information choice appears only on the full Configuration/Setup Utility main menu.

Product data

Select this choice to view system information, such as the machine type and model, the system serial number, and the revision level or issue date of the BIOS stored on the flash EEPROM.

Using the Configuration/Setup Utility main menu

System card data

Select this choice to view vital product data (VPD) for some Netfinity 8500R server components.

Devices and I/O ports

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

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

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

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

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

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

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

Notes:

1. When you configure the parallel port as bidirectional, use an Institute of Electrical and Electronics Engineers (IEEE) 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 feet).
2. If you install a Universal Serial Bus (USB) keyboard that has a mouse port, the USB keyboard emulates a mouse and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.
3. Check your operating system documentation to see if your operating system supports USB devices.
4. If your operating system supports USB devices, the USB is configured automatically.

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 the 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.

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

System security

To control access to the information in your server databases, you can implement two levels of password protection. 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 16 on page 172.

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

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

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

Using the Configuration/Setup Utility main menu

Type of Password	Results
No password set	<ul style="list-style-type: none">No password is required to start the system.You can access all choices on the Configuration/Setup Utility 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 main menu.
Administrator password only	<ul style="list-style-type: none">You must enter the password to complete the system startup.The Administrator password provides access to all choices on the Configuration/Setup Utility main menu.If you need to run the flash update program and the administrator password has been set, you must enter the administrator password when you run the flash update program.
Administrator <i>and</i> power-on password	<p>You can enter either password to complete the system startup.</p> <ul style="list-style-type: none">The administrator password provides access to all choices on the Configuration/Setup Utility 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.The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access 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 power-on password prompt; then, start the Configuration/Setup Utility program and change the power-on password.If you need to run the flash update program and the administrator password has been set, you must enter the administrator password when you run the flash update program.

Using the power-on password menu

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

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. (If necessary, see “Using the administrator password menu” on page 27 for details.) Start the Configuration/Setup Utility program and change the power-on password as previously described in this section (see steps 1 through 4 on page 27).
- You can change the position of the Password override jumper, as described in “Changing jumper settings” on page 183.
- You can remove the battery as described in “Replacing the battery” on page 164 and then install the battery.

To set a power-on password:

- Select **Power-on Password** from the System Security menu; then, press Enter.
The Power-on Password menu appears.
- Type the password in the **Enter Power-on Password** data field.

Using the Configuration/Setup Utility main menu

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 Esc to cancel the request and return to the System Security menu.

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

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 system to start in unattended-start mode when a power-on password is set:

1. Select **Power-on Password** from the System Security menu; then, press Enter.
The Power-on Password screen appears.
2. Select **Allow for unattended boot with password**.
Press the Left Arrow (←) key or Right Arrow (→) key to toggle the entry to **On**.

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.

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.

Attention:

If an administrator password is set and then forgotten, it cannot be overridden or removed. You must contact your IBM service technician.

To set an administrator password:

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

The Administrator Password menu appears.

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

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

Using the Configuration/Setup Utility main menu

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 Esc to cancel the request and return to the System Security 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.

The Administrator Password menu appears.

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

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

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

The Administrator Password screen appears.

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

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

Note: If you need to run the flash update program and the administrator password has been set, you must enter the administrator password when you run the flash update program.

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 starts on or off. You also can enable the server to run without a diskette drive or a monitor.

The server uses a startup sequence to determine the device from which the operating system loads. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive, then checks the hard disk drive in bay 1, and then checks a network adapter.

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 for changes in the master boot record at startup. You also can choose to run POST in the enhanced mode or the quick mode.

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

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

Advanced setup

Select **Advanced Setup** to change values for advanced hardware features, such as cache control, PCI configuration, and processor serial number access.

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

Use the Left Arrow (←) or Right Arrow (→) key to scroll through each data field after you select one of the setup options.

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

Processor serial number access

Select this choice to enable or disable the processor serial-number security feature. This feature has a variety of uses. Review the information that comes with your processor to determine the best use for your organization. In addition, you can check the following Web site for details on the processor serial number access feature:

<http://www.intel.com>

The default value is **Disabled**. To change this value, select **Processor Serial Number Access** from the Advanced Setup menu; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the **Processor Serial Number Access** choice. Use the Left Arrow (←) or Right Arrow (→) key to select **Enabled**. Enabling the processor serial number access feature changes the server configuration. Therefore, after you enable this feature, save the new configuration information in the Configuration/Setup Utility program. Start the Configuration/Setup Utility program and select **Save Settings**. See “Using the Configuration/Setup Utility main menu” on page 22 for more information. You must shut down and restart the server to implement this change. When you restart the server, the system displays a message indicating that the configuration has changed.

Modify front panel text

Select this choice to modify the text that appears on the server front panel. For an illustration of the front panel, see “Front panel” on page 11.

To delete text, backspace to the left; then, press the Del or Delete key.

The default value is **IBM Netfinity 8500R**. To change this value, select **Modify Front Panel Text** from the Advanced Setup menu; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the **Modify Front Panel Text** choice. When the **Modify Front Panel Text** menu appears, use the Up Arrow (↑) or Down Arrow (↓) key to highlight one of the following choices:

Using the Configuration/Setup Utility main menu

- First line of text

Currently, the *First line of text* value is **IBM Netfinity**. You may change this value to one with a maximum of 16 characters. You may use any valid combination of alphanumeric characters.

- Second line of text

Currently, the *Second line of text* value is **8500R**. You may change this value to one with a maximum of 16 characters. You may use any valid combination of alphanumeric characters.

- Save front panel text changes

Select this choice if you want to save the changes that you made to the front-panel text.

- Set front panel text to default

Select this choice if you want to change the front-panel text to its default value of **IBM Netfinity 8500R**.

PCI slot/device information

Select this choice to view and identify system resources used by PCI devices. PCI devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI device. If a conflict does occur, see “Resolving configuration conflicts” on page 34.

Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change and press Enter. Use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices. An asterisk (*) indicates that more than one device shares a slot. After making changes, you can select:

- **Save Settings** to save the selected changes.
- **Restore Settings** to delete the changes and restore the previous settings.

Note: You can use the menu selections to save settings or restore settings for the PCI Slot/Device Information choice only. The Configuration/Setup Utility main menu selections save settings, restore settings, or load default settings for all other choices, but not the PCI Slot/Device Information choice.

Your server uses a rotational interrupt technique to configure PCI devices. Because of this technique, you can install a variety of PCI devices that currently do not support sharing of PCI interrupts (IRQs). Multiple-function PCI devices use more than one interrupt.

Cache control

Select this choice to enable or disable the processor cache. In addition, you can define the processor cache type as write-back (WB) or write-through (WT). Selecting write-back mode will provide the maximum system performance.

The default values are **Write back** and **Enabled**. For proper server operation, do not change the values in this field.

Note: You cannot enable or disable the cache for individual processors.

Memory settings

Select this choice to manually disable or enable a dual inline memory module (DIMM) slot.

- If you replaced a defective DIMM, you must manually enable the DIMM slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the DIMM slot.
- If a memory error is detected during POST or memory configuration, the server can automatically disable the failing DIMM slot and continue operating with reduced memory capacity. If this occurs, you must manually enable the DIMM slot after the problem is corrected.

You can diagnose to just one DIMM.

To manually enable a DIMM slot:

1. Select **Memory Settings** from the Advanced Setup menu.
2. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the DIMM slot that you want to enable.
3. Use the Left Arrow (←) or Right Arrow (→) key to select **Enable**.

For additional information on DIMMs, see “Installing DIMMs and memory boards” on page 54.

Processor settings

Select this choice to manually enable a processor slot.

- If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot.
- If a processor error is detected during POST or runtime, the server can automatically disable the failing processors and restart the system to reconfigure without the defective processors. If this occurs, you must manually enable the processor slots after the problem is corrected.

To manually enable a processor slot:

1. Select **Processor Settings** from the Advanced Setup menu.
2. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the processor slot that you want to enable.
3. Use the Left Arrow (←) or Right Arrow (→) key to select **Enable**.

For additional information on processors, see “Working with the processor housing assembly” on page 58.

MPS version control

Select this choice to view and identify the multiprocessor specification (MPS) level. The default value is 1.4. Refer to the documentation that comes with your operating system for more information.

Using the System Partition

Error logs

Select **Error Logs** to choose to view either the POST error log or the system error log.

POST error log

Select **POST Error Log** to view up to three error codes and messages that the system generated during POST. You can clear the error log by selecting **Clear error logs**.

System error log

Select **System Error Log** to view the system error log. The system error log contains all the system, error, and warning messages that the system has generated. You can use the Up Arrow (↑) or Down Arrow (↓) keys to move between pages in the system error log.

Save settings

After you make configuration changes, review them to be sure that they contain the correct information. If the information is correct, select **Save Settings** to save the selected changes.

Restore settings

After you make configuration changes, review them to be sure that they contain the correct information. If the information is incorrect, or if you do not want to save these changes, select **Restore Settings** to delete the changes and restore the previous settings.

Load default settings

If you make configuration changes and then decide that you want to use default values instead, select **Load Default Settings** to cancel the changes and restore the factory settings. See "Recording installed devices" on page 170 for a listing of the default configuration values.

Exit setup

To exit from the Configuration/Setup Utility main menu, select **Exit Setup**. If you made changes and did not save them with the **Save Settings** choice, the system prompts you to either save the changes or exit without saving the changes. Follow the instructions on the menu.

Using the System Partition

The IBM ServerGuide program creates a 50 MB logical partition on the default hard disk drive. This partition is known as the System Partition. On some Netfinity server models, the System Partition provides server-specific utility programs, such as the Service Processor DOS Utility Program. The System Partition Main Menu displays the programs available for your server model. The System Partition is a recent enhancement for the Netfinity server products.

Notes:

1. Not all server models support running utility programs from the System Partition. For a current list of the supported Netfinity servers, start the *Netfinity Setup and Installation* CD, and click **Learn about ServerGuide**.
2. You can only install the System Partition from the *Netfinity Setup and Installation* CD.

You may choose to use the System Partition for various utility program functions.

To access the System Partition:

1. Ensure that there is no diskette in the diskette drive. If the diskette drive contains a diskette, remove it.
2. Turn on the server and watch for the IBM logo screen.
If the server is turned on already, shut down your operating system and restart the server.
3. After you start the server, several prompts appear on the IBM logo screen. To access the System Partition Main Menu, press Alt+F1 when the prompt Press Alt+F1 for System Partition Boot appears. The System Partition Main Menu appears.

For a complete list and description of the utility programs that your server supports through the System Partition, see the System Partition Main Menu.

To exit from the System Partition Main Menu, follow the instructions on the menu.

For additional information on the ServerGuide program, refer to the “ServerGuide and Netfinity Manager Information” section of this *Server Library*.

Configuring options

Before installing a new device or program, read the documentation that comes with it. Reading the instructions helps you to determine the steps that are required for installation and configuration. The following list provides a preview of the actions that might be required to configure your server.

1. Run the Configuration/Setup Utility program and record the current configuration settings.
See “The Configuration/Setup Utility program” on page 21.
2. Set jumpers or switches on the server components.
See “Changing jumper settings” on page 183 and “I/O function card jumpers” on page 190.
3. Set jumpers or switches on the device.
See the instructions that come with the adapter.
4. Install the adapter in the server.
See “Working with adapters” on page 70.
5. Install software programs.
See the installation instructions that come with the software.

Resolving configuration conflicts

6. Resolve configuration conflicts.

See “Resolving configuration conflicts.”

Resolving configuration conflicts

The resources used by your server consist of interrupt requests, direct memory access (DMA), I/O ports addresses, and memory. This information is useful when a resource configuration conflict occurs.

Conflicts in the configuration occur if:

- A device is installed that requires the same resource as another device. (For example, a conflict occurs when two adapters try to write to the same address space.)
- A device resource is changed (for example, changing jumper settings).
- A device function is changed (for example, assigning *COM1* to two serial ports).
- A software program is installed that requires the same resource as a hardware device.

The steps required to resolve a configuration error are determined by the number and variety of hardware devices and software programs that you install. If a hardware configuration error is detected, a *configuration error* message appears after the server completes POST and before the operating system is loaded. You can bypass the error by pressing **Esc** while the error message is displayed.

The Configuration/Setup Utility program configures the system hardware and PCI IRQs. The program does not consider the requirements of the operating system or the application programs. See “Resolving software configuration conflicts” on page 35 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 functions and the installed options. Record the current settings before making any changes. (See “The Configuration/Setup Utility program” on page 21 for instructions.)
2. Determine which adapter or device is causing the conflict. (See Chapter 6, “Solving problems” for instructions.)
3. Change adapter jumpers or switches. Some devices use jumpers and switches to define the system resources that the devices need. If the settings are incorrect or set to use a resource that cannot be shared, a conflict occurs and the device will remain deactivated by the configuration program.
4. Change system jumpers or switches. See “Changing jumper settings” on page 183.
5. Remove the device or adapter. Some configurations are not supported. If you must remove an adapter, see “Working with adapters” on page 70.

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 server functions. (See “The Configuration/Setup Utility program” on page 21 for instructions.)

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

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

Using the SCSISelect Utility program

Note: If your server has a redundant array of independent disks (RAID) adapter installed, use the configuration method that comes with the RAID adapter to view or change SCSI settings for attached devices.

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

You can use the SCSISelect Utility program to:

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

Starting the SCSISelect Utility program

You can access this program when you start the server. The SCSISelect prompt appears after the IBM logo appears. Press Ctrl+A immediately after the SCSISelect prompt appears:

```
<<< Press <CTRL><A> for SCSISelect™ Utility! >>>
```

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

SCSISelect Utility program choices

The following choices appear on the SCSISelect Utility program menu:

- Configure/View Host Adapter Settings
- SCSI Disk Utilities

Configure/view host adapter settings

To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings** and follow the directions on the screen.

Note: On the SCSISelect Utility program menu, the SCSI controller is referred to as the *Host Adapter*.

This menu has the following choices:

- Host Adapter SCSI ID

The default SCSI ID of the SCSI controller is 7. Do not change this value.

- SCSI Parity Checking

The default value is *Enabled*. Do not change this value.

- Host Adapter SCSI Termination

The default value is *Automatic*. Do not change this value.

- Boot Device Configuration

Select this choice to configure startable device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

- SCSI Device Configuration

Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

Note: For external SCSI tape drives, set **Send Start Unit Command** to Off for that SCSI ID. This ensures proper server operation. When the **Maximum Sync Transfer Rate** is set to 40.0, this value represents the transfer rate for UltraSCSI devices. When the **Maximum Sync Transfer Rate** is set to 20.0, this value represents the transfer rate for Fast SCSI devices.

- Advanced Configuration Options

Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for drives with UltraSCSI speed.

- BIOS Information

The BIOS information appears on the **Configure/View Host Adapter Settings** main menu screen. The BIOS information is displayed in a pop-up window, below the selectable menu items. This window contains:

1. Interrupt (IRQ) Channel
2. I/O Port Address

These values vary according to the current BIOS settings for your server; however, you cannot change the settings for the BIOS information.

To reset the SCSI controller defaults, press F6; then, follow the directions on the screen.

SCSI disk utilities

To see the IDs that are assigned to each SCSI device or to format a SCSI device, select **SCSI Disk Utilities** from the SCSISelect Utility program menu.

To use the utility, select a drive from the list. Read the screens carefully before making a selection.

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

```
Unexpected SCSI Command Failure

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

Press 'Esc' to continue.
```

Performing a low-level disk format

You can use the *Format Disk* feature of the SCSISelect Utility program to perform a low-level format on a hard disk drive.

The amount of processing time that the low-level format program requires will vary according to the hard disk drive capacity.

When to use the low-level format program

Use the Low-Level Format program:

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

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

Starting the low-level format program

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

Note: If your server has a RAID adapter installed, refer to the RAID adapter documentation for instructions for performing a low-level format on a hard disk drive attached to the PCI RAID adapter.

1. If the hard disk 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 disks normally contain more tracks than their stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, have the system serviced.

3. To install an operating system after the hard disk drive is formatted, follow the instructions in the "ServerGuide and Netfinity Manager Information" section of this *Server Library*.

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.

This chapter contains:

Before you begin	41
Lifting the server	42
Electrical safety	43
Handling static-sensitive devices	44
System reliability considerations	45
Working inside a server with power on	45
Understanding the Netfinity 8500R server design	46
I/O board	46
I/O function card	46
Midplane	46
Processor controller board	47
Processor daughterboard	47
Memory board	47
Netfinity Advanced System Management PCI adapter	48
Preparing to install options	49
Removing the top cover	51
Removing the front bezel	52
Removing the memory-access panel	53
Installing DIMMs and memory boards	54
Working with the processor housing assembly	58
Removing the processor housing assembly	60
Installing or replacing a processor	62
Installing or replacing a processor daughterboard	64
Reinstalling the processor housing assembly	69
Working with adapters	70
PCI slot LED descriptions	71
Adapter considerations	72
Configuring adapters	73
Installing a hot-plug PCI adapter	73
Installing a non-hot-plug PCI adapter	78
Verifying compatibility between network adapters and device drivers	78
Cabling internal hard disk drives to a ServeRAID adapter (optional)	78
Installing internal drives	81
Internal drive bays	81
Hard disk drives	82
Preinstallation steps	83
Installing or replacing a drive	83
Replacing a hot-swap power supply	86
Replacing a hot-swap fan	90
Replacing a processor fan	90
Replacing an I/O fan	91
Completing the installation	92
Installing the top cover	92
Installing the front bezel	94
Reconfiguring the server and updating server records	95

Connecting external options	96
Connecting external SCSI devices	96
Input/Output port connectors	97

Before you begin

Before you install any optional hardware in your server, thoroughly review the information in this section. Also, review the power supply requirements described in “Replacing a hot-swap power supply” on page 86.

- If you upgrade your server by installing a RAID adapter, you must configure your disk arrays after you install hard disk drives, as described in “Installing internal drives” on page 81. Follow the instructions in the RAID adapter documentation after installing the drives. Then, return here to install your remaining options, if applicable. See Chapter 3, “Configuring your server” on page 19 for additional details about configuration and for a description of your server utility programs.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug PCI adapters.
 - *Hot-swap* means that you can install or remove certain components, such as power supplies, fans, and hard disk drives, without turning off the server, provided that your server contains hardware and an operating system that support the installation or removal of these components. These components are known as *hot-swappable* components, and more commonly referred to as *hot-swap* components.
 - *Hot-plug* means that you can install or remove certain components without turning off the server, after you perform an intervening action, provided that your server contains hardware and an operating system that support the installation or removal of these components. For example, before you can install or remove hot-plug PCI adapters, you must enable or disable the hot-plug PCI slots that contain or will contain these adapters. To do this, you must perform your operating-system-defined procedures for enabling or disabling the affected hot-plug PCI slots. Failure to do so might cause your system to lock up. Refer to your operating-system documentation for additional information. *Hot-plug* components are also known as *hot-pluggable* components.
- The orange color on components and labels in your server indicates hot-swap or hot-plug components. This means that you can install or remove the component while the system is running, provided that your system is configured to support this function. For complete details about installing or removing a hot-swap or hot-plug component, see the information provided in this chapter.
- The blue color on components or labels indicates touch points where a component can be gripped, a latch moved, and so on.
- For a list of supported options for the Netfinity 8500R server, refer to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.
- Several types of connectors, such as those designed for adapters, processors, DIMMs, and other components, contain keys (dividers) to ensure that these components can only be installed in the correct position.

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

Before you begin installing options, be sure to do the following:

- Become familiar with the safety and handling guidelines specified in the *Safety Information* booklet, and the requirements specified under “Safety Information” on page vii, “Electrical safety” on page 43, “Handling static-sensitive devices” on page 44, and “Working inside a server with power on” on page 45. These guidelines will help you work safely while working with your server or options.
- Read the information in “System reliability considerations” on page 45.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Place your server in a location that is dry. Rain or spilled liquids might damage your server.
- Leave sufficient space around the server to allow the server cooling system to work properly. Refer to your server rack documentation, for example, *IBM Netfinity 9308 Enterprise Rack Planning Guide*, for additional information.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.

Lifting the server

4



≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

Electrical safety

For your safety, do the following *before* removing non-hot-swap or non-hot-plug components from the server; (for example, the top cover, processor housing assembly, or memory-access panel).

Note: You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug PCI adapters.

13



DANGER

Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.

- 1. If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
 - 2. If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
 - a. 13 amps or less, connect each power cord to a separate branch circuit.**
 - b. 14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
 - c. 20 amps or greater, you may connect up to three power cords to the same branch circuit.**
1. Unless you are installing or removing a hot-swap or hot-plug option, run the shutdown procedure for the operating system. Turn off the server and any attached devices, such as printers, monitors, and external drives.
 2. Unplug all the power cords from electrical outlets.
 3. Disconnect all communication cables from external receptacles.

8



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

4. Disconnect all cables and the three power cords from the back of the server.

Notes:

- a. Reconnect the cables or power cords only after you reassemble the server and put the covers back on.
- b. Power cords vary by country. For complete details about power cords for use in your country or region, refer to “Power cords” in the “Legal Information” section of this *Server Library* or see <http://www.ibm.com/pc/support> on the World Wide Web.

Handling static-sensitive devices

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

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters, the processor daughterboard, and memory modules by the edges. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you are installing a new option, touch the static-protective package containing the option to a metal expansion-slot screw or other unpainted metal surface on the server for at least two seconds. (This reduces static electricity from the package and from your body.)
- When possible, remove the option and install it directly into the server without setting the option down. When this is not possible, place the static-protective package that the option comes in on a smooth, level surface and place the option on it.
- Do not place the option on the server covers or any metal surface.

System reliability considerations

To help ensure proper cooling and system reliability, make sure:

- Each drive bay has either a drive or a filler panel installed. If a slim-high drive is installed, make sure that the slim filler bezel is installed.
- Each power supply bay has a power supply installed.
- The top cover is in place during normal operation. If the server is on, do not leave the top cover off for more than 30 minutes at a time.
- The memory-access panel is in place during normal operation.
- To leave sufficient space around the server to allow the server cooling system to work properly. Refer to your server rack documentation, for example, *IBM Netfinity 9308 Enterprise Rack Planning Guide*, for additional information.
- Cables for optional adapters are routed according to the instructions that come with the adapters.
- A fan that has failed (indicated by a lit amber LED) is replaced as soon as convenient to help maintain the redundant cooling capability.
- Additional processors are installed on the processor daughterboards in the correct order. See “Working with the processor housing assembly” on page 58 for installation instructions.
- Additional DIMMs are installed on the memory boards in the correct order. See “Installing DIMMs and memory boards” on page 54 for installation instructions.

Working inside a server with power on

Your server is designed to operate safely while powered on with the top cover removed. The server is designed to protect you and the server. Follow these guidelines when you work inside your server while the server is on:

- Avoid loose-fitting clothing on your forearms. (Button the cuffs on long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.)
- Do not allow any clothing (such as neckties or scarves) to hang inside the server.
- Remove all jewelry, such as necklaces, bracelets, and loose-fitting wrist watches.
- Remove items from your shirt pocket (such as pens and pencils) that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the server.
- If the server is on, do not leave the top cover off for more than 30 minutes at a time.

Understanding the Netfinity 8500R server design

The Netfinity 8500R server incorporates new design features and components.

In the Netfinity 8500R server design, the system has an I/O board, an I/O integrated function card (commonly referred to as an I/O function card), a midplane, a processor controller board, at least one processor daughterboard, and at least one memory board. This modular design improves serviceability and provides for a compact design.

Note: Refer to the “Start Here” section of this *Server Library* for exploded views of the major assemblies in the server.

I/O board

The I/O board houses the connectors for the PCI adapters and primary server boards, and houses other I/O devices that you can install to expand the capabilities of your server.

The I/O board contains the connectors for the midplane, I/O function card, Advanced System Management PCI adapter, two USB ports, the PCI switch card, twelve hot-plug PCI adapters, and two voltage regulator modules (VRMs).

Note: The I/O board is also known as the I/O planar.

See “I/O board component locations” on page 188 for a layout of the I/O board.

Several features, such as the Wake on LAN feature, are built into the server I/O board. To enable the Wake on LAN feature, you must install the appropriate software and hardware in your server. For complete details, refer to the documentation that comes with your Ethernet adapter.

I/O function card

The I/O function card houses the battery, I/O ports, and other I/O devices that you can install to expand the capabilities of your server.

The I/O function card contains the connectors for the I/O board, Advanced System Management PCI adapter, CD-ROM drive, diskette drive, front panel, keyboard, mouse, SCSI and other I/O ports, jumpers, battery, and other devices.

See “I/O function card component locations” on page 189 for a layout of the I/O function card.

Midplane

The midplane provides all of the interconnects for all of the major server components.

The midplane contains the connectors for the I/O board, the processor controller board, the standard memory board (A), the optional memory board (B), three memory I/O cooling fans, three power supplies, a media power device (through cabling), and a power control card.

See “I/O board component locations” on page 188, “Memory board component locations” on page 191, and “Processor-controller board component locations” on

page 193 for the location of the midplane connector on the I/O board, the memory board, and the processor controller board, respectively.

Note: The midplane is not a user-removable component. If the midplane requires service, contact your IBM service technician, IBM reseller, or IBM marketing representative.

Processor controller board

The processor controller board manages the server processors on the processor daughterboards.

The processor controller board contains the connectors for the standard processor daughterboard, the optional processor daughterboard, the cache coherency filter card A, the cache coherency filter card B, and the LED card.

See “Processor-controller board component locations” on page 193 for a layout of the processor controller board.

Processor daughterboard

The processor daughterboard houses the server processors and is connected to the processor controller board.

Your server supports two *processor daughterboards*. Each processor daughterboard contains the connectors for four processors.

See “Working with the processor housing assembly” on page 58 for instructions on installing a processor on a processor daughterboard. See “Processor-daughterboard component locations” on page 196 for a layout of the processor daughterboard.

Memory board

The memory board houses the dual inline memory modules (DIMMs). The DIMMs contain the system memory.

Your server supports two memory boards. Each memory board contains the connectors for 16 DIMMs.

See “Installing DIMMs and memory boards” on page 54 for instructions on installing a DIMM on a memory board, and installing a memory board in the server. See “Memory board component locations” on page 191 for a layout of the memory board.

Netfinity Advanced System Management PCI adapter

With a Netfinity Advanced System Management PCI adapter, in conjunction with Netfinity Manager, you can locally and remotely configure and monitor many features of your server.

Attention

The server must have the Advanced System Management PCI adapter installed for proper server operation and to use the system-management functions that the adapter provides.

The Advanced System Management PCI adapter contains the connectors for the 10/100 Mbps Ethernet port, dual serial port, Advanced System Management Interconnect bus, Personal Computer Memory Card International Association (PCMCIA) token-ring, and the I/O function card.

For more information:

- See “What your IBM Netfinity 8500R server offers” on page 4 for an overview of the functions and features
- See “Connecting external options” on page 96 for a detailed description of the connectors
- See “Advanced System Management PCI adapter component locations” on page 187 for a layout that shows the component locations
- Refer to the “Advanced System Management Information” section of this *Server Library* for installation, startup, and operating instructions

Preparing to install options

Before you begin:

Read “Electrical safety” on page 43, “Handling static-sensitive devices” on page 44, and “Working inside a server with power on” on page 45.

Note: You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug PCI adapters.

If you are:

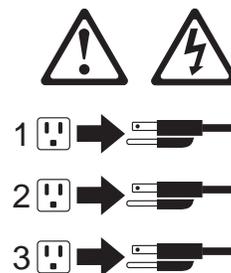
- Installing or removing a hot-plug PCI adapter, continue with “Removing the top cover” on page 51; then, go to “Working with adapters” on page 70.
- Installing or replacing a hot-swap hard disk drive, continue with “Installing internal drives” on page 81.
- Replacing a power supply, continue with “Replacing a hot-swap power supply” on page 86.
- Replacing a processor fan, continue with “Removing the front bezel” on page 52; then, go to “Replacing a hot-swap fan” on page 90.
- Replacing an I/O fan, continue with “Removing the top cover” on page 51; then, go to “Replacing a hot-swap fan” on page 90.
- Installing or removing an option not listed in the preceding list, continue with the following steps.

5



CAUTION:

The Power Control 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.



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

1



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

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.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

2. If you have a modem or fax machine attached to the server, disconnect the telephone line from the wall outlet.
3. Unplug all power cords (cables) from electrical outlets.
4. Note the location of the remaining cables and cords; then, disconnect them from the back of the server.

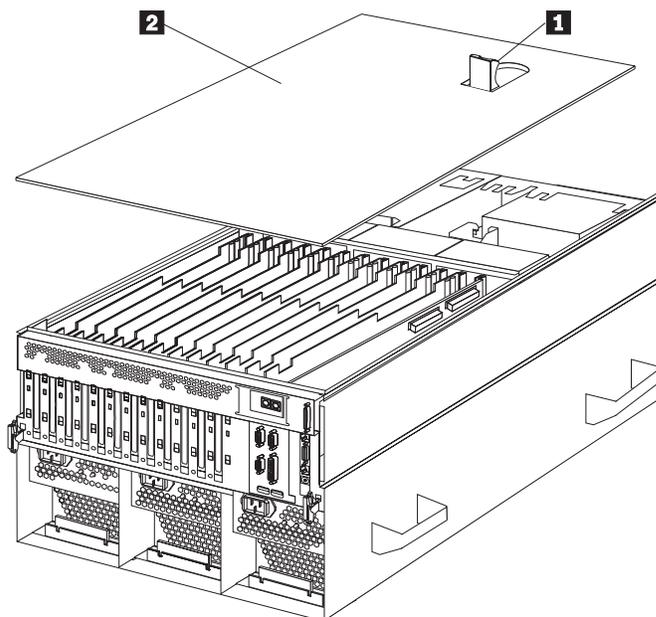
Removing the top cover

Refer to the following illustration while you perform the steps in this procedure.

Attention: If the server is on, do not leave the top cover off for more than 30 minutes at a time.

Before you begin:

Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.



To remove the server top cover:

1. Unless you are installing or removing a hot-swap or hot-plug component, run the shutdown procedure for the operating system, turn off the server and all attached devices, and disconnect all external cables and power cords (see “Preparing to install options” on page 49).
2. Lift the plastic cover-release latch **1** near the edge of the top cover **2**.
3. Lift the top cover off the server and set the cover aside.

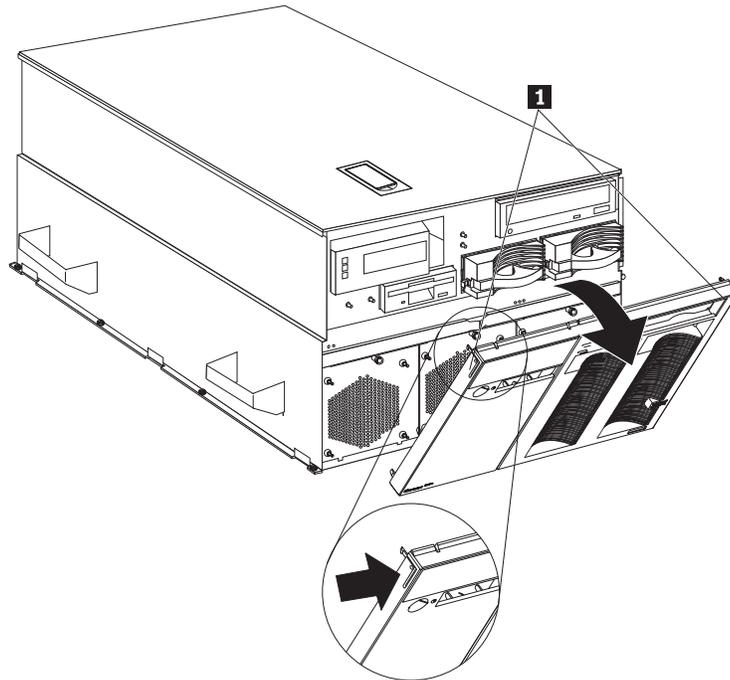
Removing the front bezel

Removing the front bezel

Refer to the following illustration while you perform the steps in this procedure.

Before you begin:

Read “Electrical safety” on page 43.



To remove the front bezel:

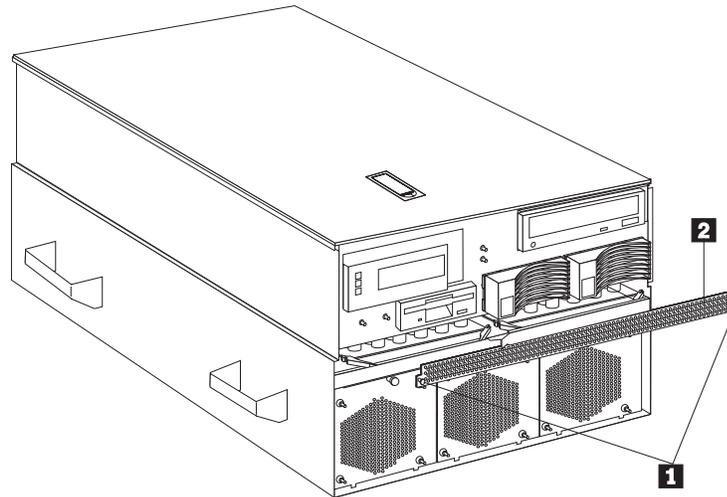
1. Press on the tabs at the top edge of the bezel **1**.
2. Pivot the top of the bezel slightly away from the server and remove the bezel from the server.
3. Set the bezel aside.

Removing the memory-access panel

Refer to the following illustration while you perform the steps in this procedure.

Before you begin:

Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.



To remove the server memory-access panel:

1. If you are installing a DIMM in an empty connector, go to step 2. If you are replacing a failed DIMM, verify that you have selected the correct DIMM for replacement. To do this, remove the front bezel (see “Removing the front bezel” on page 52) and check the LEDs at the front of the processor housing assembly, above the processor fans, to see which one is lit.
2. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices, and disconnect all external cables and power cords (see “Preparing to install options” on page 49); then, remove the front bezel (see “Removing the front bezel” on page 52).
3. Pull out the two plastic fasteners **1** on the memory-access panel **2** to the unlocked position and remove the memory-access panel.

Note: Do not remove the plastic fasteners from the memory-access panel.

4. To install or remove DIMMs, see “Installing DIMMs and memory boards” on page 54. Then, return here.

Attention: To ensure proper EMC containment and cooling for your server, reinstall the memory-access panel before turning on the server.

5. Reinstall the memory-access panel:
 - a. Ensure that the memory-access panel is fully seated in the appropriate location.
 - b. Press in the two plastic fasteners on the memory-access panel to secure it into place.

Installing DIMMs and memory boards

You can increase the amount of memory in your server by installing additional *dual inline memory modules (DIMMs)*. Your server uses 100 MHz, 168-pin, PC100 registered synchronous dynamic random-access memory (SDRAM), industry-standard DIMMs with error checking and correction (ECC). You can add extra DIMMs or replace existing DIMMs.

Notes:

1. You can install an optional memory board that contains an additional 16 DIMM connectors and supports cache-line interleaving. To obtain an optional memory board, contact an IBM reseller or IBM marketing representative.
2. The connector identifiers on both the standard and the optional memory boards are J1–J16. To distinguish the two memory boards, use the labels provided on the processor housing assembly. These labels refer to the connector identifiers as A1–A16 on the standard memory board (A), and B1–B16 on the optional memory board (B).
3. Your server comes with a system label on the server cover. The numbers located to the right of the memory boards on the system label do not indicate DIMM connector identifiers. These numbers indicate the DIMMs; for example, **1** means the first DIMM that you install, **9** means the ninth DIMM that you install, and so on.
4. *Cache-line interleaving* can only occur if two memory boards are installed in the server. This process allows the two memory boards to share a common address range, with one memory board responding to even-numbered cache lines, and the other memory board responding to odd-numbered cache lines. This configuration has the highest performance because it allows the two SDRAM arrays to be used in a balanced fashion, reducing access conflicts.
5. Installing or removing DIMMs changes the server configuration. Therefore, after installing or removing a DIMM, save the new configuration information in the Configuration/Setup Utility program. See “Using the Configuration/Setup Utility main menu” on page 22 for more information.
6. If you replaced a defective DIMM, you must manually enable the DIMM slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the DIMM slot. See “Memory settings” on page 31 for additional information.
7. See “Memory board component locations” on page 191 for a layout of the memory board.

Table 1 shows the memory installation requirements for your server.

<i>Table 1. Memory installation requirements</i>	
DIMM sizes	128 MB, 256 MB, 512 MB
DIMM population order for a single board configuration — standard memory board (A)	A1, A5, A9, A13, A3, A7, A11, A15, A2, A6, A10, A14, A4, A8, A12, A16
DIMM population order for a dual board configuration — standard memory board (A) and optional memory board (B)	A1/B1, A5/B5, A9/B9, A13/B13, A3/B3, A7/B7, A11/B11, A15/B15, A2/B2, A6/B6, A10/B10, A14/B14, A4/B4, A8/B8, A12/B12, A16/B16
<p>Notes:</p> <ol style="list-style-type: none"> 1. The 100 MHz DIMMs support the registered mode of operation. 2. Install DIMMs with a maximum height of 4.32 cm (1.7 inches). 3. Your server comes with one standard (preinstalled) memory board (A), and one or more DIMMs installed on this memory board. You can install an optional memory board (B). Both the standard memory board (A) and the optional memory board (B) contain 16 DIMM connectors (J1–J16). 4. When you install DIMMs in both the standard memory board (A) and the optional memory board (B), you must install them in matching pairs with the same part number, in the same slot on each memory board; for example, J1/J1, J5/J5, J9/J9, and so on. 	

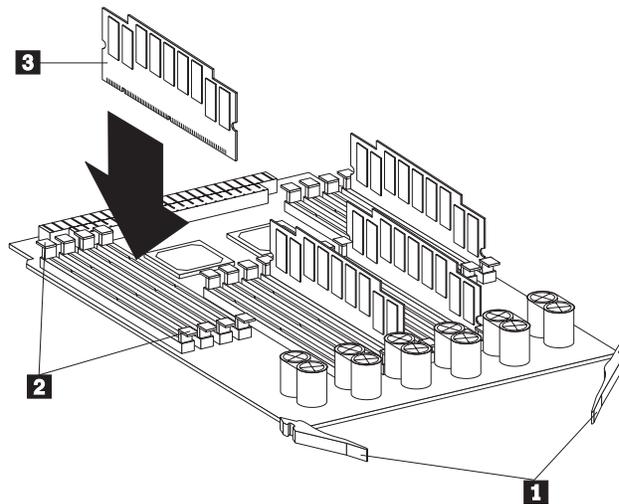
Table 2 shows the available memory configurations.

<i>Table 2. Memory expansion</i>		
DIMM size	16 Connectors (1 Board)	32 Connectors (2 Boards)
128 MB	2 GB	4 GB
256 MB	4 GB	8 GB
512 MB	8 GB	16 GB

Installing DIMMs and memory boards

Refer to the following illustration while you perform the steps in this procedure.

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



- 1** Latches
- 2** Retaining clips
- 3** DIMM

Before you begin:

- Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.
- Read the documentation that comes with your option.

To install a DIMM:

1. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices; then, remove the front bezel (see “Removing the front bezel” on page 52) and the memory-access panel (see “Removing the memory-access panel” on page 53).
2. If you are not installing an optional memory board, continue with step 3.
If you are installing an optional memory board, touch the static-protective package containing the memory board to any unpainted metal surface on the server. Then, remove the memory board from the package. Continue with step 4.
3. Remove the memory board from the server:
 - a. Pull both latches **1** simultaneously so that they fully extend from the memory board.
 - b. Grasp the two latches and pull the memory board from the server.
 - c. Place the memory board connector-side up on a flat, static-protective surface.
4. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.

5. Install the DIMM:

- a. Turn the DIMM **3** so that the keys align correctly with the connector.
- b. Align the keyed DIMM **3**, and press on both sides of the DIMM as you insert it into the connector. Be sure to press the DIMM straight into the connector.

Note: If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. Open the retaining clips and remove the DIMM; then, reinsert the DIMM.

- c. Make sure that the retaining clips **2** are in the closed position.
- d. Repeat these steps for each DIMM that you install.

6. Reinstall the memory board:

- a. Insert the memory board into the guides and gently press the memory board into the connector. When you install the memory board in the server, be sure that it is correctly seated in the connector before you apply force to close the latches.
- b. Push the latches **1** until they close and lock in place.

Attention: To ensure proper EMC containment and cooling for your server, reinstall the memory-access panel before turning on the server.

c. Reinstall the memory-access panel:

- 1) Ensure that the memory-access panel is fully seated in the appropriate location.
- 2) Press in the two plastic fasteners on the memory-access panel to secure it into place.

d. Reinstall the front bezel (see “Installing the front bezel” on page 94).

7. If you have other options to install or remove, do so now; otherwise, continue with “Completing the installation” on page 92.

Working with the processor housing assembly

Your Netfinity 8500R server comes with at least one processor installed on the standard processor daughterboard. When you install one or more additional processors, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the processors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

Note: To ensure that your operating system supports multiprocessing operations, load the appropriate multiprocessor option software in your operating system programs.

Your server supports a maximum of eight Intel Pentium III Xeon processors (upgradable when available). For a list of supported operating systems, see <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

Before you begin:

- Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.
- Thoroughly review the documentation that comes with the processor, so that you can determine whether you need to update the Netfinity 8500R server basic input/output system (BIOS). Verify that you have the latest BIOS level for your server by accessing <http://www.ibm.com/pc/us/compat/> on the World Wide Web, or by checking the IBM Bulletin Board System (BBS). Refer to the “Getting Help, Service, and Information” section of this *Server Library* for the appropriate World Wide Web addresses and bulletin-board telephone numbers.
- If you plan to use the processor serial-number security feature, you must change the setting of the **Processor Serial Number Access** menu choice in the Advanced Setup menu of the Configuration/Setup Utility program. The default value is **Disabled**; change this value to **Enabled**, as described in “Processor serial number access” on page 29.

Notes:

1. The illustrations in this section might differ slightly from your hardware.
2. To ensure proper server operation, when you install an additional processor, use processors with the same cache size and core frequency as those of the currently installed processor.
3. If you replace the processors in your server with processors of a different speed, be sure to set the processor core frequency selection jumper block correctly. (See “Processor-controller board jumpers” on page 194 for more information. For a list of supported processor speeds, see <http://www.ibm.com/pc/us/support/> on the World Wide Web.)
4. To maintain signal quality and system reliability, either a processor or a processor terminator card must be installed in each processor connector. A processor must be installed in processor connector A1 on the standard processor daughterboard (A).

5. If you are installing an optional processor daughterboard (B), you must also install the two cache coherency filter cards in the two adjacent, vertical slots between the two processor daughterboards on the processor controller board. (See “Processor-daughterboard component locations” on page 196 for the location of the cache coherency filter card A and the cache coherency filter card B connectors.)
6. Your server comes with a processor installed in connector A1, on the standard processor daughterboard (A). If you need to install additional processors, install them in the following order:
A1, A3, A2, A4
If you need to install processors on the optional processor daughterboard (B), install them in the following order:
B1, B3, B2, B4
7. If you are replacing a failed processor, verify that you have selected the correct processor for replacement. To do this, remove the front bezel (see “Removing the front bezel” on page 52) and check the LEDs on the LED card at the front of the processor housing assembly, above the processor fans, to see which LED is on.
8. If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot. See “Processor settings” on page 31 for additional information.

The processors in your server reside on processor daughterboards. The standard processor daughterboard (A) and the optional processor daughterboard (B) reside in separate cages on the processor controller board. All of these components reside in the processor housing assembly.

Note: Refer to the “Start Here” section of this *Server Library* for a detailed, exploded view of the processor housing assembly.

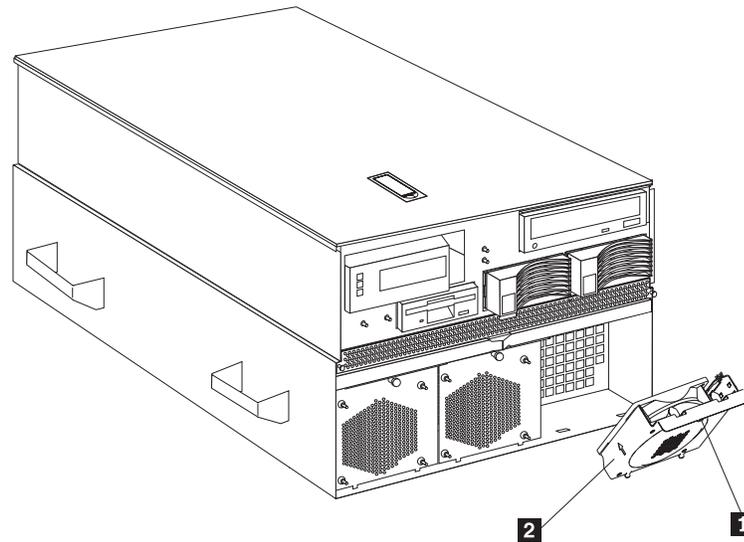
This section contains the following:

- “Removing the processor housing assembly” on page 60
- “Installing or replacing a processor” on page 62
- “Installing or replacing a processor daughterboard” on page 64
- “Reinstalling the processor housing assembly” on page 69

Removing the processor housing assembly

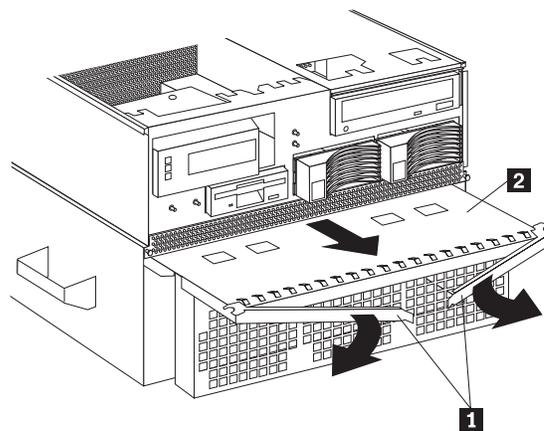
To remove the processor housing assembly:

1. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices, and disconnect all external cables and power cords (see “Preparing to install options” on page 49); then, remove the front bezel (see “Removing the front bezel” on page 52).
2. Remove the three processor fans:



- a. Pull the fastener **1** in the top center of the fan housing **2**. This places the fastener in the unlocked position.
- b. Pivot the fan downward and remove it from the server.
- c. Repeat steps 2a and 2b for each additional fan.

Refer to the following illustration while you perform the steps in this section.



3. Open the two latches **1** at the top of the processor housing assembly **2**. Fully extend the latches.
4. Pull the processor housing assembly partially out of the server, approximately 203.2 mm (8 in.).

Working with the processor housing assembly

Attention: To avoid injury, do not place your fingers immediately behind the latches at the top of the processor housing assembly.

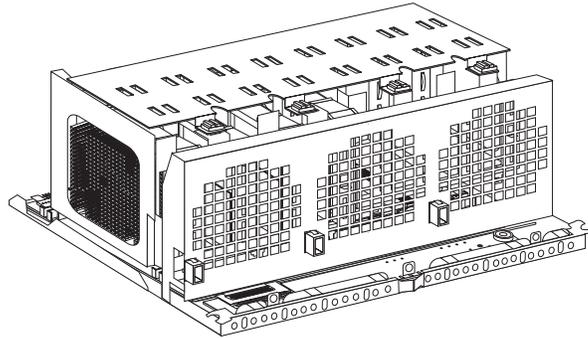
5. Close the latches at the top of the processor housing assembly.

Attention: Do not lift the processor housing assembly by the latches.

6. Grasp the bottom sides of the processor housing assembly. Lift and slide the assembly out of the server until it stops, approximately 228.6 mm (9 in.).

Note: If the assembly stops before you can slide it out of the server, lift it slightly and continue to remove it from the server.

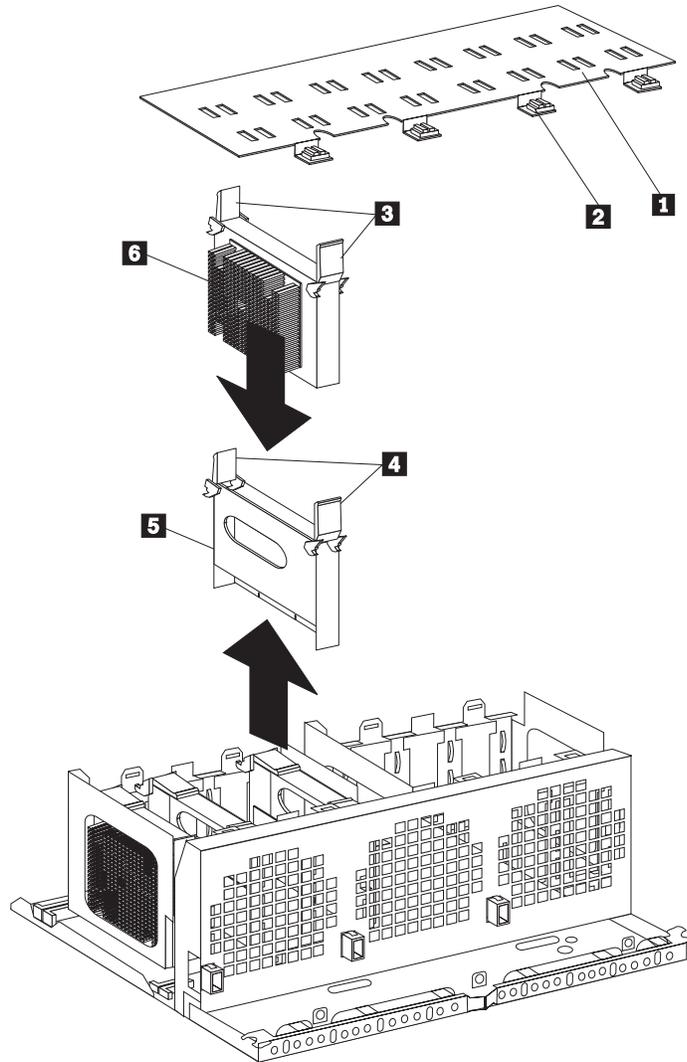
7. Place the processor housing assembly on a flat, static-protective surface, with processor labels A1–A4 and B1–B4 right side up.



Installing or replacing a processor

To install or replace a processor:

Refer to the following illustrations while you perform the steps in this procedure.



- 1** Processor-cage cover
- 2** Fasteners on processor-cage cover
- 3** Processor latches
- 4** Terminator card latches
- 5** Processor terminator card
- 6** Processor and heat sink

1. Turn the four plastic fasteners **2** on the processor-cage cover **1** until they are in the unlocked position (one quarter-turn). You may use a flat-blade screwdriver or a coin.
2. Remove the processor-cage cover **1** and set it aside.
3. Determine the processor connector in which you want to install the new processor. If the connector contains a processor terminator card **5** :
 - a. Pull the processor terminator card latches **4** so that they rotate to the unlocked position.

- b. Remove the processor terminator card **5** from the processor connector.
- c. Store the processor terminator card in a safe place.

Note: After you install the new processor in your server, place the terminator card in the empty static-protective bag.

4. If you are installing processors in the optional processor-daughterboard assembly, first follow the instructions in “Installing an optional processor daughterboard and cache coherency filter cards” on page 66; then, return here to continue.
5. If you are replacing a defective processor that was indicated by a processor failure LED and you need to verify its location, perform the following test.
 - a. The eight processor error LEDs are located on the LED card, behind the processor housing assembly latches. Locate the words *Press to show fault* on the processor housing assembly.
 - b. Press the indicated button adjacent to the words *Press to show fault*, and note the amber LEDs that indicate the defective processors, if any.

If no amber LEDs illuminate and the green capacitor test LED adjacent to the word *Testing* does not illuminate, have the system serviced.
 - c. Remove the defective processor and install a new one as described in this section. See “LED card (processor and DIMM) LEDs” on page 161 for processor status information.

Note: The LED card is not a user-removable component. If the LED card requires service, contact your IBM service technician, IBM reseller, or IBM marketing representative.

- a. Pull the processor latches **3** so that they rotate to the unlocked position.

Attention: Before you remove the processor, note the orientation of the original A1 processor.
 - b. Remove the processor **6** from the processor connector.
 - c. Set the processor aside. Refer to your processor option documentation for complete instructions on proper handling and disposal of a defective processor.
6. Install the processor:
 - a. Touch the static-protective package containing the new processor to any *unpainted* metal surface on the server; then, remove the processor from the package.
 - b. Rotate the processor latches **3** to the open position.

Attention: Before you press the processor into the connector, make sure that the processor has the same orientation as the original A1 processor.
 - c. Insert the processor **6** into the guides and gently press the processor into the connector. When the processor is correctly inserted, all the processor heat sinks in both processor cages face the same direction, toward connector A1.
 - d. Rotate the processor latches **3** until they close and lock in place.
 7. If you plan to install more than one processor, repeat step 3 on page 62 and step 6 in this section.

Working with the processor housing assembly

8. If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot. See “Processor settings” on page 31 for additional information.

9. If you are installing a processor daughterboard, continue with “Installing or replacing a processor daughterboard.”

If you are not installing a processor daughterboard, continue with the following steps.

10. Reinstall the processor-cage cover by inserting the cover tabs into the slots on the top of the processor cage.

11. Turn the four plastic fasteners on the processor-cage cover until they are in the locked position (one quarter-turn). You may use a flat-blade screwdriver or a coin.

Attention: Do not lift the processor housing assembly by the latches.

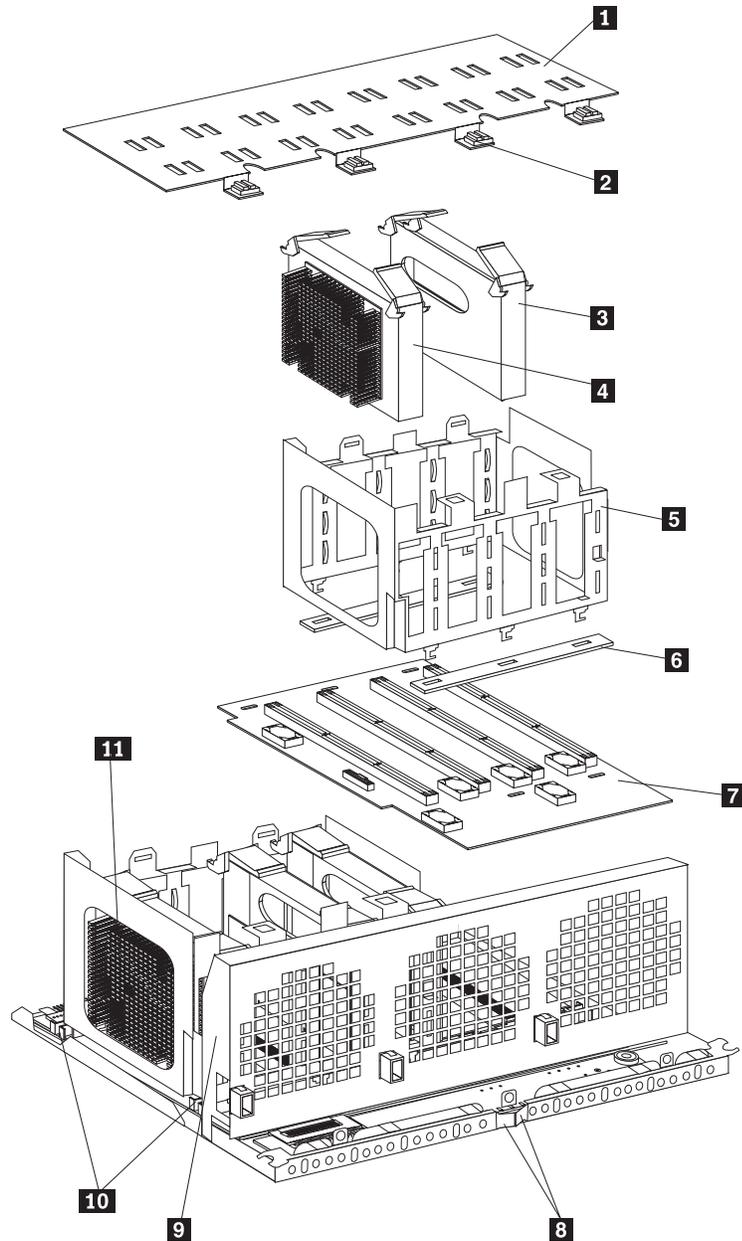
12. Reinstall the processor housing assembly as described in “Reinstalling the processor housing assembly” on page 69.

Installing or replacing a processor daughterboard

You will need to install a second processor daughterboard if you plan to use more than four processors in your server. The additional processors must be installed on an optional processor daughterboard. Or, you might need to replace a processor daughterboard.

Refer to the following illustration while you perform the steps in this section. In this illustration, the standard processor cage is installed in the processor housing assembly, with a processor **11** in connector A1. The optional processor cage is item **5**.

Working with the processor housing assembly



- 1** Processor-cage cover
- 2** Fasteners on processor-cage cover
- 3** Processor terminator card
- 4** Optional processor
- 5** Processor cage
- 6** Processor-daughterboard spacers (not present if processor daughterboard is present)
- 7** Processor daughterboard
- 8** Processor housing assembly latches
- 9** Fan guard
- 10** Processor-cage release latches
- 11** Processor A1

Installing an optional processor daughterboard and cache coherency filter cards

To install an optional processor daughterboard and the cache coherency filter cards:

Attention: Do not lift the processor housing assembly by the latches **8**.

1. If you have not already removed the processor housing assembly, do so now. Perform step 1 on page 60 through step 7 on page 61 and steps 1 and 2 on page 62; then, return here.
2. If you have not already removed the processor-cage cover **1**, do so now. Rotate the four fasteners **2** to the unlocked position; then, lift the cover and set it aside.
3. Remove the empty processor cage **5**:
 - a. Squeeze and slide out the release latches **10** as far as they will go, until they reach the unlocked position; then, release.
 - b. Lift the empty processor cage out of the processor housing assembly, and remove the spacers **6**.

Note: When you are removing the processor cage from the processor housing assembly, be sure that the processor cage release latches remain in place. Store the spacers in a safe place for future use.

4. Remove the fan guard **9**:
 - a. Remove the two screws from the sides of the fan guard.
 - b. Lift the fan guard off the processor housing assembly.
 - c. Rotate the fan guard away from the processors.
 - d. Slide the fan guard toward the processors to remove the tabs on the bottom of the fan guard from the slots. Do not disconnect the power cables.
5. Install the two cache coherency filter cards in the two adjacent, vertical slots between the two processor daughterboards on the processor controller board. For location, see “Processor-controller board component locations” on page 193.
6. Reinstall the fan guard:
 - a. Ensure that the power cables are routed over the top of the retainer bracket that holds the two cache coherency filter cards in place.
 - b. Slide the tabs on the bottom of the fan guard into the slots.
 - c. Place the fan guard on the processor housing assembly.
 - d. Reinstall the two screws that you removed in step 4a to secure the fan guard.
7. Touch the static-protective package containing the new processor daughterboard to any *unpainted* metal surface on the server; then, remove the new processor daughterboard **7** from its static-protective package.
8. Align the processor-daughterboard connector with the keyed connector on the processor controller board.

Note: For the location of the processor-daughterboard connectors on the processor controller board, see “Processor-controller board component

locations” on page 193. For a layout of the processor daughterboard, see “Processor-daughterboard component locations” on page 196.

9. Firmly press the processor daughterboard **7** down into the keyed connector on the processor controller board. Push in the center of the board, until the processor daughterboard is fully seated.
10. Ensure that the two processor cage release latches are still in the unlocked (pulled out) position.
11. Align the processor cage with its tabs over the corresponding slots on the processor daughterboard. Match the labels on the processor cage with the corresponding labels on the fan guard **9**; for example, A1/A1.
12. Firmly press the processor cage down into the slots in the processor housing assembly, until the processor cage is fully seated.
13. Squeeze and firmly push the release latches **10** back into the locked position; then, release.
Attention: Ensure that the release latches are in the fully locked position.
14. Install processors **4** in the desired connectors, as described in step 3 on page 62 through step 7 on page 63; then, return here.
15. Install terminator cards **3** in the connectors that do not contain processors. The arrows on the terminators must face toward the large connector on the processor housing assembly and away from the fan guard.
16. Reinstall the processor-cage cover by reversing step 2 on page 66.
17. Reinstall the processor housing assembly by performing steps 1 through 7 on page 69.

Replacing the standard processor daughterboard

To replace the processor daughterboard in the standard processor cage:

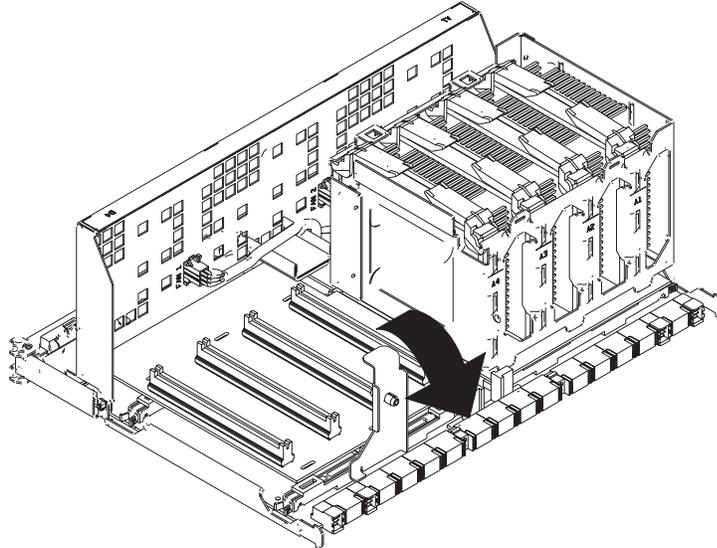
Refer to the illustration that immediately precedes “Installing an optional processor daughterboard and cache coherency filter cards” on page 66 while you perform the steps in this section.

Attention: Do not lift the processor housing assembly by the latches.

1. If you have not already removed the processor housing assembly, do so now. Perform step 1 on page 60 through step 7 on page 61 and steps 1 and 2 on page 62; then, return here.
2. If you have not already removed the processor-cage cover **1**, do so now. Rotate the four fasteners **2** to the unlocked position; then, lift the cover and set it aside.
3. Open the latches at the top of the processor in connector A1, and remove the processor. Place it on a flat, static-protective surface. Repeat these actions for the remaining processors and terminator cards in the processor cage.
4. Remove the processor cage:
 - a. Squeeze and slide out the release latches **10** as far as they will go, until they reach the unlocked position; then, release. as they will go, until they reach the unlocked position.
 - b. Lift the processor cage out of the processor housing assembly, and place it on a flat, static-protective surface.

Working with the processor housing assembly

5. If necessary, remove the processor-daughterboard extraction tool from processor cage A (behind processor A4); then, place the processor-daughterboard extraction tool under and against the processor daughterboard, as shown, in the area marked Use extraction tool here.



6. Press the processor-daughterboard extraction tool downward to pivot and lift the processor daughterboard; then, remove the processor daughterboard from the processor housing assembly.
7. Remove the new processor daughterboard **7** from its static-protective bag.
8. Align the processor-daughterboard connector with the keyed connector on the processor controller board.
Note: For the location of the processor-daughterboard connectors on the processor controller board, see “Processor-controller board component locations” on page 193. For a layout of the processor daughterboard, see “Processor-daughterboard component locations” on page 196.
9. Firmly press the processor daughterboard **7** down into the keyed connector on the processor controller board. Push in the center of the board, until the processor daughterboard is fully seated.
10. Align the processor cage with its tabs over the corresponding slots on the processor daughterboard. Match the labels on the processor cage with the corresponding labels on the fan guard **9**; for example, A1/A1.
11. Firmly press the processor cage down into the slots on the processor housing assembly, until the processor cage is fully seated.
12. Squeeze and firmly push the release latches **10** back into the locked position; then, release.
Attention: Ensure that the release latches are in the fully locked position.
13. Install processors **4** in the desired connectors, as described in step 3 on page 62 through step 7 on page 63; then, return here.
14. Install terminator cards **3** in the connectors that do not contain processors. The arrows on the terminators must face toward the large connector on the processor housing assembly and away from the fan guard.

15. If you removed the processor-daughterboard extraction tool in step 5, replace the processor-daughterboard extraction tool on processor cage A, behind processor A4. Otherwise, store the tool in a safe place for future use.
16. Reinstall the processor-cage cover by performing steps 10 and 11 on page 64.
17. Reinstall the processor housing assembly as described in “Reinstalling the processor housing assembly.”

Reinstalling the processor housing assembly

To reinstall the processor housing assembly:

1. With the processor housing assembly positioned so that the processors are pointing downward and the latches **3** are closed, align the processor housing assembly with the guides on the inside walls of the server.

Attention: To avoid injury, do not place your fingers immediately behind the latches at the top of the processor housing assembly.

2. Grasp the bottom sides of the processor housing assembly. Slide the processor housing assembly partially into the server; then, open the latches fully.
3. Lift and slide the assembly into the server until it stops.
4. Close the processor housing assembly latches.
5. Reinstall the three processor fans:
 - a. Insert the fans in the server. Align the tabs on the bottom edge of the fans with the matching slots in the server chassis.
 - b. When you have the fans correctly seated, press the fasteners in the top center of the fans to secure the fans in the server.
6. Reinstall the front bezel (see “Installing the front bezel” on page 94).
7. If you have other options to install or remove, do so now; otherwise, continue with “Completing the installation” on page 92.

Working with adapters

You can add adapters to extend the capabilities and power of your server.

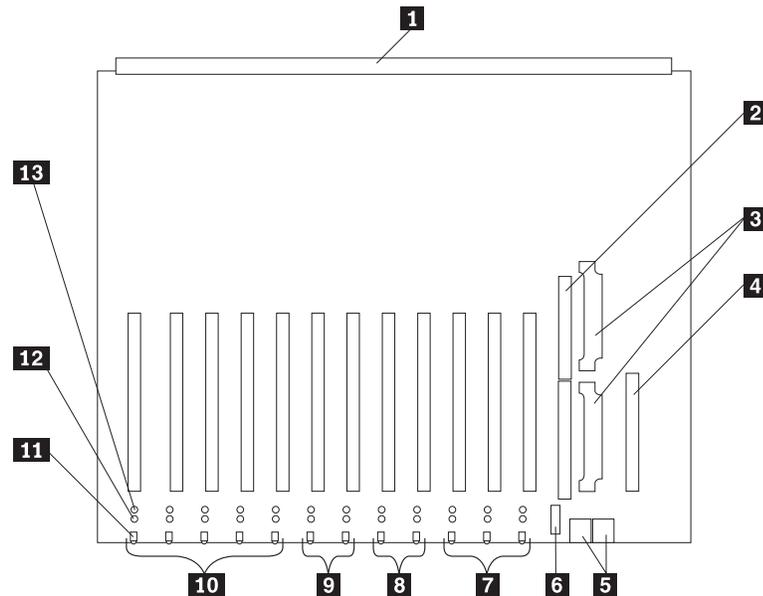
You add adapters to the expansion connectors, called slots, on the I/O board of your server. All slots are PCI expansion slots. Your server supports up to 12 adapters in the PCI slots. There are two additional dedicated slots for the I/O function card and the the Advanced System Management PCI adapter.

You can install a new PCI adapter or replace an existing PCI adapter with the same type of adapter without turning the server power off and restarting the system. These slots are called *hot-pluggable* PCI slots. They are also referred to as hot-plug PCI slots.

A PCI adapter comes with built-in identification and configuration specifications (set in memory on the device) that provide installation information to the server during startup. This information is read by the input/output (I/O) bus and interpreted by the server BIOS. The BIOS routines automatically configure the adapter around the resources already in use by other devices.

Your server comes with a video controller. This video controller is an integrated component on the I/O function card. The integrated video controller has super video graphics array (SVGA) technology.

The following illustration shows the location of the expansion slots and other components referred to in these steps.



- 1** Midplane connector
- 2** I/O function card slot
- 3** Voltage regulator module (VRM) connectors
- 4** Advanced System Management PCI adapter slot
- 5** USB 1 and USB 2 port connectors
- 6** PCI switch card connector
- 7** Hot-plug, 64-bit, PCI slots 10–12 (bus A, 33 MHz)
- 8** Hot-plug, 64-bit, PCI slots 8–9 (bus B, 66 MHz)
- 9** Hot-plug, 64-bit, PCI slots 6–7 (bus C, 66 MHz)
- 10** Hot-plug, 64-bit, PCI slots 1–5 (bus D, 33 MHz)
- 11** Hot-plug external attention/fail LED for PCI slot (green blink = attention, amber = defective PCI adapter)
- 12** Hot-plug internal attention/fail LED for PCI slot (green blink = attention, amber = defective PCI adapter)
- 13** Hot-plug power LED for PCI slot (green solid, on)

PCI slot LED descriptions

Each PCI slot has two lights associated with it — one Attention/Fail light and one Power On light.

- **Power On Light:** This light is on when the PCI slot is active and has power. Do not add or remove an adapter from the PCI slot when the Power On light is on. When this light is off, the PCI slot is inactive and has no power applied. You can install or remove an adapter when the Power On light is off. Refer to your operating-system documentation to determine if your operating system supports hot-plug PCI adapters.
- **Attention/Fail Lights:** These are bicolor lights. When an Attention/Fail light flashes green, it indicates the PCI Hot-Plug Attention function. The meaning of the Attention light is defined by your operating system. Refer to your operating-system documentation to determine if your operating system supports

hot-plug PCI adapters and, if so, what the Attention light indicates. When this light is solid amber, it indicates a failure on the PCI adapter installed in the slot.

Adapter considerations

Before you continue with the adapter-installation procedure:

- Review and follow the instructions that come with the adapter and your operating system in addition to the instructions given in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter documentation.
- Manual assignment of interrupts is never required with operating systems that use the Advanced Programmable Interrupt Controller (APIC) interrupt structure. Although you can manually assign interrupts through the Configuration/Setup Utility program, most adapters designed for PCI slots are auto-configuring. If the required resources are available, the BIOS software automatically configures an adapter around the resources already in use by other devices. The default setting is generally the most appropriate. If you choose to manually assign interrupts, be sure that these interrupts do not conflict with existing values. If a conflict does occur, see “Resolving configuration conflicts” on page 34.
- For a list of compatible RAID adapters, and installation requirements, refer to <http://www.ibm.com/pc/us/compat/> on the World Wide Web. If you install a RAID adapter, configure the adapter using the RAID adapter documentation.
- The I/O function card slot can support only the I/O function card. It is not an expansion slot.
- The Advanced System Management PCI adapter slot can support only the Advanced System Management PCI adapter. It is not an expansion slot.

Attention: You must have the Advanced System Management PCI adapter installed for proper operation of your server and to use the system-management functions that the adapter provides. See “Understanding the Netfinity 8500R server design” on page 46 for more information about the Advanced System Management PCI adapter.

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. If you want a monitor to be the startup monitor, install a video adapter in slot 10, 11, or 12. When you install a PCI video adapter in one of these slots, the server BIOS automatically disables the integrated video controller.

Table 3 on page 73 contains information on the requirements for the PCI adapter slots and PCI buses in your server.

Table 3. PCI adapter information

Bus	Slots	Speed	PCI slot keying
A	10–12	33 MHz	5.0 V
B	8–9	66 MHz	3.3 V
C	6–7	66 MHz	3.3 V
D	1–5	33 MHz	5.0 V

Notes:

- All expansion slots are hot-plug, 64-bit, PCI slots.
- You can install:
 - A full-length or half-length, 32-bit or 64-bit, 5 V or Universal, hot-plug or non-hot-plug PCI adapter in slots 1–5 or 10–12. 66 MHz PCI adapters plugged into these slots will operate at 33 MHz.
 - A full-length or half-length, 32-bit or 64-bit, 3.3 V or Universal, hot-plug or non-hot-plug PCI adapter in slots 6–7 and 8–9. A 33 MHz PCI adapter installed in one of these slots limits a 66 MHz PCI adapter installed on the same bus to 33 MHz.
- To optimize performance, spread the installation of high-speed adapters, such as 66 MHz Ethernet adapters, between the two 66 MHz PCI buses.

Configuring adapters

PCI devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI device. From the Configuration/Setup Utility program, you can select available resources for the adapter that you are installing. If a conflict does occur, see “Resolving configuration conflicts” on page 34.

Refer to the documentation that comes with the adapter for information about required system resources. Then, make the appropriate jumper or switch settings on the adapter.

Installing a hot-plug PCI adapter

This section gives the procedure for installing a hot-plug PCI adapter. If you want to remove a hot-plug adapter, reverse the steps. If your operating system supports hot-plug PCI adapters, you can replace a failing hot-plug PCI adapter with a new adapter of the same type without turning off power to the server.

Notes:

- You do not need to turn off the server to install or remove a hot-plug PCI adapter.
- When you install an adapter, be sure that the gold-edge connectors on the adapter match the connectors in the PCI slot.

Before you begin:

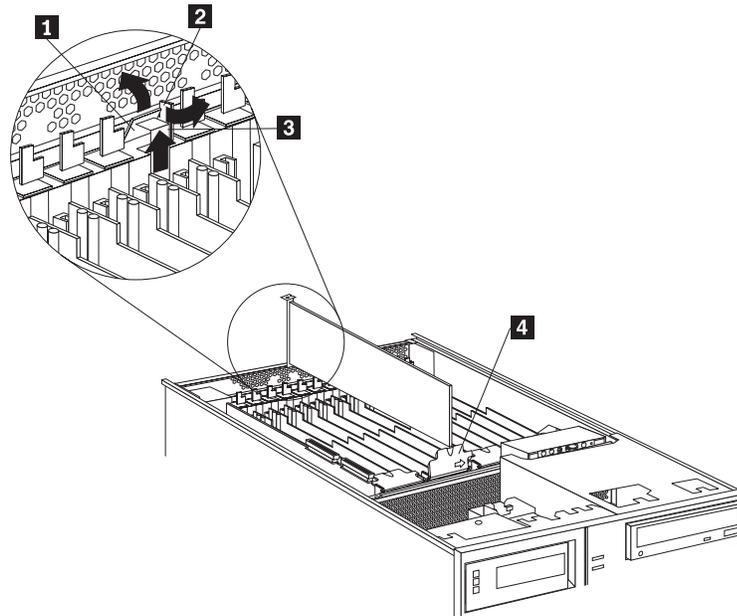
- Read “Electrical safety” on page 43, “Handling static-sensitive devices” on page 44, and “Working inside a server with power on” on page 45.
- Read the documentation that comes with your adapter for any special requirements or restrictions.
- Read the documentation that comes with your operating system.
- The orange color on components and labels in your server indicates hot-swap or hot-plug components. This means that you can install or remove the component while the system is running, provided that your system is configured to support this function. For complete details about installing or removing a hot-swap or hot-plug component, see the information provided in this chapter.
- The blue color on components or labels indicates touch points where a component can be gripped, a latch moved, and so on.

Attention:

Do not remove a hot-plug adapter before performing the operating-system-defined procedure for disabling the hot-plug PCI slot that contains the adapter. Failure to do so might cause your system to lock up. Refer to your operating system documentation.

Refer to the following illustrations while you perform the steps in this procedure.

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



- 1** Tab
- 2** Adapter retention latch
- 3** Expansion-slot cover
- 4** Adapter retention cover

To install a hot-plug PCI adapter:

1. If you have not already done so, remove the top cover (see “Removing the top cover” on page 51).

Attention: If the server is on, do not leave the top cover off for more than 30 minutes at a time.

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

Note: Check the instructions that come with the adapter for any requirements or restrictions.

3. Disable the PCI slot from your operating system. Make sure that the Power On light for the PCI slot is off. See step 12 on page 77 for the Power On light location. (Refer to the documentation that comes with your operating system for information about disabling a hot-plug PCI slot.)

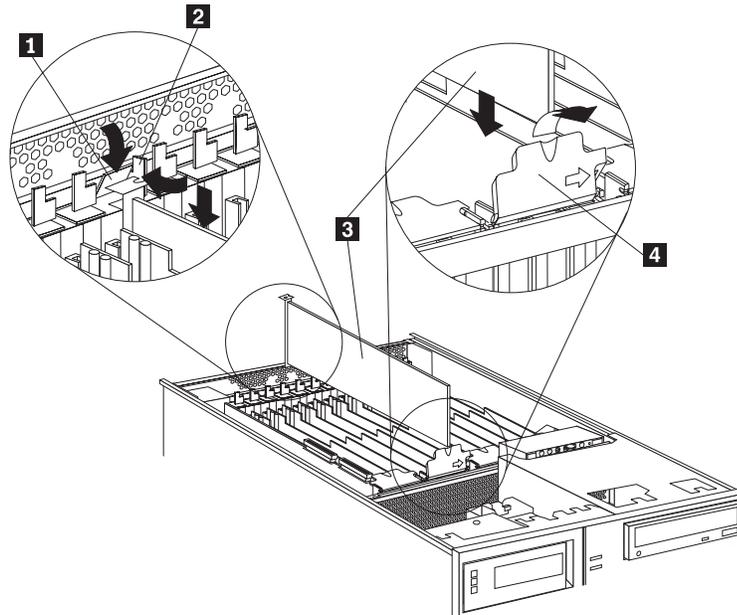
4. Remove the expansion-slot cover **3**:

- a. Rotate the adapter retention latch **2** to the open (unlocked) position.
- b. Lift the tab **1** at the top of the expansion-slot cover to the open (unlocked) position.
- c. Remove the expansion-slot cover **3** from the server. Store it in a safe place for future use.

Attention: Expansion-slot covers must be installed on all vacant slots. This maintains the electromagnetic-emissions characteristics of the system and ensures proper cooling of system components.

5. If you are installing a full-length adapter, open the adapter retention cover **4**.
 - a. Press outward on the adapter retention assembly where indicated by the arrow.
 - b. Continue pressing on the assembly as described in step 5a, and lift the adapter retention cover **4**.
 6. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any internal cables before you install the adapter.
 7. Touch the static-protective package containing the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package.

Note: Avoid touching the components and gold-edge connectors on the adapter.
 8. Place the adapter, component-side up, on a flat, static-protective surface.
 9. Set any jumpers or switches as described by the adapter manufacturer.
- Refer to the following illustrations while you perform the following steps.



- 1** Tab
- 2** Adapter retention latch
- 3** Adapter
- 4** Adapter retention cover

10. Install the adapter:

- a. Carefully grasp the adapter **3** by its top edge or upper corners, and align it with the expansion slot on the I/O board.

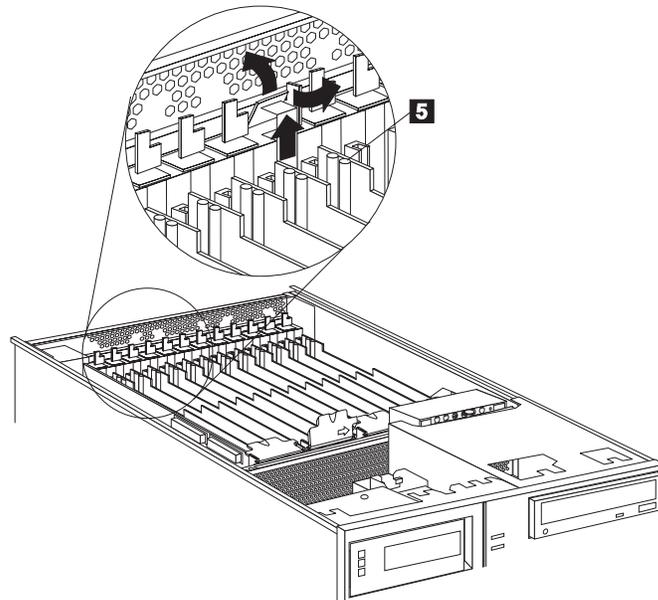
Attention: When you install an adapter in the server, be sure that it is completely and correctly seated in the connector. Incomplete insertion might cause damage to server components or the adapter.

- b. Press the adapter *firmly* into the expansion slot.
- c. If you are installing a full-length adapter, close the adapter retention cover **4**.
- d. Lower the tab **1** over the adapter. Rotate the adapter retention latch **2** until it snaps in place (the locked position).

11. If you have not already done so, connect any cables to the adapter.

12. Enable the PCI slot from your operating system. Make sure that the Power On light **5** for the PCI slot is on.

Attention: If the installed adapter is not supported by the hot-plug capability of your operating system, shut down and restart the server.



13. If you have other options to install or remove, do so now; otherwise, continue with “Completing the installation” on page 92.

Installing a non-hot-plug PCI adapter

This section gives the procedures for installing a non-hot-plug adapter. If you want to remove a non-hot-plug adapter, reverse the steps.

Before you begin:

- Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.
- Read the documentation that comes with your adapter for any special requirements or restrictions.
- The orange color on components and labels in your server indicates hot-swap or hot-plug components. This means that you can install or remove the component while the system is running, provided that your system is configured to support this function. For complete details about installing or removing a hot-swap or hot-plug component, see the information provided in this chapter.
- The blue color on components or labels indicates touch points where a component can be gripped, a latch moved, and so on.

Refer to the illustrations in “Installing a hot-plug PCI adapter” on page 73 while you perform the steps in this procedure.

To install a non-hot-plug PCI adapter:

1. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices; and disconnect all external cables and power cords (see “Preparing to install options” on page 49); then, remove the top cover (see “Removing the top cover” on page 51).
2. Determine which expansion slot you will use for the adapter.
Note: Check the instructions that come with the adapter for any requirements or restrictions.
3. Perform step 4 on page 75 through step 11 on page 77, and step 13 on page 77.

Verifying compatibility between network adapters and device drivers

Your server supports several types of network adapters. If you are having trouble with the installation or operation of a network adapter or network operating system, ensure that the network-adapter device driver supports multiple processors. Refer to your network-adapter documentation for additional information about adapter compatibility requirements.

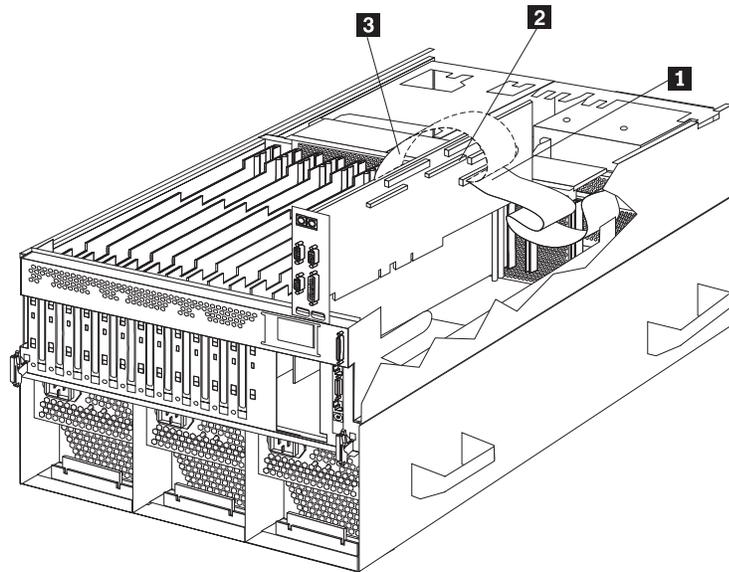
Cabling internal hard disk drives to a ServeRAID adapter (optional)

You can install an optional ServeRAID adapter in your server to enable you to configure the internal hot-swap hard disk drives into disk arrays. To do this, you must disconnect the cable from the integrated SCSI controller on the I/O function card, and connect the cable to a ServeRAID adapter. To cable a ServeRAID adapter to the internal hard disk drives in your server, or to make this adapter a startup device, you must install the ServeRAID adapter in PCI slot 10, 11, or 12. Refer to your ServeRAID adapter option documentation for complete instructions on installing a ServeRAID adapter in your server.

The following procedure describes the cable routing that is necessary when you install the ServeRAID adapter. Refer to the following illustration while you perform the steps in this procedure.

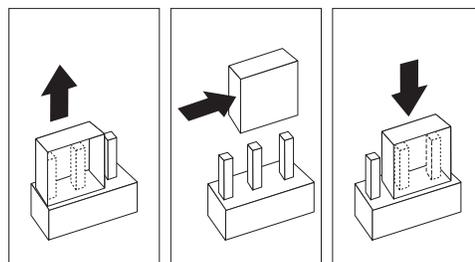
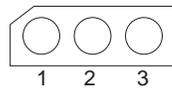
Notes:

1. It might be easier for you to route the cable before you install the adapter.
2. You do not have to remove the I/O function card or the screws on the I/O function card to connect the internal SCSI cable to a ServeRAID adapter.



- 1** Standard internal SCSI cable location for connection to internal SCSI port B
- 2** Internal SCSI port B
- 3** New internal SCSI cable location for connection to ServeRAID adapter

1. Disconnect the internal SCSI cable **1** from internal SCSI port B **2** on the I/O function card.
2. Change the setting of the three-pin, SCSI B detect jumper (identifier J19) on the I/O function card from pins 1 and 2 to pins 2 and 3. This prevents the server from displaying a non-applicable error message, Cable not present.



Note: For additional information on changing jumper settings, see “Changing jumper settings” on page 183. For the jumper location, see the

illustration of the I/O function card in “I/O function card component locations” on page 189.

3. The SCSI cable comes with two standard folds. Unfold the SCSI cable at the fold that is closer to the connector on the end of the cable. If necessary, refer to the illustration at the beginning of this procedure.
4. Install the ServeRAID adapter in PCI slot 10, 11, or 12.
5. Connect the internal SCSI port B end of the SCSI cable to the appropriate channel on the ServeRAID adapter **3**. Refer to your ServeRAID adapter option documentation for instructions on installing a ServeRAID adapter in your server and connecting the SCSI cable to the ServeRAID adapter.

Installing internal drives

Different types of drives allow your system to read multiple types of media and store more data.

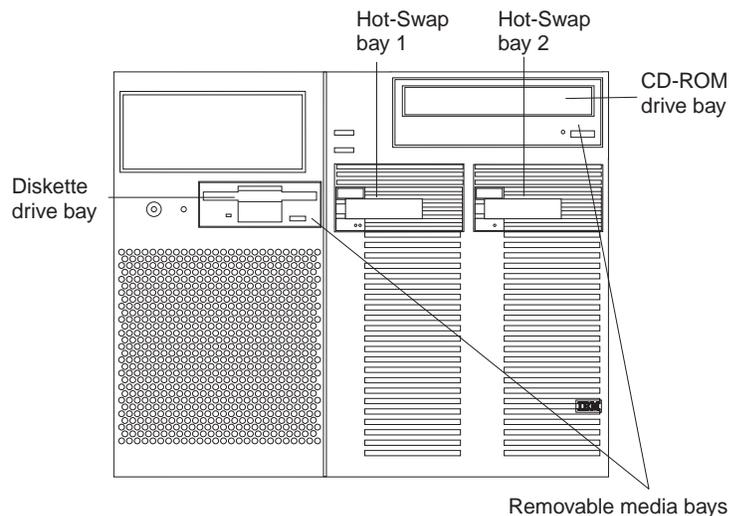
Several types of drives are available, such as:

- Diskette
- Hard disk
- CD-ROM

Some drives have a special design called *small computer system interface*, or SCSI. This design allows you to attach multiple drives to a single SCSI connector. For additional information about SCSI devices, see “SCSI IDs” on page 82.

Internal drive bays

Internal drives are installed in *bays*. Your server comes with one 3.5-inch, 1.44 MB diskette drive, one CD-ROM drive, and two hard disk drive bays.



Your server contains hardware and an operating system that support the replacement of a failed hard disk drive without turning off the server, when the drive is connected to a ServeRAID adapter. Therefore, you can continue to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swappable* drives. They are also referred to as hot-swap drives.

The front of each hot-swap hard disk drive has two indicator lights (see “Controls and indicators” on page 8). If the amber hard disk status light for a drive is lit continuously, that individual drive is defective and needs to be replaced. When the hard disk status light indicates a defective drive, you can replace a hot-swap drive without turning off the server.

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-drive trays come with the hot-swap drives.

- Your server comes with a preinstalled 3.5-inch, 1.44 MB diskette drive and a preinstalled integrated drive electronics (IDE) CD-ROM drive.

Installing internal drives

- The server supports one diskette drive only.
- Your server supports one slim-high (1-inch), 3.5-inch, hot-swap hard disk drive with a filler bezel or one half-high (1.6-inch), 3.5-inch, hot-swap hard disk drive in each hot-swap bay.
- The hot-swap bays connect to a SCSI *backplane*. This backplane is the printed circuit board behind the bay. The backplane supports up to two hard disk drives.
- Empty hot-swap bays and trays that contain slim-high drives must contain a filler bezel.
- The diskette drive uses 2 MB diskettes. For optimum use, format 2 MB diskettes to 1.44 MB.

Hard disk drives

Your server comes with a Wide Ultra-2 SCSI (LVD) controller on the I/O function card.

Notes:

1. LVD = low-voltage differential
2. If you plan to install both internal and external SCSI devices, you must follow the instructions in “Connecting external options” on page 96, in addition to the instructions in this section.

A 16-bit (wide) SCSI cable connects the hot-swap backplane to one channel of the integrated SCSI controller on the I/O function card.

SCSI IDs

Each SCSI device that is connected to an individual integrated SCSI controller needs a unique identification (ID) so that the controller can identify the devices and ensure that different devices do not attempt to transfer data at the same time. (The integrated SCSI controllers operate independently.) If you need to set IDs for SCSI devices, refer to the instructions that come with those devices.

Your server automatically sets SCSI IDs for hot-swap hard disk drives. The server uses the hard disk drive SCSI IDs to send status information to the indicator lights located on each hot-swap drive.

Note: Do not set the SCSI ID jumpers on hard disk drives.

The SCSI backplane in the server supports up to two hot-swap drives. Table 4 shows the default SCSI IDs that the backplane assigns for hot-swap hard disk drives.

Bay	1	2
ID	0	1
Note: The default SCSI ID for the SCSI backplane is 15. The default SCSI ID for each SCSI controller is 7.		

A simplified layout of the SCSI backplane is shown in “SCSI backplane component locations” on page 197.

The processing sequence for SCSI devices is set through the SCSISelect Utility program. The default sequence proceeds from the lowest SCSI ID to the highest (0 to 6, then 8 to 14). The default SCSI ID for each SCSI controller is 7. The default SCSI ID for the SCSI backplane is 15.

Termination

All the internal hot-swap drives in your server have automatic termination.

Preinstallation steps

Before you install drives in your server, verify that you have all the cables and any other equipment specified in the documentation that comes with the internal drive. You might also 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.
2. Verify that all jumpers are removed from the drive.
3. To install the drive, continue with “Installing or replacing a drive.”

Installing or replacing a drive

Notes:

1. You do not have to turn off the server to install hot-swap drives in these bays. If these bays are not connected to a ServeRAID adapter, shut down and restart the server. If these bays are connected to a ServeRAID adapter, you can use your RAID management software to bring the drives online.

Refer to your ServeRAID adapter option documentation for instructions on installing a ServeRAID adapter.

2. You do not have to turn off the server to remove a drive from a hot-swap bay, when that bay is connected to a ServeRAID adapter.

If the amber hard disk status light for a drive is lit continuously, that individual drive is defective and needs to be replaced. For additional information, see “LEDs for Internal hard disk drives in a ServeRAID environment” on page 162. For the location of the hard disk status light, see “Controls and indicators” on page 8.

Attention:

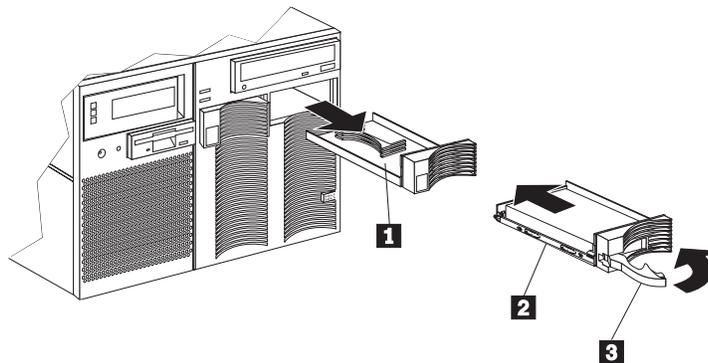
1. Before you hot-swap a drive, refer to the amber hard-disk status light for that drive to make sure that it is defective. If your server has a ServeRAID adapter installed and you assigned RAID level 1 or 5 to the logical drives in your disk array, make sure that the drive is defective. If you partially or completely remove a good drive instead of a defective one, your server might lose valuable data. However, the ServeRAID adapter can rebuild the data that you need, provided that certain conditions are met. Refer to the ServeRAID adapter documentation for further details.
2. 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 after disconnecting). Handle the drive gently.

Installing internal drives

Before you begin:

- Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.
- Read the documentation that comes with your drive.

Refer to the following illustration while you perform the steps in this procedure.



- 1** Filler panel (tray and slim filler bezel)
- 2** Hot-swap hard disk drive
- 3** Drive tray handle (open position)

To install or replace a hard disk drive:

1. Determine the bay in which you want to install the drive.
2. If you are removing a defective hard disk drive, do so now. Otherwise, continue with step 3.

Remove the defective hard disk drive **2** by pressing on the lock to release the handle **3**, placing the handle in the open position (perpendicular to the drive), and pulling the hot-swap tray from the bay. Continue with step 4.

3. Remove the filler panel **1** from the empty hot-swap bay by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.

Note: If you are installing a slim-high drive, you must separate the slim filler bezel from the tray, and insert the slim filler bezel into the top of the hard disk drive cage. Otherwise, store the filler panel in a safe place.

4. Install the hard disk drive **2** in the hot-swap bay:
 - a. Remove the new drive assembly from the static-protective package.
 - b. Touch the static-protective package containing the drive assembly to any unpainted metal surface on the server. Then, remove the drive assembly from the static-protective package.
 - c. If you are installing a slim-high drive, separate the slim filler bezel from the tray, and insert the slim filler bezel into the top of the hard disk drive cage.
 - d. Ensure that the tray handle **3** is open (that is, perpendicular to the drive).
 - e. Align the drive assembly so that it engages the guide rails in the bay.
 - f. Gently push the drive assembly into the bay until the drive stops.

- g. Push the tray handle to the closed (locked) position.
5. Check the hard disk drive status indicators to verify that the hard disk drives are operating properly. See “Identifying problems through status indicators” on page 159 for details.

Note: If your server has a ServeRAID adapter installed, refer to the ServeRAID adapter documentation for details about configuration requirements. Record the configuration information in the appropriate tables in “Recording installed devices” on page 170.

Replacing a hot-swap power supply

13



DANGER

Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.

- 1. If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
- 2. If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
 - a. 13 amps or less, connect each power cord to a separate branch circuit.**
 - b. 14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
 - c. 20 amps or greater, you may connect up to three power cords to the same branch circuit.**

Your server comes with three power supplies, three 220 V ac power cords, and three 110 V ac power cords (U.S. only). Be sure to select the appropriate power cord voltage for your server environment. All three power cords must have the same voltage.

If you connect the three:

- 220 V ac power cords to the power supplies, the three power supplies support redundancy and hot-swap capability.
- 110 V ac power cords to the power supplies, the three power supplies do not support redundancy if the system configuration exceeds any of these conditions:
 - More than six processors
 - More than 24 memory DIMMs
 - More than eight PCI adapters

For servers with redundant power, the loss of a single power supply will not affect the server operation. Replace a power supply that has failed as soon as convenient to help maintain the redundant power and cooling capability. When the ac power LED is on, the dc power LED is on, and the System Power light on the operator panel is on, the power supply has failed. See “Power supplies” on page 14 for the location of the dc power LEDs. See “Power supply LEDs” on page 160 for more information on the dc power LEDs.

Attention: To ensure proper server operation, be sure to connect all three 220 V ac power cords or all three 110 V ac power cords to the power supplies.

Note: Your server also comes with three 220 V ac power cords for connection to the server rack power distribution unit (PDU). Refer to *IBM Netfinity Rack Power Distribution Unit (PDU) Installation Instructions* for additional information on installing a PDU. See Chapter 5, “Installing the server in and removing the server from the rack enclosure” on page 103 for additional information on installing a server rack.

8



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



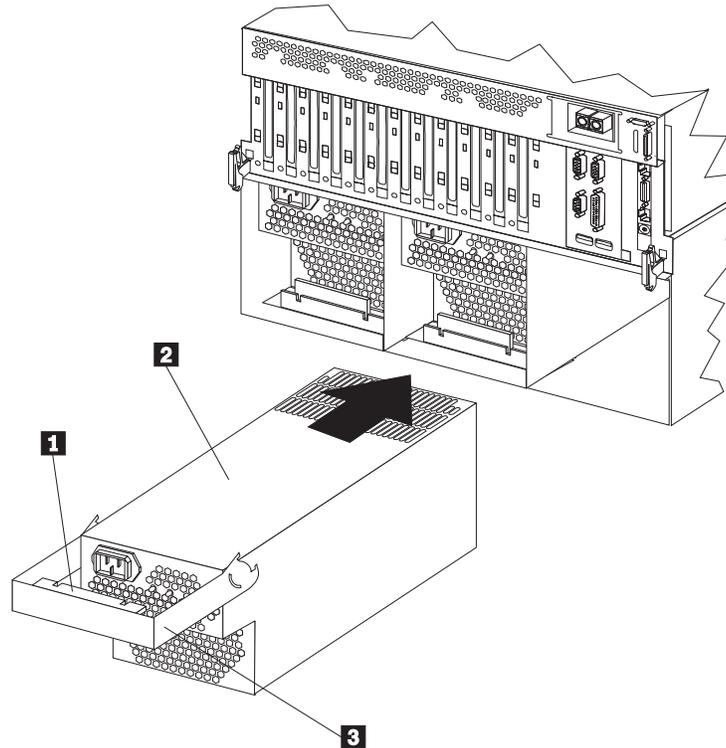
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Replacing a hot-swap power supply

Refer to the following illustration while performing the steps in this procedure.

Notes:

1. The illustrations in this section might differ slightly from your hardware.
2. You do not need to turn off the power to the server to replace hot-swap power supplies.



- 1** Handle release latch
- 2** Power supply
- 3** Handle

To replace a hot-swap power supply:

1. Remove the power supply:
 - a. Unplug the power cord from the power supply and the electrical outlet and, if necessary, remove the power supply cord from the strain-relief bracket.
 - b. If a strain-relief bracket is attached to the power supply, remove the screw on the back of the power supply (lower right side), and remove the strain-relief bracket.
 - c. Press the release latch **1** on the handle **3** on the power supply **2**.
 - d. Lift and fully extend the handle on the power supply. Then, slide the power supply out of the chassis. Refer to your power supply option documentation for complete instructions on proper handling and disposal of a defective power supply.

2. Replace the power supply:
 - a. Remove the new power supply from the static-protective package.
 - b. Touch the static-protective package containing the power supply to any unpainted metal surface on the server. Then, remove the power supply from the static-protective package.
 - c. Place the handle **3** on the power supply **2** in the open (up) position, and slide the power supply into the chassis. If necessary, lower the handle slightly to avoid the I/O housing assembly; then, continue inserting the power supply into the bay until it stops.
 - d. Press the handle down to seat the power supply in the bay. This places the power supply in the locked position.
 - e. Reconnect the power cord to the power supply and the electrical outlet (if removed).
 - f. Remove the new strain-relief bracket from its package and install it on the power supply cord.
Note: If a new strain-relief bracket did not come with your new power supply, attach the strain-relief bracket that you removed in step 1b on page 88 on the new power supply.
 - g. Verify that the ac power light and the dc power light are lit, indicating that the power supply is operating correctly. See “Power supply LEDs” on page 160 for details. See “Power supplies” on page 14 for the location of the ac and dc power LEDs.
3. If you have other options to install or remove, do so now; otherwise, continue with “Completing the installation” on page 92.

Replacing a hot-swap fan

Your server comes with three hot-swap processor fans (labeled and numbered 1, 2, and 3) in the front of the processor housing assembly at the front of the server, and three hot-swap I/O fans (labeled and numbered 4, 5, and 6) behind the hot-swap drive bays. Each fan has an LED; the fan LEDs are amber in color. A fan LED is lit only when the fan needs replacement.

Notes:

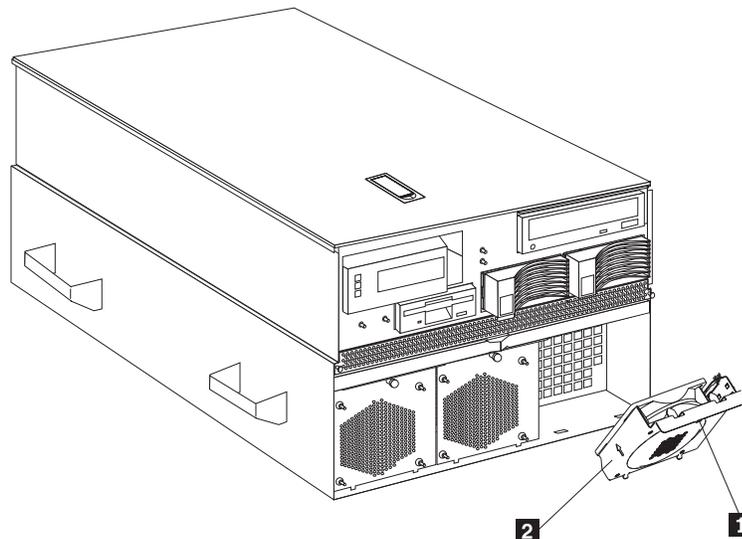
1. The illustrations in this section might differ slightly from your hardware.
2. You do not need to turn off the power to the server to replace a fan.
3. Replace a fan that has failed as soon as convenient to maintain the redundant cooling capability.
4. The top cover is in place during normal operation. If the server is on, do not leave the top cover off for more than 30 minutes at a time.

To replace a hot-swap fan:

- To replace a processor fan, continue with “Replacing a processor fan.”
- To replace an I/O fan, continue with “Replacing an I/O fan” on page 91.

Replacing a processor fan

1. Determine which fan you will replace.
2. Remove the front bezel (see “Removing the front bezel” on page 52).



3. Pull out the fastener **1** in the top center of the processor fan **2**. This places the fastener in the unlocked position.
4. Pivot the fan downward and remove it from the server.
5. Insert the replacement fan in the fan bay. Align the bottom tabs of the fan **2** with the matching slots in the server chassis.
6. Pivot the fan in an upward position.

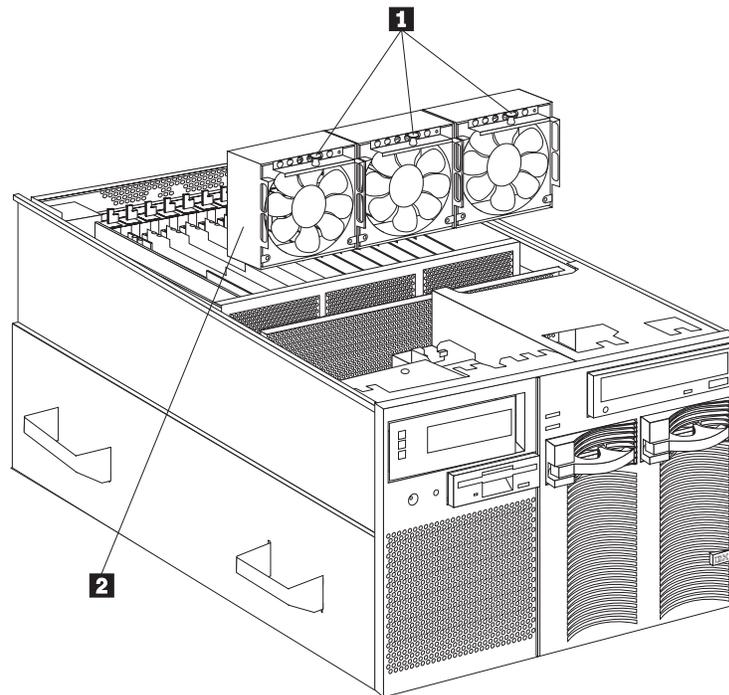
7. When you have the fan correctly seated in the fan bay, press on the fastener in the center of the fan to secure the fan in the server.

Note: When you correctly seat the fan in the chassis, the fan blades begin to spin. The fan LED goes out a few seconds after the new fan is installed.

8. If you have other options to install or remove, do so now; otherwise, continue with “Completing the installation” on page 92.

Replacing an I/O fan

1. Determine which fan you will replace.
2. Remove the top cover (see “Removing the top cover” on page 51).



3. Pull up the fastener **1** in the center of the fan **2**. This places the fastener in the unlocked position.
4. Lift the fan out of the server.
5. Insert the replacement fan in the fan bay. Align the connector on the bottom of the fan with the matching connector in the server chassis.
6. When you have the fan correctly seated in the fan bay, press down on the fastener in the center of the fan to secure the fan in the server.

Note: When you correctly seat the fan in the chassis, the fan blades begin to spin. The fan LED goes out a few seconds after the new fan is installed.

7. If you have other options to install or remove, do so now; otherwise, continue with “Completing the installation” on page 92.

Completing the installation

Depending on the options that you have installed, you must reinstall the top cover and the front bezel to complete the installation. You must also reconnect all the cables that you disconnected in “Preparing to install options” on page 49, and, after installing certain options, you must run the Configuration/Setup Utility program. Follow the instructions in this section.

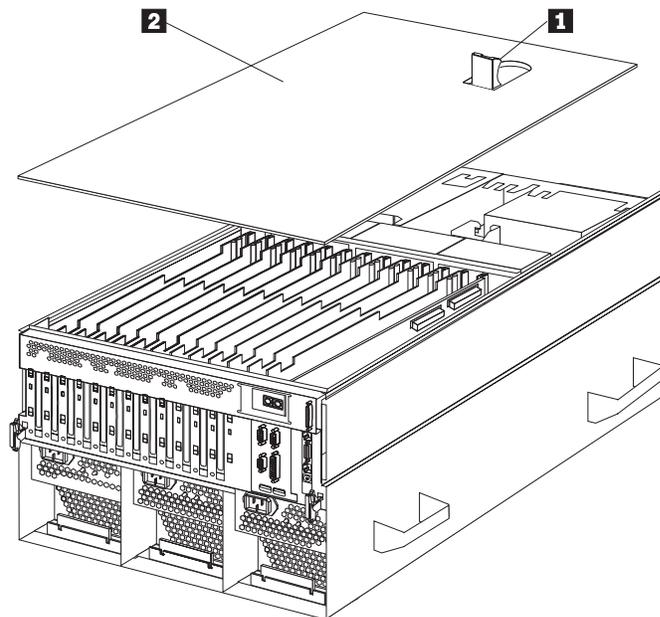
Installing the top cover

Notes:

1. The top cover is in place during normal operation. If the server is on, do not leave the top cover off for more than 30 minutes at a time.
2. If necessary, see “Input/output connectors and expansion slots” on page 12 for connector locations.

To install the server top cover:

1. Before installing the top cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left tools or loose parts inside the server.
2. Place the cover-release latch **1** in the open (up) position.
3. Insert the bottom tabs of the cover **2** in the matching slots in the server chassis.



4. Close the cover-release latch to pull the cover forward and lock the cover in place.

13

**DANGER**

Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.

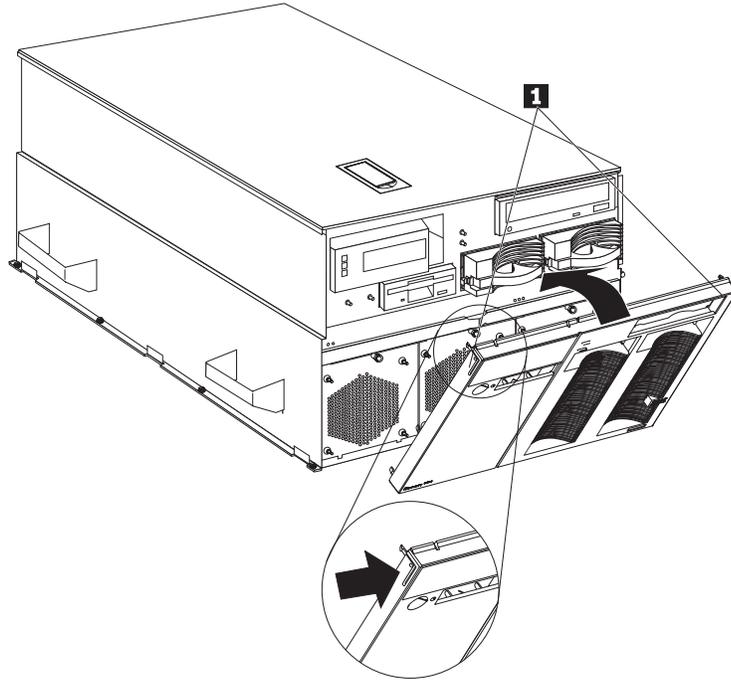
- a. If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.
 - b. If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:
 - 1) 13 amps or less, connect each power cord to a separate branch circuit.
 - 2) 14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.
 - 3) 20 amps or greater, you may connect up to three power cords to the same branch circuit.
5. If you disconnected any cables or cords from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

Installing the front bezel

Installing the front bezel

To install the front bezel:

1. Insert the bottom tabs of the bezel in the matching slots in the server chassis.
2. Press in the tab on the bezel; then, pivot the top of the bezel until the latches **1** snap into place. This places the bezel in the locked position.



Reconfiguring the server and updating server records

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed.

- Device drivers

Some options have device drivers that you need to install. Refer to the documentation that comes with your option for information about installing any required device drivers.

- DIMMs

If you replaced a defective DIMM, you must manually enable the DIMM slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the DIMM slot. See “Memory settings” on page 31 for additional information.

- Processors

Your Netfinity 8500R server comes with at least one processor installed on the standard processor daughterboard. If you have installed one or more additional processors, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system. Refer to your operating-system documentation for additional information.

If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot. See “Processor settings” on page 31 for additional information.

- Reconfiguring the server

Run the Configuration/Setup Utility program to save the new configuration information. See Chapter 3, “Configuring your server” on page 19.

- Updating server records

Record your updated device and configuration information in the appropriate tables in “Recording installed devices” on page 170.

Connecting external options

Before you begin:

- Read “Electrical safety” on page 43 and “Handling static-sensitive devices” on page 44.
- Read the documentation that comes with your options.

Connecting external SCSI devices

Your server comes with one external SCSI port so that you can connect external SCSI devices.

You can also attach a SCSI storage expansion enclosure to your server.

Cabling requirements

If you plan to install external SCSI devices, you must order additional SCSI cables. These cables must have the proper connectors for the SCSI external connector and the external devices. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative.

Refer to the information that comes with your adapter to determine the number of internal and external connectors, channels, and SCSI devices that the adapter supports.

For information about the maximum length of SCSI cable between the terminated ends of the cable, see the following ANSI SCSI Standards:

- X3.131-1986 (SCSI)
- X3.131-1994 (SCSI-2)
- X3T10/1071D
- X3T10/1142D (Ultra-2 SCSI)
- X3.302:1998 (Ultra-2 SCSI)

Adhering to these standards ensures that your server operates properly.

Setting SCSI IDs for external devices

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID, so that the SCSI controller can identify the devices and ensure that different devices do not attempt to transfer data at the same time. SCSI devices that are connected to different SCSI controllers can have duplicate SCSI IDs. Refer to “SCSI IDs” on page 82 and to the instructions that come with the SCSI devices for more information about setting a SCSI ID.

Installing external devices

To attach an external device:

1. Run the shutdown procedure for the operating system. Turn off the server and all attached devices.
2. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

Input/Output port connectors

The input/output (I/O) port connectors are for attaching external devices, such as printers, keyboards, and displays, to your server. The I/O port connectors on your server include:

- Two serial-port connectors
- One parallel-port connector
- One video-port connector
- One keyboard-port connector
- One auxiliary-device-port connector
- One external Wide Ultra-2 SCSI (LVD) port connector
- Two USB-port connectors
- One 10/100 Mbps Ethernet port connector on the Advanced System Management PCI adapter
- One dual serial-port connector on the Advanced System Management PCI adapter
- One Advanced System Management Interconnect port connector

Refer to the illustration in “Input/output connectors and expansion slots” on page 12 for the locations of the connectors.

Serial port

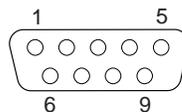
Your server comes with two serial ports. (Refer to “Input/output connectors and expansion slots” on page 12 for the locations of the connectors.) These ports are used to communicate with printers, plotters, external modems, scanners, and auxiliary terminals. You can also use these ports to transfer data between computers.

Serial ports transfer data one bit at a time, using direct memory access (DMA). DMA is a method of transferring data between I/O devices and system memory without intervention by the system processor.

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

The serial ports can transmit and receive data and commands at rates of from 300 bits per second up to 345 600 bits per second. To use a serial port at 345 600 bits per second, you need a shielded serial cable. For information about this cable, contact your IBM marketing representative or your IBM authorized reseller.

Each serial port has a 9-pin, male D-shell connector on the back of the server. The pin-number assignments of this connector conform to the industry standard.



Connecting external options

The following table shows the pin-number assignments for the serial-port connectors.

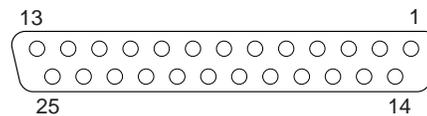
<i>Table 5. Serial port pin-number assignments</i>			
Pin	Signal	Pin	Signal
1	Data carrier detect	6	Data set ready
2	Receive data	7	Request to send
3	Transmit data	8	Clear to send
4	Data terminal ready	9	Ring indicator
5	Signal ground		

When you turn on your server, the POST routine assigns the serial ports to specific communication port addresses.

Some application programs use only certain ports, and some modems are designed for use only at certain communication port addresses. You might need to use the Configuration/Setup Utility program to change communication port address assignments to resolve conflicts.

Parallel port

The parallel port usually is used to communicate with printers, and transfers data one byte at a time using DMA. The parallel port has a 25-pin, female D-shell connector on the back of your server. (Refer to "Input/output connectors and expansion slots" on page 12 for the location of the connector.)



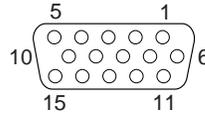
The following table shows the pin-number assignments for the parallel-port connector.

<i>Table 6. Parallel port pin-number assignments</i>			
Pin	Signal	Pin	Signal
1	STROBE	14	-AUTO FEED XT
2	Data 0	15	-ERROR
3	Data 1	16	-INIT
4	Data 2	17	-SLCT IN
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	24	Ground
12	PE (paper end)	25	Ground
13	SLCT (select)		

When you turn on your server, the POST routine assigns the parallel port a specific port address. You can change the parallel-port assignment by using the Configuration/Setup Utility program.

Video port

The I/O function card in your server has one SVGA video port. This port is used to attach a video monitor. The video port has a 15-pin analog connector on the back of the server. (Refer to “Input/output connectors and expansion slots” on page 12 for the location of the connector.)



The following table shows the pin-number assignments for the video connector.

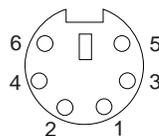
Pin	Signal
1	Red
2	Green or monochrome
3	Blue
4	Not connected
5	Ground
6	Ground
7	Ground
8	Ground
9	Not connected
10	Ground
11	Not connected
12	Not connected
13	Horizontal synchronization (Hsync)
14	Vertical synchronization (Vsync)
15	Not connected

The integrated video controller has 4 MB of video memory. The integrated video controller supports the following screen resolutions:

- 640 × 480 pels with up to 16,000,000 colors
- 800 × 600 pels with up to 16,000,000 colors
- 1024 × 768 pels with up to 16,000,000 colors
- 1152 × 864 pels with up to 16,000,000 colors
- 1280 × 1024 pels with up to 64,000 colors
- 1600 × 1200 pels with up to 64,000 colors

Keyboard and auxiliary-device ports

The I/O function card has one keyboard port and one auxiliary-device port that supports a mouse or other pointing device. (Refer to “Input/output connectors and expansion slots” on page 12 for the locations of the connectors.)



The following table shows the pin-number assignments for the connectors used by the keyboard and auxiliary-device ports.

Connecting external options

Table 8. Keyboard and auxiliary-device port pin-number assignments

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

Wide Ultra-2 SCSI (LVD) ports

Your server has two Wide Ultra-2 SCSI (LVD) bus-master controllers on the I/O function card; one supports internal devices and the other is connected to an external connector for support of external devices. Each controller supports up to 15 SCSI devices. You can use the 68-pin, SCSI connectors for these controllers to expand the capabilities of your server by attaching different types of SCSI devices, such as drives or printers.

Table 9 shows the pin-number assignments for the 68-pin SCSI connectors.

Table 9. 68-Pin SCSI port pin-number assignments

Pin	Signal	Pin	Signal
1	+DB12	35	-DB12
2	+DB13	36	-DB13
3	+DB14	37	-DB14
4	+DB15	38	-DB15
5	+DBP1	39	-DBP1
6	+DB0	40	-DB0
7	+DB1	41	-DB1
8	+DB2	42	-DB2
9	+DB3	43	-DB3
10	+DB4	44	-DB4
11	+DB5	45	-DB5
12	+DB6	46	-DB6
13	+DB7	47	-DB7
14	+DBP	48	-DBP
15	Ground	49	Ground
16	Ground	50	-Cable Detect
17	Tempwrr	51	Tempwrr
18	Tempwrr	52	Tempwrr
19	Ground	53	Reserved
20	Ground	54	Ground
21	+ATN	55	-ATN
22	Ground	56	Ground
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB8	65	-DB8
32	+DB9	66	-DB9
33	+DB10	67	-DB10
34	+DB11	68	-DB11

Universal Serial Bus ports

The I/O board in your server contains two Universal Serial Bus (USB) ports. Each USB port has an external connector on the rear on the server for attaching devices that previously used serial, parallel, keyboard, mouse, and game ports.

USB is an emerging serial interface standard for telephony and multimedia devices. USB technology uses Plug and Play to determine what device is attached to the connector. Each USB device is accessed by a unique *USB address*. A device called a hub is used to convert the USB port into multiple attachment points. A hub has multiple ports where devices can be attached. USB provides 12 megabits-per-second (Mbps) data transfer rate with a maximum of 63 devices and a maximum signal distance of 5 meters (16 ft.) per data segment.

Note: If more than one USB device is to be attached, the device must be connected to a hub.

Table 10 shows the pin-number assignments for the USB connectors.

<i>Table 10. USB connector pin-number assignments</i>	
Pin	Signal
1	VCC
2	-Data
3	+Data
4	Ground

Advanced System Management PCI adapter 10/100 Mbps Ethernet port

The Advanced System Management PCI adapter contains a 10/100 Mbps Ethernet controller. The Ethernet controller has an external RJ-45 connector that is used with Category 3, 4, or 5 unshielded twisted-pair (UTP) cable. The connector enables your Advanced System Management PCI adapter to attach to an Ethernet network for remote communication.

Notes:

1. The Advanced System Management PCI adapter 10/100 Mbps Ethernet port cannot be accessed from the network operating system. The connector is dedicated to connecting your Advanced System Management PCI adapter to an Ethernet network through a service-processor interface, such as Netfinity Manager.
2. The 100BASE-TX Fast Ethernet standard requires that the cabling in the network is Category 5 or higher.

Table 11 on page 102 shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

Connecting external options

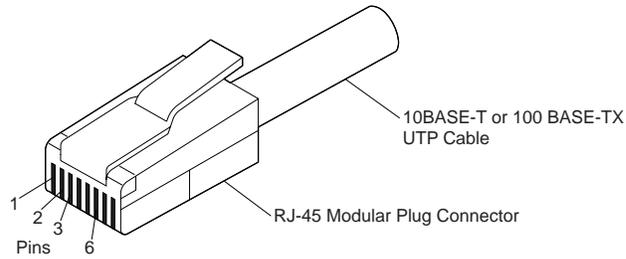


Table 11. 10/100 Mbps Ethernet connector pin-number assignments

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

Advanced System Management dual serial port

The Advanced System Management PCI adapter contains a dual serial port. The port has an external connector that can be used to attach to a Y-cable that is shipped with your server. The serial connectors on the Y-cable and the pin-number assignments are the same as for the system serial ports. This Y-cable can be used to attach to a modem that is dedicated to communication with the Advanced System Management PCI adapter.

You can obtain a listing of compatible modems and related information by accessing the following address: <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

Advanced System Management Interconnect port

The Advanced System Management PCI adapter contains an Advanced System Management Interconnect port. The port has an external connector that must be attached to an optional Y-cable that provides for chaining other compatible service processors for remote access. To obtain an optional Y-cable, contact an IBM reseller or IBM marketing representative.

The following table shows the pin-number assignments for the connectors used by the Advanced System Management Interconnect bus port.

Table 12. Advanced System Management Interconnect bus connector pin-number assignments

Pin	Signal
1	Term power
2	+ Input
3	- Input
4	+ Output
5	- Output
6	Ground