IBM Netfinity Servers   S10L-9800-02

**IBM Netfinity 5500 - Type 8660
Models 11U, 11X, 1RU, 1RX, 41U,
41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX,
51U, 51X, 52U, 52X, 5RU, 5RX,
5SU, 5SX**

Hardware Maintenance Manual

September 1998

**We Want Your Comments!
(Please see page 330)**

IBM

Second Edition (September 1998)

About This Manual

This manual contains diagnostic information, Symptom-to-FRU Indexes, service information, error codes, error messages, and configuration information for the Netfinity 5500 - Type 8660.

Important

This manual is intended for trained servicers who are familiar with IBM PC Server products.

Important Safety Information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

注意和危险声明（简体中文）

重要事项：

本书中的所有注意和危险声明之前都有编号。该编号用于英语的注意或危险声明与 *Safety Information* 一书中可以找到的翻译版本的注意或危险声明进行交叉引用。

例如，如果一个注意声明以编号 1 开始，那么对该注意声明的翻译出现在 *Safety Information* 一书中的声明 1 中。

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

注意及危險聲明（中文）

重要資訊：

本書中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在「安全資訊」(Safety Information) 一書中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在「安全資訊」(Safety Information) 一書的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

Prenez connaissance de toutes les consignes de type Attention et
Danger avant de procéder aux opérations décrites par les instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Accertarsi di leggere tutti gli avvisi di attenzione e di
pericolo prima di effettuare qualsiasi operazione.

주의 및 위험 경고문(한글)

중요:

> 이 책에 나오는 모든 주의 및 위험 경고문은 번호로 시작됩니다.
> 이 번호는 *Safety Information* 책에 나오는 영문판 주의 및 위험
> 경고문과 한글판 주의 및 위험 경고문을 상호 참조하는데 사용됩
> 니다.
>
> 예를 들어 주의 경고문이 번호 1로 시작되면 *Safety Information*
> 책에서 이 주의 경고문은 경고문 1번 아래에 나옵니다.
>
> 지시를 따라 수행하기 전에 먼저 모든 주의 및 위험 경고문을 읽
> 도록 하십시오.

 Lea atentamente todas las declaraciones de precaución y
peligro ante
 de llevar a cabo cualquier operación.

Online Support

Use the World Wide Web (WWW) or the IBM PC
Company BBS to download Diagnostic, BIOS Flash, and
Device Driver files.

File download address is:

http://www.us.pc.ibm.com/files.html

The IBM PC Company BBS can be reached at (919)
517-0001.

IBM Online Addresses:

The HMM manuals online address is:

http://www.us.pc.ibm.com/cdt/hmm.html

The IBM PC Company Support Page is:

http://www.us.ibm.com/support/index.html

The IBM PC Company Home Page is:

http://www.pc.ibm.com

Contents

Netfinity 5500 - Type 8660

General Checkout

The server diagnostic programs are stored in nonvolatile random-access memory (NVRAM) on the on the system board. See "Diagnostic Programs" on page 10. These programs are the primary method of testing the major components of your server: the system board, Ethernet controller, video controller, RAM, keyboard, mouse (pointing device), diskette drive, serial port, and parallel port. You can also use them to test some external devices.

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

When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages might not occur the next time you run the test.

A failed system might be part of a shared DASD cluster (two or more systems sharing the same external storage device(s)). Prior to running diagnostics, verify that the failing system is not part of a shared DASD cluster.

A system might be part of a cluster if:

- The customer identifies the system as part of a cluster.
- One or more external storage units are attached to the system and at least one of the attached storage units is additionally attached to another system or unidentifiable source.
- One or more systems are located near the failing system.

If the failing system is suspect to be part of a shared DASD cluster, all diagnostic tests can be run except diagnostic tests which tests the storage unit (DASD residing in the storage unit) or the storage adapter attached to the storage unit.

(CONTINUED)

Notes

1. For systems that are part of a shared DASD cluster, run one test at a time in looped mode. Do not run all tests in looped mode, as this could enable the DASD diagnostic tests.

2. If multiple error codes are displayed, diagnose the first error code displayed.

3. If the computer hangs with a POST error, go to the "Symptom-to-FRU Index" on page 263.

4. If the computer hangs and no error is displayed, go to "Undetermined Problems" on page 286.

5. Power Supply problems, see "Symptom-to-FRU Index" on page 263.

6. Safety information, see "Safety Information" on page 300.

7. For intermittent problems, check the error log; see, "Error Logs" on page 99.

001

IS THE SYSTEM PART OF A CLUSTER?

Yes No

> ### 002
>
> Go to Step 004.

003

Schedule maintenance with the customer. Shut down all systems related to the cluster. Run storage test.

004

– Power-off the computer and all external devices.
– Check all cables and power cords.
– Set all display controls to the middle position.
– Power-on all external devices.
– Power-on the computer.
– Check the control panel system error LED; if on, see "Control Panel System Error LED" on page 266.
– Check the error log. If an error was recorded by the system, see "Symptom-to-FRU Index" on page 263.
– Start the Diagnostic Programs. See "Running Diagnostic Programs" on page 13.
– Check for the following responses:

   1. No beep.
   2. Readable instructions or the Main Menu.

(Step **004** continues)

004 (continued)
DID YOU RECEIVE THE CORRECT RESPONSES?
Yes No

> **005**
>
> Find the failure symptom in "Symptom-to-FRU Index" on page 263.

006

– Run the Diagnostic Programs. If necessary, refer to "Running Diagnostic Programs" on page 13.
 If you receive an error, go to "Symptom-to-FRU Index" on page 263.
 If the diagnostics completed successfully and you still suspect a problem, see "Undetermined Problems" on page 286.

Diagnostic Tools

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

Diagnostic Programs

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your server: the system board, Ethernet controller, video controller, RAM, keyboard, mouse (pointing device), diskette drive, serial port, and parallel port. You can also use them to test some external devices.

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

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

Power-on Self Test (POST)

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

POST does the following:

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

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

While the memory is being tested, the amount of available memory appears on the screen. These numbers advance as the server progresses through POST and the final number that appears on the screen represents the total amount of memory available. If POST finishes without detecting any problems, a single beep sounds, the first screen of your operating system or application program appears, and the System POST Complete (OK) light is illuminated on the information LED panel.

If POST detects a problem, more than one beep sounds and an error message appears on your screen.

Note: A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages usually will not occur the next time you run the test.

For a complete list of error codes, see "Symptom-to-FRU Index" on page 263.

POST Beep Codes

POST generates beep codes to indicate successful completion or the detection of a problem.

- One beep indicates the successful completion of POST.
- For a complete list of error codes, see "Symptom-to-FRU Index" on page 263.

Error Messages

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

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

POST Error Messages: POST error messages occur during startup when POST finds a problem with the hardware or detects a change in the hardware configuration. For more information, see "Symptom-to-FRU Index" on page 263..

Diagnostic Error Messages: Diagnostic error messages occur when a test finds a problem with the server hardware. These error messages are alphanumeric and they are saved in the Test Log. For more information, see "Error Symptoms" on page 272.

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

System Error Log: The system error log contains all error and warning messages issued during POST and all system status messages from the the system management processor. See "System Error Log" on page 99 for information about how to view the system error log.

Option Diskettes: An optional device or adapter can come with an Option Diskette. Option Diskettes usually contain option-specific diagnostic test programs or configuration files.

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

Diagnostic Programs

Use the following information to run the diagnostic programs. These programs are designed to test the IBM Netfinity 5500. If you want to test a non-IBM product, refer to the information that comes with that product.

> **Note**
>
> When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages usually will not occur the next time you run the test.

Running Diagnostic Programs: While you are running the diagnostic programs, **F1** displays Help information. Pressing **F1** from within a help screen provides a help index from which you can select different categories. Pressing **Esc** exits Help and returns to where you left off.

> **Notes**
>
> 1. To run the diagnostic programs, you must start the server with the highest level password.
>
>   That is, if you enter the power-on password and an administrator password is set, you cannot run the programs. You can only view the error messages in the Test Log.
>
>   You must enter the administrator password to run the diagnostic programs.
> 2. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem persists, have the system serviced.
> 3. If the diagnostic tests do not find a problem but the problem persists during normal operations, see "Symptom-to-FRU Index" on page 263 and look for the problem symptom.
> 4. You might have to install a wrap connector on your active parallel or serial port to obtain accurate test results for these ports.
> 5. You might need a scratch diskette to obtain accurate test results when testing the diskette drive.
> 6. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

To start the diagnostic programs:

1. Turn on the server and watch the screen.

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

2. When the message F2 for Diagnostics appears, press **F2.**.

   If a power-on password or administrator password is set, the server prompts you for it. Type in the appropriate password; then, press **Enter.**

3. The Diagnostic Programs screen appears.

4. Select either **Extended** or **Basic** from the top of the screen.

5. Select the test you want to run from the list that appears; then, follow the instructions on the screen.

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

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

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

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

To view the Test Log:

1. Turn on the server and watch the screen.

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

2. When the message F2 for Diagnostics appears, press **F2.**

   If a power-on password or administrator password is set, the server prompts you for it. Type in the appropriate password; then, press **Enter.**

3. The Diagnostic Programs screen appears.

4. Select **Utility** from the top of the screen.

5. Select **View Test Log** from the list that appears; then, follow instructions on the screen.

Features

The following table summarizes the features of the Netfinity 5500.

Microprocessor
- Intel® Pentium® II microprocessor with MMX™ technology
- 16 KB of level-1 cache
- 512 KB of level-2 cache
- Expandable to two microprocessors

Memory
- Standard: 128 MB (min.), expandable to 1 GB
- 100 MHz synchronous dynamic random access memory (SDRAM), error correcting code (ECC)
- Four dual inline memory-module (DIMM) sockets

Diskette Drive
- Standard: One 3.5-inch, 1.44 MB

Hard Disk Drives
- Up to six hot-swappable hard disk drives supported

CD-ROM Drive
- Standard: 32X IDE

Keyboard and Auxiliary Device
(some models)
- Keyboard
- Mouse

Expansion Bays
- Six slim (1-inch) or three half-high (1.6-inch) hot-swap drive bays
- Three 5.25-inch removable-media bays (one used by CD-ROM drive)
- The IBM Netfinity NetBAY3 (tower model only) allows installation of options to provide extra expansion bays

Expansion Slots

Up to seven adapters can be installed.
- Four 32-bit hot-plug PCI slots
- Two standard (non-hot-plug) 32-bit PCI slots
- One 16-bit ISA slot

Upgradable Firmware
- BIOS, diagnostics, system management processor, and ServeRAID II upgrades (when available) can update EEPROMs on the system board

Security Features
- Door and top cover lock (tower model only)
- NetBAY3 bezel lock
- Power-on and administrator passwords
- Selectable drive-startup
- Keyboard password
- Systems management security
  - User log-in password
  - Read-only or read/write access
  - Dial back

Predictive Failure Analysis (PFA) Alerts
- Power supplies
- Fans
- Memory
- Hard disk drives
- Microprocessors

Integrated Functions
- Two serial ports
- Two universal serial bus (USB) ports
- One parallel port
- Mouse port
- Keyboard port
- Video port

- IBM ServeRAID II controller (two channels) on system board
- 10BASE-T/100BASE-TX Ethernet port (controller on system board)
- For redundant Ethernet capability, an optional network interface card (NIC) is available
- System management processor on system board
- Dedicated systems management I/O port
- Video controller (with 1 MB video memory) compatible with:
  - Super video graphics array (SVGA)
  - Video graphics adapter (VGA)

Power Supply

- 400 W (115–230 V ac)
- Automatic voltage range selection
- Built-in overload and surge protection
- Automatic restart after a loss of power
- For redundant power, an optional 400 W power supply is available

Redundant Cooling

- Three hot-swap fans

Additional Service Information

The following additional service information supports
Netfinity 5500 - Type 8660

Administration and Monitoring Utility Program

The IBM ServeRAID Administration and Monitoring utility program monitors your ServeRAID controller while your network operating system is up and running.

The Administration and Monitoring utility program comes in three versions:

- IBM OS/2
- Novell NetWare/IntraNetware
- Microsoft Windows NT and Windows 95

The OS/2 and NetWare/IntraNetware utility programs run on the server in the stand-alone mode only.

The Windows NT/Windows 95 Administration and Monitoring utility program runs on the server in the stand-alone mode, or in a client/server environment in the client/server mode. You can use the stand-alone mode to administer and configure your ServeRAID controller while at the server. You can use the client/server mode to administer and configure ServeRAID controllers and adapters that are in servers anywhere on your network. The TCP/IP networking protocol supports the client/server mode and allows connections to IBM OS/2, Microsoft Windows NT, Novell NetWare/IntraNetware and SCO OpenServer operating systems.

> **Note**
>
> The Windows NT and Windows 95 utility programs are required to use the logical-drive migration feature. See "Logical Drive Migration Administration" on page 38.
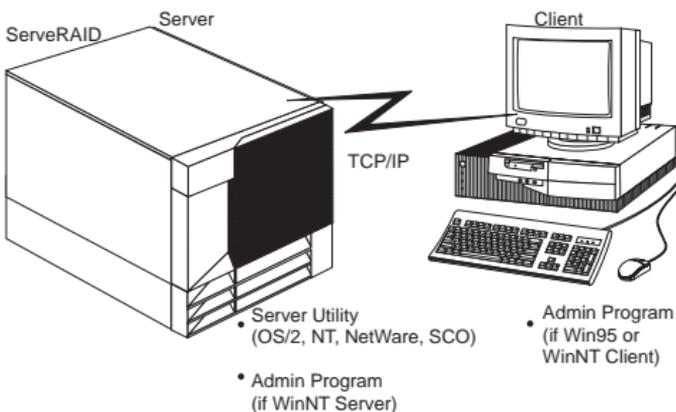
This section provides installation instructions for the following ServeRAID utility programs.

- The Administration and Monitoring utility program runs on a Windows-based system (Windows 95, Windows NT workstation, or Windows NT server).
- Server Utilities
  - OS/2 Server Utility

- – Microsoft Windows NT Server Utility
- – Novell NetWare/Intranetware Server Utility
- – SCO OpenServer Utility

You can obtain updates to the installation instructions for the ServeRAID utility programs from the World Wide Web. See "Online Support" on page iv.

Before You Begin

- Be sure that your ServeRAID controller is configured properly.
- Be sure that your network operating system is installed and functional.
- If you are using Microsoft Windows NT, you can use the Administration and Monitoring utility program in the client/server mode (across the network) or in the stand-alone mode (at the server).
  - – See "Installing the Server Utility Programs" on page 20 for client/server mode instructions.
  - – See "Installing the Administration and Monitoring Utility Programs Using Diskettes" on page 25 for stand-alone mode instructions.
- If you are using OS/2, NetWare/IntraNetware, or SCO OpenServer, you must use the Administration and Monitoring utility program in the client/server mode. Requirements for this environment include:
  - – A Windows NT or Windows 95 client running the IBM ServeRAID Administration and Monitoring utility program
  - – A network adapter or controller with proper cabling for access to the client system
  - – The TCP/IP networking protocol installed on both the server and client systems
  - – The IBM ServeRAID Administration and Monitoring Server utility program installed on the client system
    - - See "Installing the Server Utility Programs Using Diskettes" on page 20 to install your server utility program.
    - - See "Installing the Administration and Monitoring Utility Programs Using Diskettes" on page 25 to install the Administration and Monitoring utility program on a Windows 95 or Windows NT system.

Installing the Server Utility Programs

> **Note**
>
> If you are installing the OS/2, Novell
> NetWare/Intranetware, or SCO OpenServer versions
> of the server utility programs, you must use diskettes.
> Go to

You can install the server utility programs in one of two
ways:

- Using ServerGuide (see "Installing the Server Utility
  Programs Using ServerGuide")
- Using diskettes (see "Installing the Server Utility
  Programs Using Diskettes")

***Installing the Server Utility Programs Using
ServerGuide:*** You can install the server utility programs
using the CoPilot feature of ServerGuide. Refer to your
ServerGuide package for more information.

Once you have installed the server utility programs, go to
"Using the Server Utility Programs" on page 23 for
information on how to use them.

***Installing the Server Utility Programs Using
Diskettes:*** This section contains installation instructions
and information about using the IBM OS/2 server utility,
Microsoft Windows NT server utility, Novell
NetWare/IntraNetware server utility, and SCO OpenServer
utility.

> **Note**
>
> You must first make the ServeRAID diskettes using
> the Diskette Factory feature of ServerGuide. Refer to
> your ServerGuide package for instructions.

IBM OS/2 Server Utility Programs: **To install the
IBM OS/2 server utility program using diskettes:**

1. Insert the *IBM ServeRAID Device Driver Diskette* into
   the diskette drive.
2. Create an IPSRAID directory on the hard disk. Type:

   md d:\ipsraid

   (where *d:* is the hard disk drive letter)
3. Copy the following file to the target directory. Type:

   copy a:\remote\servers\os2\ipsadm.exe d:\ipsraid

   (where *a:* is the diskette drive letter and *d:* is the hard
   disk drive letter)
4. Copy the icon file to the target directory. Type:

   copy a:\remote\servers\os2\ipsadm.ico
   d:\ipsraid\ipsadm.ico

(where *a:* is the diskette drive letter and *d:* is the hard disk drive letter)

5. Create an icon for the application:
    a. Open the template folder from the OS/2 Systems folder on the Desktop.
    b. Drag a program template onto the Desktop.
    c. At the Program Tab, type the following path and file name:

       d:\ipsraid\ipsadm.exe

       (where *d:* is the hard disk drive letter)
    d. At the General Tab, type the following as the title:

       IPSRAID Admin/Monitor

    e. Find the current icon,

       d:\ipsraid\ipsadm.ico

       (where *d:* is the hard disk drive letter)
6. Double-click on the new icon to access the server utilities.
7. Continue with "Using the Server Utility Programs" on page 23.

Microsoft Windows NT Server 4.x Utility Program: **To install the Microsoft Windows NT 4.x server utility program :**

1. Insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive.
2. Create an IPSRAID directory on the hard disk. Type:

   md d:\ipsraid

   (where *d:* is the hard disk drive letter)
3. Copy the following file to the target directory. Type:

   copy a:\remote\servers\nt\ipsadm.exe
   d:\ipsraid\ipsadm.exe

   (where *a:* is the diskette drive letter and *d:* is the hard disk drive letter)
4. Copy the icon file to the target directory. Type:

   copy a:\remote\servers\nt\ipsadm.ico
   d:\ipsraid\ipsadm.ico

   (where *a:* is the diskette drive letter and *d:* is the hard disk drive letter)
5. To create a new shortcut for the utility:
    a. Using the right mouse button, click on the Desktop and select **New;** then, select **Shortcut.**
    b. In the **Create Shortcut** window, type:

       d:\ipsraid\ipsadm.exe

       (where *d:* is the hard disk drive letter)

          or

       If you are not sure of the path and file name, click on the **Browse** button; then, find and select the file:

d:\ipsraid\ipsadm.ext

(where d: is the drive letter)
   c. Click on **Next.**
   d. In the Select a Title for the Program window, type:

      ipsraid admin/monitor server

   e. Click on **Finish** and an icon appears on your desktop.
6. To create a customized icon for the shortcut you just created:
   a. Using the right mouse button, click on the icon that you created for your shortcut; then, select **Properties.**
   b. Click on the **Shortcut** note tab.
   c. Click on **Change Icon.**
   d. Click on **OK** in the information window.
   e. In the **Change Icon window,** type:

      d:\ipsadm\ipsadm.ico

      (where d: is the hard disk drive letter)

         or

      If you are not sure of the path and file name, click on the **Browse** button; then, find and select the file:

      d:\ipsadm\ipsadm.ico

      (where d: is the hard disk drive letter)

   f. Click on **OK** for the icon.
   g. Click on **OK** for the program properties.
   h. Double-click on the new icon to access the server utilities.
7. Continue with "Using the Server Utility Programs" on page 23.

Novell NetWare/Intranetware Server Utility Program: **To install the Novell Netware 3.x/IntraNetware 1.0 server utility program, do** one **of the following:**

- From a DOS prompt:
   1. Insert the IBM ServeRAID Device Driver Diskette into the diskette drive.
   2. Type:

      copy a:\remote\servers\netware\ipsadm.nlm
      d:\nwserver\ipsadm.nlm

      (where a: is the diskette drive letter and d:\nwserver is the hard disk drive and directory where NetWare/IntraNetware is installed)
   3. Load the NLM from the system console, type:

      load d:\nwserver\ipsadm.nlm

      (where d:\nwserver is the hard disk drive and directory where NetWare/IntraNetware is installed)

4. Continue with "Using the Server Utility Programs" on page 23.

- From a client workstation on the network:
    1. Insert the *IBM ServeRAID Device Driver Diskette* into a diskette drive, such as drive a:.
    2. Type:

       copy a:\remote\servers\netware\ipsadm.nlm
       f:\system\ipsadm.nlm

       (where *a:* is the diskette drive letter and *f* is the SYS volume)
    3. Load the NLM from the system console. Type:

       load ipsadm.nlm
    4. Continue with "Using the Server Utility Programs."

SCO OpenServer Server Utility Program: The SCO OpenServer Server utility program is installed from the *SCO Open Server Boot-Time Loadable (BTLD) Diskette* during the installation of the IBM ServeRAID device driver. The file is installed in the **/usr/bin** directory.

To run the program, type **ipsadm &** at the command prompt.

If the program does not run, use the following instructions to manually install the SCO OpenServer 5.X utility program.

1. Insert the *IBM ServeRAID SCO Open Server Boot-Time Loadable (BTLD) Diskette* into a diskette drive.
2. Create a directory for the server utility. Type:

   mkdir /ipsraid
3. Mount the diskette drive. Type:

   mount /dev/fd0 /mnt
4. Copy the following file. Type:

   cp /mnt/ipsraid/new/usr/bin/ipsadm /ipsraid/ipsadm
5. Unmount the diskette drive. Type:

   umount /mnt
6. To start the server utility to run in the background, type:

   ./ipsadm &
7. Continue with "Using the Server Utility Programs."

Using the Server Utility Programs: You can use command-line parameters to customize your ServeRAID programs.

To use command-line parameters, issue the IPSADM command in the following format:

IPSADM <parameter 1> <parameter 2> ...

Descriptions of the optional command-line parameters are as follows:

Command	Description
-?	The -? command displays the help for the valid parameters.
-p:number	The -p:*number* command specifies the port number on which the server will check for client connections.
	The *port number* is a parameter used in TCP/IP to distinguish between different services on a single server. The default for the ServeRAID utilities is port number 1087. You can change the port number on the command line if another service on the system is using 1087.
-d	The -d command disables logging of messages to the display.
-f	The -f command specifies to log messages to the default file, IPSADM.LOG
-f:filename	The -f:*filename* command specifies the name of a file in which to log messages.
	Messages can be logged to the screen or to a text file on the system. The default setting logs messages to the standard output (usually the display), but you can disable this by using the -d parameter. The -f parameter enables logging messages to a file. Messages consist of startup information, connecting and disconnecting clients, and error messages.
-s:filename	The -s:*filename* command specifies the name of the file that contains security information. For more information about server security, see "Server Security File."

Server Security File: Security information is maintained in an optional text file on the server system. The file stores unencrypted user names and unencrypted passwords; therefore, the file must be kept in a secure directory.

When user names and passwords are entered on the Administration and Monitoring utility program (the client), they are encrypted for delivery to the server. The server decrypts the user names and passwords to verify authorized access to the ServeRAID controller. If the verification is successful, the ServeRAID controller accepts commands from the client. If no security file is present in the default directory or the directory specified by the -s

parameter, the ServeRAID controller disables security and accepts commands from any client connection.

The security file contains one user name and password combination per line. The user name and password strings are separated by a colon (:), and each string can have a maximum of eight characters.

Server Utility Name Resolution: The server utility program relies on name resolution to determine the host name from the client that is trying to connect. When a client is trying to access a remote server, the server tries to look up the name of the connecting client. The method used to look up the name is determined by the configuration of the server. Some possible methods for this are Domain Name Servers (DNS) or *HOSTS* files. With certain configurations, some timing delays might occur due to misconfiguration or inability to access the DNS. If problems occur, check your network configuration.

Installing the Administration and Monitoring Utility Program:
You can install the Administration and Monitoring utility program in one of two ways:

- Using ServerGuide (see "Installing the Administration and Monitoring Utility Program Using ServerGuide")
- Using diskettes (see "Installing the Administration and Monitoring Utility Programs Using Diskettes")

--- **Note** ---

If you are installing the OS/2, Novell NetWare/IntraNetware, or SCO OpenServer versions of the Administration and Monitoring program, you must use diskettes. Go to "Installing the Administration and Monitoring Utility Programs Using Diskettes" for instructions.

Installing the Administration and Monitoring Utility Program Using ServerGuide: You can install the Administration and Monitoring utility program using the CoPilot feature of ServerGuide. Refer to your ServerGuide package for more information.

Once you have installed the Administration and Monitoring utility program, go to "Using the Administration and Monitoring Utility Program" on page 26 for information on how to use it.

Installing the Administration and Monitoring Utility Programs Using Diskettes

> ─── **Note** ───
>
> You must first make the ServeRAID diskettes using
> the Diskette Factory feature of ServerGuide. Refer to
> your ServerGuide package for instructions. Also, if
> you are using OS/2, Novell NetWare/IntraNetware, or
> SCO OpenServer, you must use the Administration
> and Monitoring utility program in the client/server
> mode.

**To install the Administration and Monitoring utility
program using diskettes:**

1. Ensure that your system is turned on and Windows
   NT or Windows 95 is installed. Refer to the
   documentation that comes with your operating system
   for installation instructions.
2. Insert the *Administration and Monitoring Utility
   Program Diskette* that you created into the diskette
   drive.
3. At the **Run** prompt, type:

   a:setup
4. Press **Enter**; then, follow the instructions that appear
   on the screen.

For instructions on how to use the Administration and
Monitoring utility program, see "Using the Administration
and Monitoring Utility Program."

**Using the Administration and Monitoring
Utility Program:** You can use the Administration and
Monitoring utility program to monitor your ServeRAID
controllers, view the ServeRAID configuration and
associated devices, rebuild an array, reassign a drive to
replace a defunct drive, rebuild a logical drive, create a
logical drive, create an array, delete an array, dynamically
increase the logical drive size, change RAID levels, and
much more.

**To start the Administration and Monitoring utility
program:**

- Double-click on the IBM ServeRAID Administration
  icon.

  or
- Select **IBM ServeRAID Administration** from the start
  menu.

  The Administration and Monitoring utility program
  starts in stand-alone mode.

The following illustration is an example of the screen that appears.
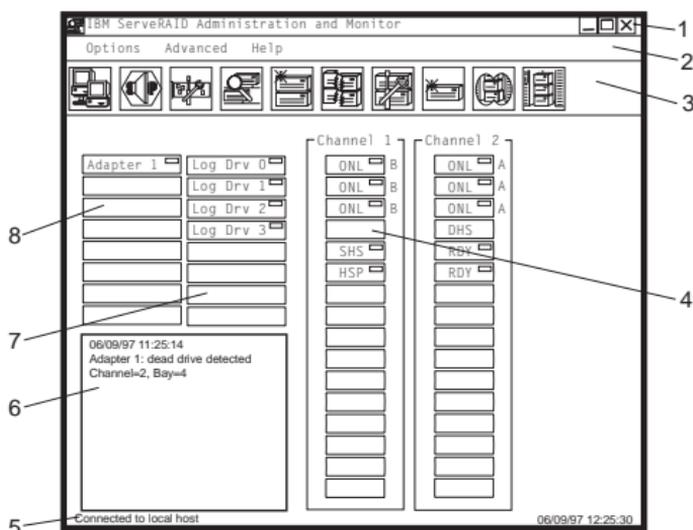
Descriptions of the labeled areas are as follows:

1. Title Bar   Displays the title of the application, along with the minimize icon, the maximize icon, and the close icon.

2. Menu Bar   Displays the pull-down menus for all supported functions.

3. Tool Bar   Displays the icons for the commonly used functions.

4. Device Area   Displays information for each device connected to the physical channel of the ServeRAID controller. This includes the device states and the array identifiers, if applicable.

5. Status Bar   Displays help for the area where the cursor is currently pointing. The date and time are also displayed.

6. Status Window   Displays messages regarding the operational status of each ServeRAID controller.

7. Logical Drive Area Displays the number of logical drives that you created and the status of each logical drive.

8. Adapter Area   Displays the number of ServeRAID controllers installed in the server and the status of each ServeRAID controller.

Options Pull-Down Menu: This section provides information about the following three choices available from the Options pull-down menu on the main screen of the Administration and Monitoring utility:

• Network Settings
• General Options

- Alert Options

Network Settings: If you want to monitor ServeRAID controllers across a network, you must switch to the client/server mode.

You can use the Network Settings dialog box to select and connect to servers in your network that have an IBM ServeRAID controller installed.

To select and connect to a server:

1. Click on the ![icon] icon on the tool bar or select **Network Settings** from the **Options** pull-down menu.

   A screen similar to the following appears.

```
┌─────────────────────────────────────────┐
│  Network Settings                     X  │
│                                          │
│   ◯   Stand-alone              ┌───────┐ │
│                                │Connect│ │
│                                └───────┘ │
│   ◉   Client/Server            ┌───────┐ │
│                                │Cancel │ │
│   ┌ Client/Server Settings ────────────┐ │
│   │ User Name:        Password         │ │
│   │ ┌────────────┐   ┌──────────────┐  │ │
│   │ │ ServeRAID  │   │ * * * * * *  │  │ │
│   │ └────────────┘   └──────────────┘  │ │
│   │ ◉ TCP/IP  ┌─────┐    ┌────────┐    │ │
│   │           │ Add │    │ Delete │    │ │
│   │           └─────┘    └────────┘    │ │
│   │ Host Name: Port Number (Optional)  │ │
│   │ ┌──────────────────────────────┐   │ │
│   │ │ ips: 1087                  ▼ │   │ │
│   │ └──────────────────────────────┘   │ │
│   │                                    │ │
│   └────────────────────────────────────┘ │
└─────────────────────────────────────────┘
```

2. Select the **Client/Server** radio button.
3. If security is enabled on the server to which you are connecting, type in your **User Name** and **Password** as defined by the security file on the server to which you are connecting. (See "Server Security File" on page 24 for information about the security file).
4. Type in either the **Hostname** or the TCP/IP **Address** of the system, or select them from the pull-down list.

   Note

   If your server was started on any port other than the default (1087), type in a colon and the correct port number for your configuration (for example: ServeRAID:1088) after the Hostname or TCP/IP Address that you just entered.

5. Click on **Connect** to initiate a connection with the remote system.

General Options: You can use the General Options screen to enable, disable, or reset the alarm; or to set the polling options.

When you select General Options from the Options pull-down menu, a screen similar to the following appears.

```
┌─────────────────────────────────────────────┬───┐
│ General Options                             │ X │
├─────────────────────────────────────────────┴───┤
│  ┌─ Alarm Options ──────────────────────────┐   │
│  │                                           │   │
│  │   ┌─┐                                     │   │
│  │   │✓│ Disable Alarm      │ Reset Alarm │  │   │
│  │   └─┘                                     │   │
│  │                                           │   │
│  └───────────────────────────────────────────┘   │
│  ┌─ Polling Options ────────────────────────┐   │
│  │                                           │   │
│  │                            ┌─┐▲           │   │
│  │   Poll Adapter Every  │5│  └─┘▼ Seconds   │   │
│  │                                           │   │
│  └───────────────────────────────────────────┘   │
│              │   Cancel   │     │     OK     │    │
└─────────────────────────────────────────────────┘
```

Enabling, Disabling, or Resetting the Alarm: The alarm alerts you if any of the following conditions occur:

- A DDD hard disk drive has been detected
- A Predictive Failure Analysis (PFA) event has occurred
- A ServeRAID controller is not responding

To enable or disable the alarm, click on the box for **Disable Alarm** on the General Options screen. Placing a check in the box disables the alarm; removing the check enables the alarm.

To reset the alarm, click on the ⟨🔊⟩ icon or click on **Reset Alarm** on the General Options menu. Resetting the alarm turns off the alarm for the current failure. It does not disable the feature.

Polling Options: You can use the General Options screen to define how often the ServeRAID controller will *poll*, or check your server for any changes that might have occurred in the server (such as a rebuild or a drive entering the defunct (DDD) state). You can set a time interval of from five to 60 seconds. The default time interval setting is five seconds.

The following events are polled for:

- Rebuild started
- Rebuild completed

- Synchronization started
- Synchronization completed
- Migration started
- Migration completed
- PFA event detected
- Dead drive detected
- ServeRAID controller not responding to commands

Netfinity Alert Options: Netfinity alerts allow system administrators who are using the Netfinity Manager to configure the ServeRAID Administration and Monitoring utility program, to notify the Netfinity Alert Manager of various activities occurring on the server.

To configure the settings for the Netfinity alerts:

1. Open the Options pull-down menu.
2. Click on **Alert Options.**
3. Click on **Netfinity Alerts.**

   A screen similar to the following appears.

```
┌─────────────────────────────────────────────┐
│  Netfinity Alerts                        ✕   │
│                                              │
│       ☑ Enable Netfinity Alerts              │
│                                              │
│          ☐ Alert Information Messages        │
│                                              │
│          ☑ Alert Warning Messages            │
│                                              │
│          ☑ Alert Fatal Messages              │
│                                              │
├─────────────────────────────────────────────┤
│  Send Test Alert │   Cancel   │     OK       │
└─────────────────────────────────────────────┘
```

4. To enable all of the Netfinity alerts, click on the check box next to Enable Netfinity Alerts.
5. To disable any of the Netfinity alerts:
   a. Verify that there is a check in the check box next to Enable Netfinity Alerts.
   b. Click on the check box next to the specific alert or alerts that you want to disable.
6. To test the Netfinity alerts, click on the **Send Test Alert** button. This will send a Netfinity alert and test message to the Netfinity Alert Manager.

If Netfinity alerts are enabled, the ServeRAID controller relays three types of messages to the Netfinity Alert Manager:

- Information messages
  - Rebuild started
  - Rebuild completed
  - Synchronization started

- Synchronization completed
- Migration started
- Migration completed
- Warning messages
  - PFA event detected
- Critical messages
  - Dead drive detected
  - ServeRAID controller not responding to commands

By knowing what these types of messages are, the system administrator can then configure Netfinity Manager with instructions for monitoring the server configuration and specifying the appropriate action to take if an alert is issued. For example, the system administrator can program Netfinity Manager to dial out through a modem to a specified phone number if a defunct drive is detected on any server across the network.

Using the ServeRAID Administration

Functions: This section describes how to administer your ServeRAID controller using the following functions:

- "Array Administration"
- "Logical Drive Administration" on page 34
- "Logical Drive Migration Administration" on page 38
- "Physical Device Administration" on page 42
- "ServeRAID Controller Administration" on page 45

Array Administration: This section contains instructions for creating a disk array and deleting a disk array using the ServeRAID Administration and Monitoring utility program.

Creating Disk Arrays

Disk arrays provide access to hard disk drives in a logical manner. Hard disk drives are grouped in a disk array, and divided into logical drives for access by the operating system.

To create a disk array:

1. Click on the ⬜ icon on the tool bar or select **Manage Disk Arrays** from the **Advanced** pull-down menu; then, select **Create Disk Array.**

A screen similar to the following appears.

```
┌─────────────────────────────────────┬───┐
│ Select Ready Drives                 │ ✕ │
├─────────────────────────────────────┴───┤
│ Select 1 or more RDY (Ready)             │
│ drives that will be used to              │
│ create the new array                     │
│ ┌────────┐         ┌────────┐            │
│ │ Cancel │         │  OK    │            │
│ └────────┘         └────────┘            │
└──────────────────────────────────────────┘
```
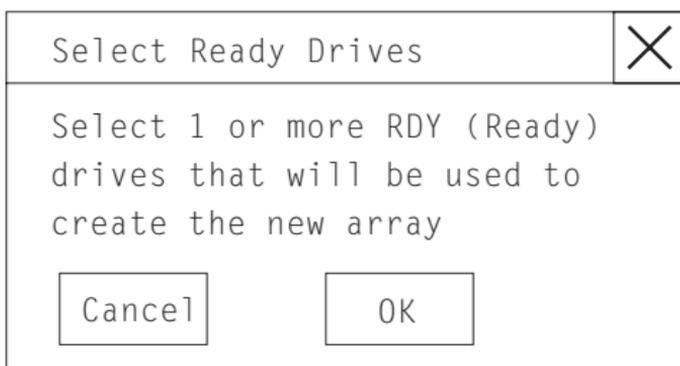
2. Select one or more Ready (RDY) drives for the new disk array.

   To select a RDY drive, click on the desired RDY button from the device area. A disk array identifier appears beside each RDY drive added to the disk array.

   If you change your mind about a selected drive, select the button again to remove the selected drive from the disk array.

3. Click on **OK** to define a logical drive for the new array.

   A screen similar to the following appears.

```
┌──────────────────────────────────────────────────────┬───┐
│ Create Logical Drive                                  │ ✕ │
├───────────────────────────────────────────────────────┴───┤
│ Array  Free        Raid      Requested        ┌────────┐   │
│ ID     Space MB)   Level     Space            │  OK    │   │
│ ┌─────────────┐  ┌───────┐  ┌───────────┐     └────────┘   │
│ │C   2150   ▼ │  │ 0   ▼ │  │   2150    │     ┌────────┐   │
│ └─────────────┘  └───────┘  └───────────┘     │ Cancel │   │
│                                               └────────┘   │
└────────────────────────────────────────────────────────────┘
```
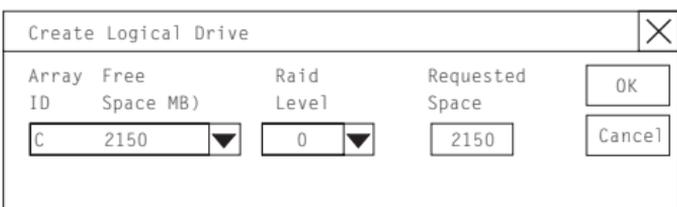
4. Select the RAID level that you want to assign to the logical drive from the pull-down list.

   The RAID levels available depend on the number of hard disk drives that you select for the disk array.

   • If you have one hard disk drive, the logical drive can be only RAID level 0.
   • If you have two or more hard disk drives, the logical drive can be RAID level 0 or 1.
   • If you have three or more hard disk drives, the logical drive can be RAID level 0, 1, or 5.

5. Type the size, in megabytes, that you want to assign to the logical drive in the **Requested Space** entry field.

Notes

Notes:

1. The Requested Space default value is calculated as the maximum logical drive size available for the RAID level assigned.
2. The Requested Space must be between 2 MB and the maximum available.
3. The actual logical drive size that appears might be slightly different from what you type in the **Space Requested** field.

   The size of a logical drive is determined by the RAID level and the number of hard disk drives. For example, a disk array consisting of three, 1 GB hard disk drives with a requested RAID level 0 logical drive of 1000 MB will actually contain only 999 MB because the data is striped across all three drives, with 333 MB on each drive.
---

6. Click on **OK** to create the disk array.
7. You *must* initialize all new logical drives before storing data in them. See "Initializing Logical Drives" on page 36.

Note

All new RAID level 5 logical drives are automatically synchronized when you initialize them.

Deleting Disk Arrays

Deleting a disk array deletes all logical drives that are defined in that array. All data and programs in the disk array are lost during this procedure.

Note

For some operating systems, deleting a disk array and its associated logical drives will change the drive letters that are assigned to the remaining drives when you restart the system.

Attention

Before proceeding, ensure that you have backed up any data and programs that you want to save.

To delete a disk array:

1. Click on the [icon] icon on the tool bar or select **Manage Disk Arrays** from the **Advanced** pull-down menu; then, select **Delete Disk Array.**

   A screen similar to the following appears.

```
┌─────────────────────────────────────┐
│ Delete Disk Array              [ X ] │
│                                      │
│                          ┌────────┐  │
│         Array ID         │   OK   │  │
│                          └────────┘  │
│         ┌───┬───┐         ┌────────┐ │
│         │ B │ ▼ │         │ Cancel │ │
│         └───┴───┘         └────────┘ │
│         ┌───────┐                    │
│         │ A     │                    │
│         │ B     │                    │
│         └───────┘                    │
│                                      │
│                                      │
└─────────────────────────────────────┘
```
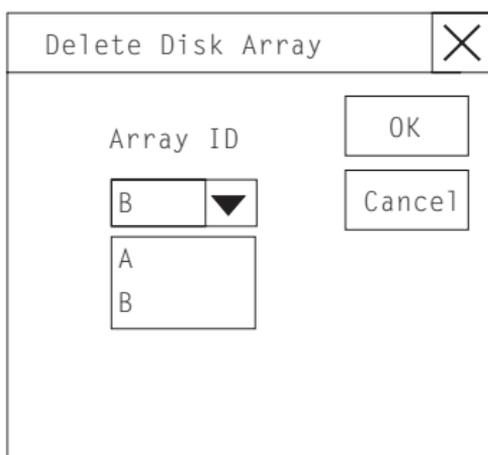
2. Select the disk array ID that you want to delete from the pull-down list.
3. Click on **OK** to delete the disk array.

Logical Drive Administration: This section contains instructions for creating a logical drive, initializing and synchronizing a logical drive, and accessing blocked logical drives using the ServeRAID Administration and Monitoring utility program.

Creating Logical Drives
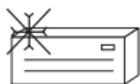
> [icon] You *must* create at least one logical drive for each disk array. You can create up to eight logical drives.

If you plan to use the logical-drive migration (LDM) feature, do not create more than seven logical drives. The LDM procedure requires one free logical drive to perform the migration. See "Logical Drive Migration Administration" on page 38 for more information.

To create a logical drive:

.

1. Click on the [icon] icon on the tool bar or select **Manage Logical Drive** from the **Advanced** pull-down menu; then, select **Create Logical Drive.**

   A screen similar to the following appears.

```
┌─────────────────────────────────────────────────┐
│ Create Logical Drive                          ⊠ │
│                                                 │
│ Array   Free        Raid       Requested   ┌──────┐ │
│ ID      Space MB)   Level      Space       │  OK  │ │
│ ┌──────────┐   ┌──────────┐  ┌──────────┐  └──────┘ │
│ │A  1762  ▼│   │ 0      ▼│  │  881     │  ┌──────┐ │
│ └──────────┘   └──────────┘  └──────────┘  │Cancel│ │
│ ┌──────────┐                               └──────┘ │
│ │A  1762   │                                       │
│ │B  1906   │                                       │
│ └──────────┘                                       │
│                                                   │
└─────────────────────────────────────────────────┘
```
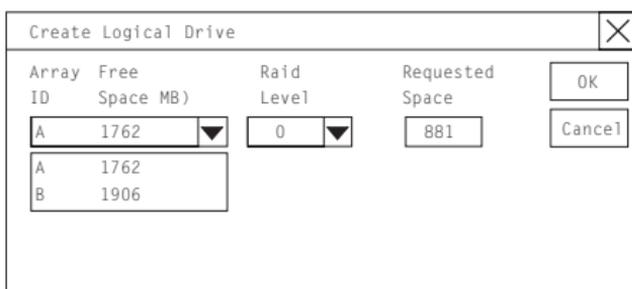
2. Select the disk array ID for which you want to create
   a logical drive.

3. Select the RAID level that you want to assign to the
   logical drive from the pull-down list.

   The RAID levels available depend on the number of
   hard disk drives that you select for the disk array.

   Notes:

   a. If you have one hard disk drive, the logical drive
      can be only RAID level 0.
   b. If you have two or more hard disk drives, the
      logical drive can be RAID level 0 or 1.
   c. If you have three or more hard disk drives, the
      logical drive can be RAID level 0, 1, or 5.
   d. If you plan to use the Change RAID Level
      feature of logical drive migration, you must
      assign the same RAID level to all of the logical
      drives in the array. See "Changing RAID Levels"
      on page 39 for more information.

4. Type the size, in megabytes, that you want to assign
   to the logical drive in the **Requested Space** entry
   field.

   Notes:

   a. The Requested Space default value is calculated
      as the maximum logical drive size available for
      the RAID level assigned.
   b. The Requested Space must be between 2 MB
      and the maximum available.
   c. The actual logical drive size that appears might
      be slightly different from what you type in the
      Requested Space field.

      The size of a logical drive is determined by the
      RAID level and the number of hard disk drives.
      For example, a disk array consisting of three,
      1 GB hard disk drives with a requested RAID
      level 0 drive of 1000 MB will actually contain only
      999 MB because the data is striped across all
      three drives, with 333 MB on each drive.

5. Click on **OK** to create the logical drive.

6. You *must* initialize all new logical drives before storing
   data in them. Continue with "Initializing Logical
   Drives" on page 36.

> ─── **Note** ───
>
> All new RAID level 5 logical drives are
> automatically synchronized when you initialize
> them.

Initializing Logical Drives: Initializing a logical drive
erases the first 1024 sectors on the drive and prevents
access to any data previously stored on that drive. You
must initialize all new logical drives before storing data in
them.

To initialize a logical drive:

1. Select the logical drive that you want to initialize from
   the Main Screen of the Administration and Monitoring
   utility program.

   A screen similar to the following appears.

```
┌─────────────────────────────────────────────────┬───┐
│ Logical Drive Information                        │ ✕ │
├─────────────────────────────────────────────────┴───┤
│ ┌───────────────────────────────────────────────┐   │
│ │ Logical Drive Number    1                     │   │
│ │ Blocked                 No                    │   │
│ │ Part of Array           A                     │   │
│ │ Part of Merge Group     1                     │   │
│ │ Date Created            05/19/97              │   │
│ │ State                   OKY                   │   │
│ │ Size                    100MB                 │   │
│ │ RAID Level              0                     │   │
│ │ Write Policy            WT                    │   │
│ │ Read Ahead              On                    │   │
│ │ Strip Unit Size         8 KB                  │   │
│ │ Number of Chunks        3                     │   │
│ │ Stripe Order            1,1 1,2 1,4           │   │
│ └───────────────────────────────────────────────┘   │
│ ┌─────────┐ ┌────────────┐ ┌─────────────┐ ┌──────┐ │
│ │ Unblock │ │ Initialize │ │ Synchronize │ │  OK  │ │
│ └─────────┘ └────────────┘ └─────────────┘ └──────┘ │
└─────────────────────────────────────────────────────┘
```
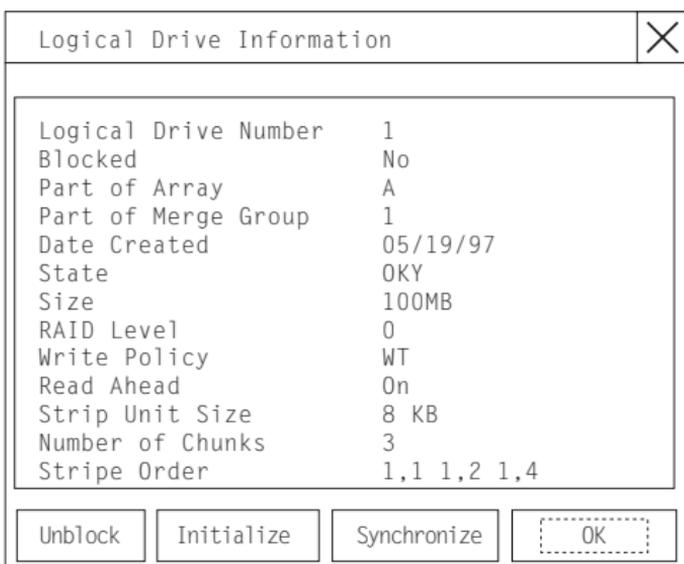
2. Click on **Initialize** to initialize the drive.

> ─── **Note** ───
>
> RAID level 5 logical drives are automatically
> synchronized when you initialize them. You do
> not need to synchronize RAID level 0 or 1 logical
> drives before storing data.

Synchronizing Logical Drives: The purpose of
synchronizing logical drives is to compute and write the
parity data on the selected RAID level 5 logical drives.
Synchronizing a RAID level 1 logical drive copies the data
from the primary disk to the mirrored disk.

RAID level 5 logical drives are automatically synchronized
when you initialize them. You do not need to synchronize
RAID level 0 or 1 logical drives before storing data. Also,
the *data scrubbing* feature of the ServeRAID controller
continuously reads all sections of RAID level 1 and RAID
level 5 logical drives "in the background" while your system

is running. If a defective sector is found, it is automatically repaired. As a result, you no longer have to synchronize RAID level 1 and RAID level 5 logical drives on a weekly basis.

Synchronizing a logical drive verifies that the data redundancy for the logical drive is correct. For RAID level 5, the parity bit is computed and then written to the parity drive.

To synchronize a logical drive:

1. Select the logical drive that you want to synchronize from the Main Screen of the Administration and Monitoring utility program.

   A screen similar to the following appears.

```
┌─────────────────────────────────────────────┬───┐
│ Logical Drive Information                    │ X │
├─────────────────────────────────────────────┴───┤
│ ┌───────────────────────────────────────────────┐│
│ │ Logical Drive Number    1                     ││
│ │ Blocked                  No                    ││
│ │ Part of Array            A                     ││
│ │ Part of Merge Group      1                     ││
│ │ Date Created             05/19/97              ││
│ │ State                    OKY                    ││
│ │ Size                     100MB                  ││
│ │ RAID Level               0                      ││
│ │ Write Policy             WT                      ││
│ │ Read Ahead               On                     ││
│ │ Strip Unit Size          8 KB                    ││
│ │ Number of Chunks         3                      ││
│ │ Stripe Order             1,1 1,2 1,4            ││
│ └───────────────────────────────────────────────┘│
│ ┌────────┐ ┌──────────┐ ┌─────────────┐ ┌──────┐ │
│ │ Unblock│ │Initialize│ │ Synchronize │ │  OK  │ │
│ └────────┘ └──────────┘ └─────────────┘ └──────┘ │
└──────────────────────────────────────────────────┘
```
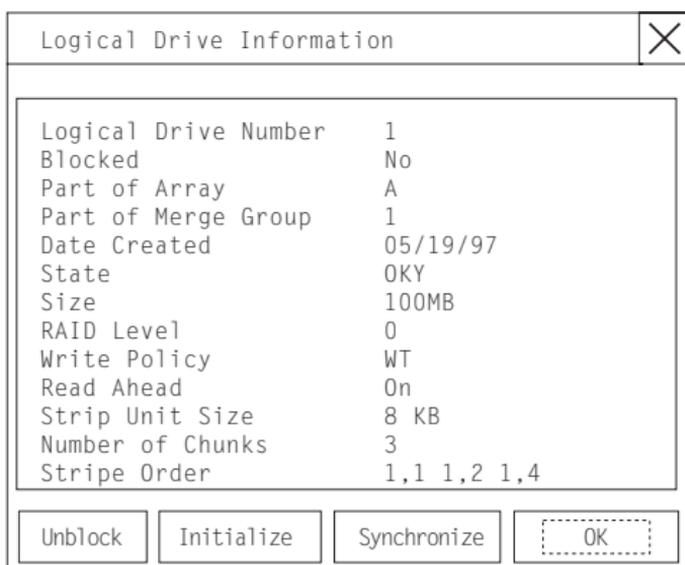
2. Click on **Synchronize** to synchronize the drive.

   The synchronization process begins and reports progress information on the screen.

```
┌──────────────────────────────────────────────┐
│  Adapter 1 Synchronization Progress          │
│                                              │
│  Log Drv 0  ████████████░░░░░░░░░░░     53%   │
│  Log Drv 1  [                      ]         │
│  Log Drv 2  [                      ]         │
│  Log Drv 3  [                      ]         │
│  Log Drv 4  [                      ]         │
│  Log Drv 5  [                      ]         │
│  Log Drv 6  [                      ]         │
│  Log Drv 7  [                      ]         │
│                                              │
└──────────────────────────────────────────────┘
```
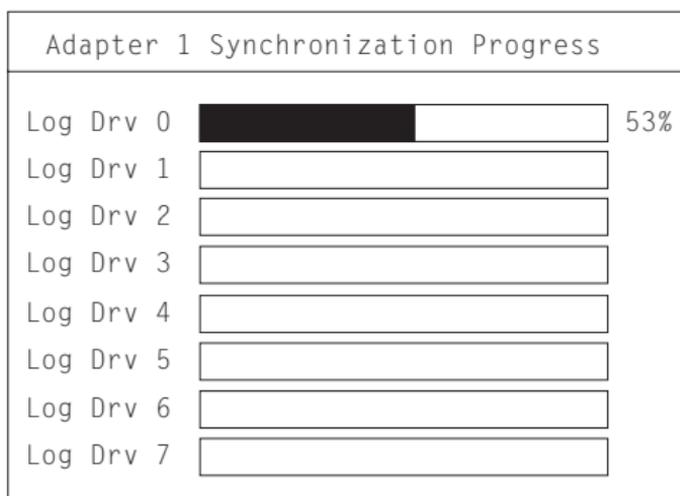
┌── **Note** ─────────────────────────────────┐
│ Only one synchronization command can be   │
│ active at a time.   │
└───┘

Unblocking Logical Drives: Whenever the ServeRAID controller performs a rebuild operation on an array, the data stored in any RAID level 1 and RAID level 5 logical drives in the array is reconstructed. However, the data stored in RAID level 0 logical drives in that array cannot be reconstructed. The data in the RAID level 0 logical drives is blocked when the ServeRAID controller detects that the array is valid, but the data might be damaged.

After the rebuild process completes, you can unblock the RAID level 0 logical drives; this redefines their state as OKY and allows access to them once again. But remember, the RAID level 0 logical drive might contain damaged data. You must re-create, install, or restore the data for the RAID level 0 logical drive from the most recent backup disk or tape.

To unblock a blocked drive:

1. Select the logical drive that is blocked from the Main Menu of the Administration and Monitoring utility program.

   A screen similar to the following appears.

   ```
   ┌─────────────────────────────────────────────┬───┐
   │ Logical Drive Information                    │ ✕ │
   ├─────────────────────────────────────────────┴───┤
   │  ┌───────────────────────────────────────────┐  │
   │  │ Logical Drive Number    1                 │  │
   │  │ Blocked                 No                │  │
   │  │ Part of Array           A                 │  │
   │  │ Part of Merge Group     1                 │  │
   │  │ Date Created            05/19/97          │  │
   │  │ State                   OKY               │  │
   │  │ Size                    100MB             │  │
   │  │ RAID Level              0                 │  │
   │  │ Write Policy            WT                │  │
   │  │ Read Ahead              On                │  │
   │  │ Strip Unit Size         8 KB             │  │
   │  │ Number of Chunks        3                 │  │
   │  │ Stripe Order            1,1 1,2 1,4       │  │
   │  └───────────────────────────────────────────┘  │
   │  ┌─────────┐┌──────────┐┌───────────┐┌───────┐  │
   │  │ Unblock ││ Initialize ││ Synchronize ││  OK  │  │
   │  └─────────┘└──────────┘└───────────┘└───────┘  │
   └─────────────────────────────────────────────────┘
   ```
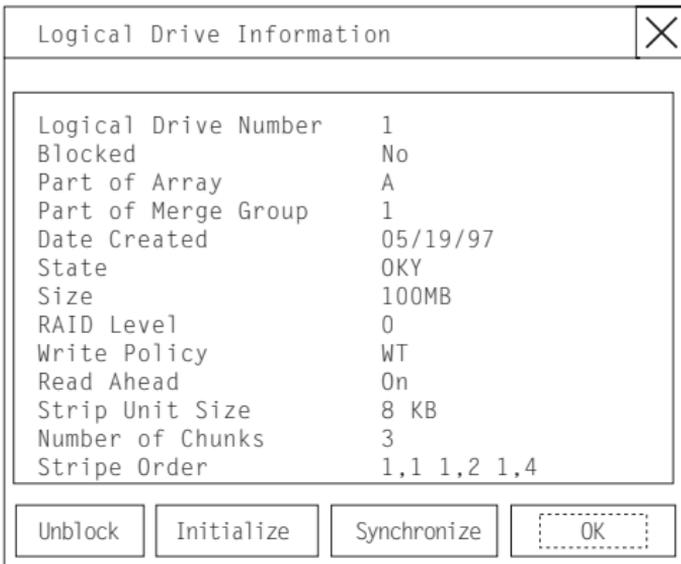
2. Click on **Unblock** to unblock the drive.
3. You *must* initialize all new logical drives before storing data in them. See with "Initializing Logical Drives" on page 36.
4. Restore the data to the drive from your most recent backup disk or tape.

Logical Drive Migration Administration: The logical drive migration (LDM) feature dynamically changes the current logical drive structure. You can use this feature to change the RAID level, increase the free space in a disk array, or change the size of a logical drive.

To use the LDM feature, you must have two logical drives available: one free (FRE) logical drive and one source

logical drive that is in the okay (OKY) state. During the
LDM procedure, the ServeRAID controller changes the
state of the FRE logical drive to SYS; then, temporarily
uses the SYS drive to perform the migration. When the
migration procedure completes, the ServeRAID controller
changes the state of the SYS drive back to FRE.

Changing RAID Levels:

You can change (migrate) the RAID levels of
currently defined logical drives. Depending
upon the current RAID level, you might need
to add or remove a hard disk drive before you
can change the RAID level.

To use the Change RAID Level feature, all of the logical
drives within the array must be the same RAID level.

The ServeRAID controller supports changing RAID levels
as follows:

- Change two RAID level 0 logical drives to RAID level 5
  by adding one hard disk drive
- Change two RAID level 1 logical drives to RAID level 5
  by adding one hard disk drive
- Change from RAID level 5 to RAID level 0 by
  removing one hard disk drive

To change the RAID level:

1. Click on the [icon] icon on the tool bar or select
   Manage Disk Arrays from the **Advanced** pull-down
   menu; then, select **Logical Drive Migration.**

   A screen similar to the following appears.

   ```
   ┌─────────────────────────────────────────────┬───┐
   │ Logical Drive Migration                     │ X │
   ├─────────────────────────────────────────────┴───┤
   │ ┌─Logical Drive Migration Options─┐  ┌──────┐    │
   │ │ ⦿  Change RAID Level            │  │  OK  │    │
   │ │                                 │  └──────┘    │
   │ │ ○   Add Physical Drive(s)       │  ┌──────┐    │
   │ │                                 │  │Cancel│    │
   │ └─────────────────────────────────┘  └──────┘    │
   └─────────────────────────────────────────────────┘
   ```
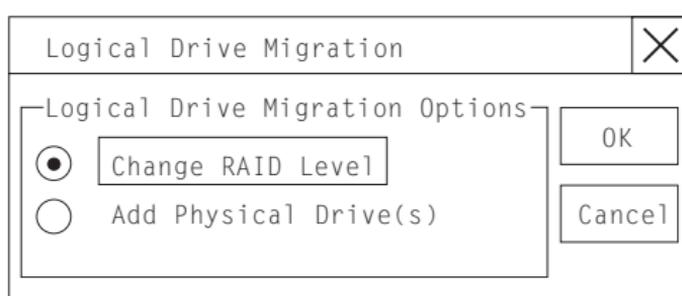
2. Select **Change RAID Level;** then, click on **OK.**

```
┌─────────────────────────────────────────────────────┐
│  Change RAID Level                                ✕  │
│                                                       │
│ Options:                                      ┌────┐  │
│ ┌───────────────────────────────────────────┐ │ OK │  │
│ │ Change array B from Raid 5 to Raid 0  ▼  │ └────┘  │
│ └───────────────────────────────────────────┘        │
│                                               ┌──────┐│
│  Logical      Raid        Size                │Cancel││
│  Drive        Level       (MB)                └──────┘│
│ ┌───────────────────────────────────────────┐        │
│ │  0            5           1000             │        │
│ │  1            5           1000             │        │
│ │                                            │        │
│ │                                            │        │
│ │                                            │        │
│ │                                            │        │
│ └───────────────────────────────────────────┘        │
│                                                       │
└─────────────────────────────────────────────────────┘
```
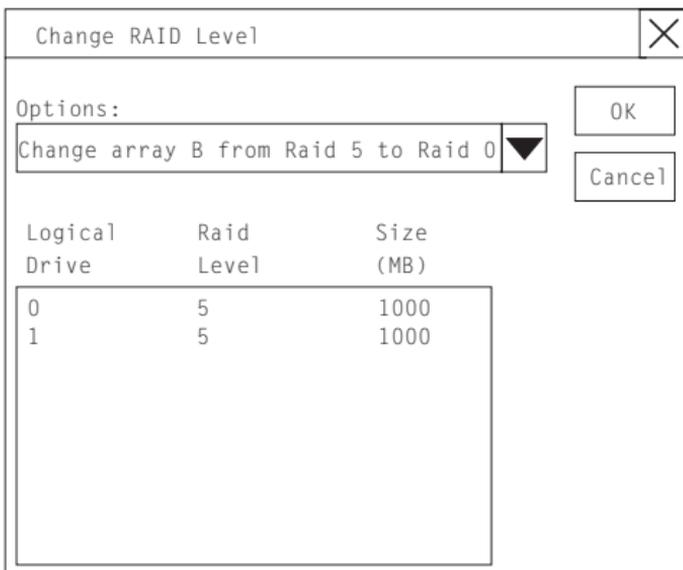
3. Select a migrating option from the pull-down list.

> **Note**
>
> The affected logical drives appear based on the migrating option selected.

4. Click on **OK** to proceed; then, click on **OK** to verify the operation.
5. Select a Ready (RDY) drive to add to the array if you are migrating to RAID level 5.

> **Note**
>
> If you are migrating to RAID level 0, the last drive defined in the array becomes RDY.

Adding a Physical Drive:

You can expand currently defined arrays to new sizes by adding one to three new hard disk drives.

The ServeRAID controller supports adding new space to a disk array as follows:

* You can increase the free space in a disk array without adjusting the size of the logical drives. This is useful when you need to add logical drives to your existing disk arrays. Refer to the following illustration.

Logical Drive 0	500 MB	Logical Drive 0	500 MB
Logical Drive 1	1000 MB	Logical Drive 1	1000 MB
Free Space	2800 MB	Free Space	4950 MB
Disk 1 Disk 2 Disk 3		Disk 1 Disk 2 Disk 3 Disk 4	
Before LDM		**After LDM**	
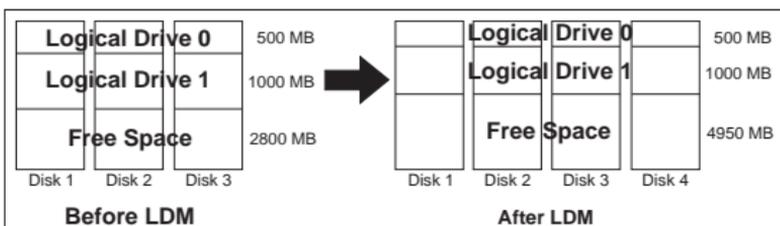
For example, an existing disk array uses three, 2150 MB hard disk drives that are configured as two

RAID level 5 logical drives (one 500 MB and one 1000 MB) and 2800 MB of free space. If you use the logical-drive migration procedure and add a 2150 MB hard disk drive to increase the amount of free space, the end result will be two RAID level 5 logical drives (one 500 MB and one 1000 MB) and 4950 MB of free space.

- You can increase the size of all the logical drives proportionally in a disk array. This is useful when you want to increase the size of the currently defined logical drives. Refer to the following illustration.
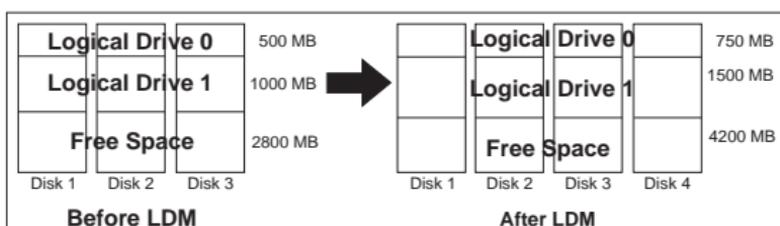
For example, an existing array uses three 2150 MB hard disk drives that are configured as two RAID level 5 logical drives (one 500 MB and one 1000 MB) and 2800 MB of free space. If you use the logical-drive migration procedure and add a 2150 MB hard disk drive to proportionally increase the size of the disk array, the end result will be two RAID level 5 logical drives (one 750 MB and one 1500 MB) and 4200 MB of free space.

To add a physical drive:

1. Click on the icon on the tool bar or select **Manage Disk Arrays** from the **Advanced** pull-down menu; then, select **Logical Drive Migration.**

   A screen similar to the following appears.
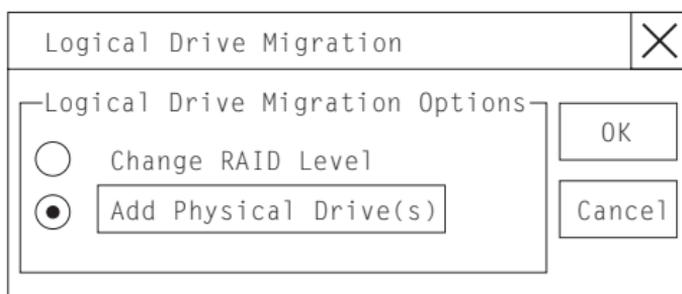
2. Select **Add Physical Drive(s);** then, click on **OK.**

   A prompt appears requesting that you select from 1 to 3 Ready (RDY) drives to add to the existing array.

3. Click on the appropriate RDY drives. An **X** appears beside the selected drive.

4. Click on **OK.**

A screen similar to the following appears.

```
┌─────────────────────────────────────────────────────────────┐
│  Add Physical Drive(s) to Array                          ☒  │
├─────────────────────────────────────────────────────────────┤
│  Options:                                          ┌──────┐ │
│  Increase the capacity of all logical drives in array B ▼ │  OK  │ │
│                                                    └──────┘ │
│                                                    ┌──────┐ │
│                                                    │Cancel│ │
│  Logical        Raid          Size        New Size └──────┘ │
│  Drive          Level         (MB)        (MB)              │
│  ┌────────────────────────────────────┐  ┌──────────────┐  │
│  │ 0             5             1000    │  │ 1500         │  │
│  │ 1             0             498     │  │ 664          │  │
│  │ 2             5             300     │  │ 450          │  │
│  │                                     │  │              │  │
│  │                                     │  │              │  │
│  │                                     │  │              │  │
│  │                                     │  │              │  │
│  └────────────────────────────────────┘  └──────────────┘  │
└─────────────────────────────────────────────────────────────┘
```
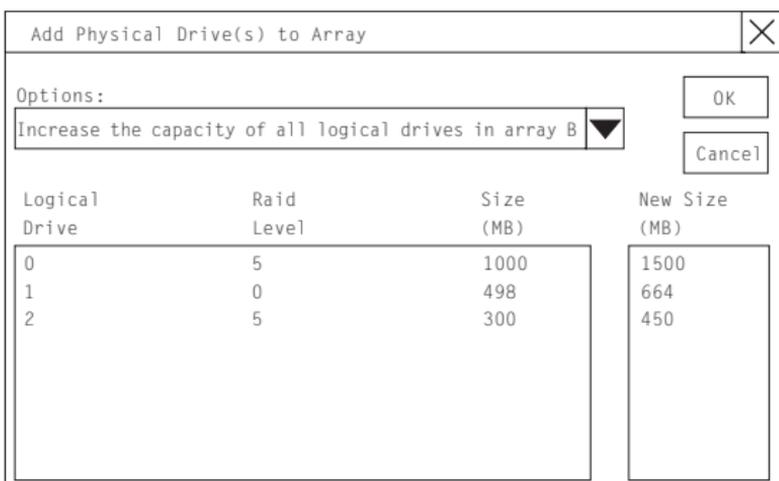
5. Select one of the available options for expansion from the pull-down list.

   The screen shows a list of the affected logical drives with their new sizes.

6. Click on **OK.**

Physical Device Administration: This section contains instructions for setting physical device states and rebuilding drives using the ServeRAID Administration and Monitoring utility program.

Setting Physical Device States: Physical devices always appear in one of the following defined states, but you can easily redefine them into another state.

The following table shows the valid device states and valid alternative states.

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

To change the physical device state:

1. Select the device from the Main Screen of the Administration and Monitoring utility program. A screen similar to the following appears.

```
 ┌─────────────────────────────────────────────┐
 │  Device Management                        ⊠  │
 │                                              │
 │  ┌─Drive State─┐ ┌─Drive Information────────┐│
 │  │ ○ EMP       │ │ Channel       1          ││
 │  │ ○ SBY       │ │ Bay           2          ││
 │  │ ○ RDY       │ │ SCSI ID       1          ││
 │  │ ○ DHS       │ │ Vendor        IBM        ││
 │  │ ○ SHS       │ │ Serial Number 003056669  ││
 │  │ ○ HSP       │ │ Size          1003 MB    ││
 │  │ ○ DDD       │ │ State         ONL        ││
 │  │ ◉ ONL       │ │ Soft Event    0          ││
 │  │ ○ RBL       │ │ Hard Event    0          ││
 │  │             │ │ Misc Event    0          ││
 │  │             │ │ Parity Event  0          ││
 │  │             │ │ PFA           No         ││
 │  └─────────────┘ └──────────────────────────┘│
 │                                              │
 │ ┌───────────────┐┌───────────────┐┌────────┐ │
 │ │Set Device State││ Rebuild Drive ││   OK   │ │
 │ └───────────────┘└───────────────┘└────────┘ │
 └─────────────────────────────────────────────┘
```

2. Click on the radio button that indicates the desired
   state.

   ┌─ **Note** ─────────────────────────────────────┐

   If you set a DDD drive to ONL without performing
   a Rebuild (RBL) operation and that drive is part
   of a critical (CRT) logical drive, your server might
   lose data.

   └───┘

3. Click on **Set Device State.**

Rebuilding Drives: When a hard disk drives goes
defunct (DDD), a Rebuild operation is required to
reconstruct the data for the device in its respective disk
array. You can rebuild only RAID level 1 and RAID level 5
logical drives. The data stored in stored in RAID level 0
logical drives cannot be reconstructed; therefore, RAID
level 0 logical drives are blocked.

After the rebuild process completes, you can unblock the
RAID level 0 logical drives, which redefines their state as
OKY and allows access to them once again. But
remember, the RAID level 0 logical drive might contain
damaged data. You must re-create, install, or restore the
data for the RAID level 0 logical drive from the most recent
backup disk or tape. (See "Unblocking Logical Drives" on
page 38 for more information.)

To rebuild a drive:

1. Click on the DDD device on the Main Screen of the
   Administration and Monitoring utility program.
2. Click on **Rebuild Device.**

   A screen similar to the following appears.

```
┌─────────────────────────────────────────┐
│ Rebuild Physical Drive            ┌───┐ │
│                                   │ ✕ │ │
│                                   └───┘ │
│ Select OK to make the drive in          │
│ channel 1 bay 5 the destination of      │
│ the rebuild, or select another drive    │
│ for the destination of the build        │
│ ┌──────────────┐      ┌──────────────┐  │
│ │    Cancel    │      │      OK      │  │
│ └──────────────┘      └──────────────┘  │
└─────────────────────────────────────────┘
```
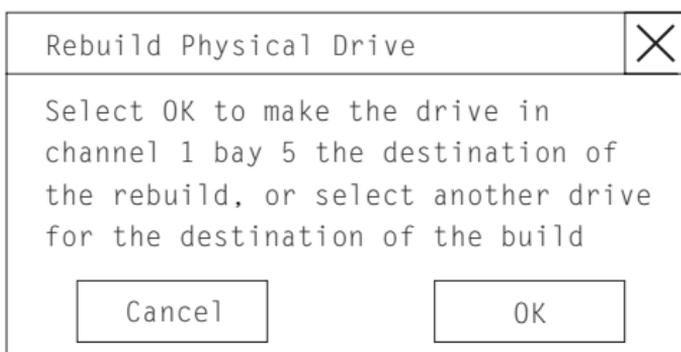
3. Select a RDY drive on which to store the reconstructed data, or click on **OK** to use the same bay if you have physically replaced the drive.

> ┌─ **Note** ──────────────────────────────┐
> The replacement hard disk drive must be the same size or larger than the failed drive.

4. The rebuild process begins and reports progress information on the screen.

```
┌─────────────────────────────────────────┐
│  Adapter 1 Rebuild Progress             │
│ ─────────────────────────────────────── │
│ Log Drv 0 ████████████▒▒▒▒▒▒▒▒▒▒    53% │
│ Log Drv 1 [                           ] │
│ Log Drv 2 [                           ] │
│ Log Drv 3 [                           ] │
│ Log Drv 4 [                           ] │
│ Log Drv 5 [                           ] │
│ Log Drv 6 [                           ] │
│ Log Drv 7 [                           ] │
│                                         │
└─────────────────────────────────────────┘
```
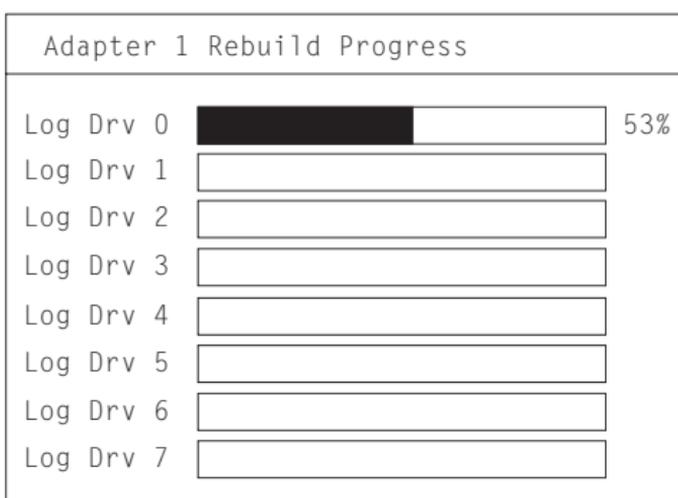
Notes:

1. Only one Rebuild operation can take place at a time.
2. The Rebuild operation changes the hard disk drive state from DDD to RBL if the array contains a CRT logical drive. After the Rebuild operation completes, the hard disk drive state changes from RBL to ONL. (When you rebuild to a RDY drive, the DDD drive is removed from the array and the state of the DDD drive is changed to defunct hot-spare (DHS).)
3. If multiple hot-spare (HSP) drives are available, the ServeRAID controller searches all the bays on each channel for a hot-spare drive of the appropriate size and the first appropriate hot-spare drive found enters the Rebuild (RBL) state.
4. If a hot-spare (HSP) drive is available, a Rebuild operation starts automatically.

ServeRAID Controller Administration: This
section provides instructions for copying the drive
configuration to the ServeRAID controller, copying the
ServeRAID controller configuration to the drives, initializing
the ServeRAID controller configuration, and scanning for
new drives.

Copying the Drive Configuration to the ServeRAID Controller:
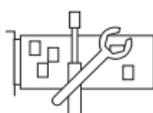
You can copy the configuration information
stored on the hard disk drives to the
ServeRAID controller. This procedure is useful
when you install drives from other systems.

During the copy procedure, the ServeRAID controller
automatically performs any necessary rearrangement of
the configuration; then, the controller writes the new
configuration information back to the reserved area on the
configured hard disk drives.

**To copy the drive configuration information to the
ServeRAID controller:**

1. Click on the icon on the tool bar or select
   Adapter Configuration from the **Advanced**
   pull-down menu.

   A screen similar to the following appears.

```
┌─────────────────────────────────────────────────┐
│ Adapter Configuration                         ☒ │
│ ┌─Adapter Configuration Options ──────┐  ┌────┐ │
│ │                                     │  │ OK │ │
│ │  ◯  Copy Drive Configuration To Adapter│  └────┘ │
│ │                                     │  ┌──────┐│
│ │  ◯  Copy Adapter Configuration To Drives│  │Cancel││
│ │                                     │  └──────┘│
│ │  ◯  Initialize Adapter Configuration │          │
│ └─────────────────────────────────────┘          │
└─────────────────────────────────────────────────┘
```
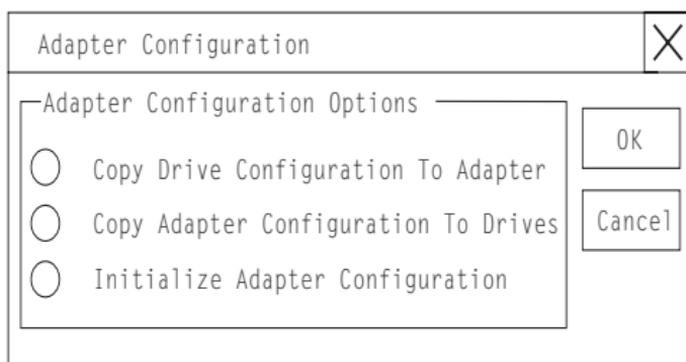
2. Select **Copy Drive Configuration to Adapter;** then,
   click on **OK.**

Copying the ServeRAID Controller Configuration to the Drives:
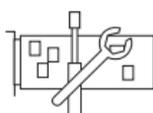
You can copy the configuration information
stored in the ServeRAID controller to all
configured hard disk drives.

**To copy the ServeRAID controller configuration
information to the drives:**

1. Click on the [icon] icon on the tool bar or select **Adapter Configuration** from the **Advanced** pull-down menu.
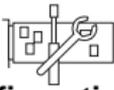
   A screen similar to the following appears.

```
 ┌─────────────────────────────────────────────────┬───┐
 │ Adapter Configuration                            │ X │
 ├─────────────────────────────────────────────────┴───┤
 │ ┌─Adapter Configuration Options ─────────────┐       │
 │                                                ┌──────┐
 │ ○   Copy Drive Configuration To Adapter        │  OK  │
 │                                                └──────┘
 │ ○   Copy Adapter Configuration To Drives       ┌──────┐
 │                                                │Cancel│
 │ ○   Initialize Adapter Configuration           └──────┘
 │ └────────────────────────────────────────────┘       │
 └─────────────────────────────────────────────────────┘
```
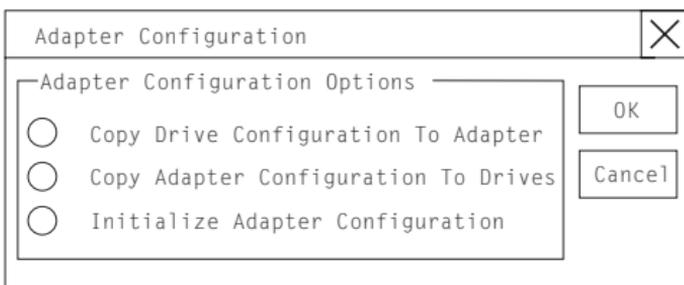
2. Select **Copy Adapter Configuration to Drives;** then, click on **OK.**

Initializing the ServeRAID II Controller:
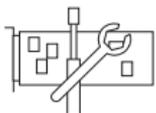
[icon] This procedure initializes the ServeRAID controller configuration by clearing all the logical drives and resetting all functional hard disk drives to RDY. This procedure is useful when you want to start over and create a new configuration.

```
┌─ Attention ──────────────────────────────────────────┐
│ All the data and programs in the array are lost during │
│ this procedure.                                         │
└──────────────────────────────────────────────────────┘
```

To initialize the ServeRAID controller:
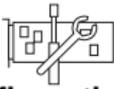
1. Click on the [icon] icon on the tool bar or select **Adapter Configuration** from the **Advanced** pull-down menu.

   A screen similar to the following appears.

```
 ┌─────────────────────────────────────────────────┬───┐
 │ Adapter Configuration                            │ X │
 ├─────────────────────────────────────────────────┴───┤
 │ ┌─Adapter Configuration Options ─────────────┐       │
 │                                                ┌──────┐
 │ ○   Copy Drive Configuration To Adapter        │  OK  │
 │                                                └──────┘
 │ ○   Copy Adapter Configuration To Drives       ┌──────┐
 │                                                │Cancel│
 │ ○   Initialize Adapter Configuration           └──────┘
 │ └────────────────────────────────────────────┘       │
 └─────────────────────────────────────────────────────┘
```
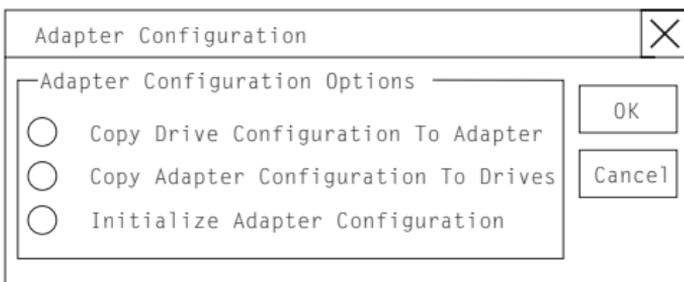
2. Select **Initialize Adapter Configuration;** then, click on **OK.**

Scanning for New Drives: This option enables you to locate new drives attached to the ServeRAID controller.

To scan for new drives:

Click on the icon on the tool bar or select **Scan For New Drives** from the **Advanced** pull-down menu.

Using the ServeRAID Monitoring

Functions: This section contains instructions for using the ServeRAID Administration and Monitoring utility program to monitor the ServeRAID controller status information, event logs, logical drive information, and physical device information.

Monitoring Status Information: You can monitor the ServeRAID controller status by clicking on the active ServeRAID controller button on the Main Screen of the Administration and Monitoring utility program. The currently active ServeRAID controller button is indicated by a green or red light. (Green indicates an active controller; red indicates that the controller is not responding.)

If there is more than one ServeRAID controller in the system, click on the appropriate button to make it active.

A screen similar to the following appears.

```
┌─────────────────────────────────────────────────────┬───┐
│  Adapter Information                                 │ ✕ │
│                                                      ├───┤
│                                                      │ ▲ │
│  ┌────────────────────────────────────────────────┐ │   │
│  │  Adapter Number                  1             │ │   │
│  │  Number of Logical Drives        6             │ │   │
│  │  Unattended Mode                 Off           │ │   │
│  │  Code Block Version              97125         │ │   │
│  │  Boot Block Version              96340         │ │   │
│  │  Concurrent Commands             64            │ │   │
│  │  Maximum Devices Supported       45            │ │   │
│  │  Flash Program Count             2650          │ │   │
│  │  Defunct Disk Count              0             │ │   │
│  │  Rebuild Rate                    High          │ │   │
│  │  Hot-Swap Rebuild                Disabled      │ │   │
│  │  Offline Logical Drive Count     0             │ │   │
│  └────────────────────────────────────────────────┘ │ ▼ │
├──────────────┬──────────────┬──────────────┬────────┴───┤
│Device Event Log│ Hard Event Log │ Soft Event Log │   OK   │
└──────────────┴──────────────┴──────────────┴────────────┘
```
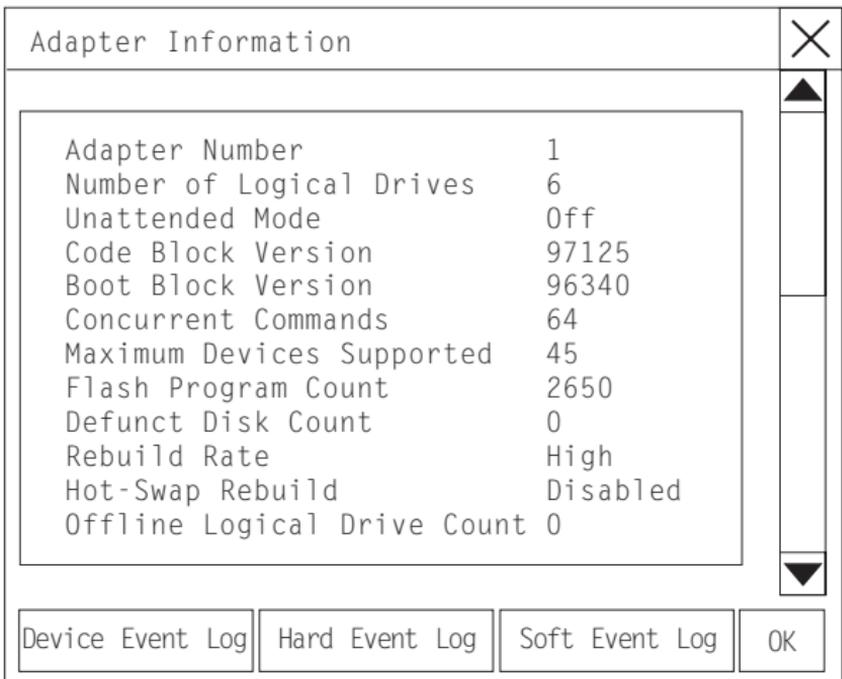
Descriptions of the information that appears on the screen are as follows.

> **Note**
>
> You might have to scroll down, using the scroll bar, to see all of the items that appear on this screen.

Adapter Number   The active ServeRAID controller (1 to 8).

**Number of Logical Drives**   The number of defined logical drives (0 to 8).

Unattended Mode	**Off** - The user chooses the recovery method when there is a ServeRAID controller startup error. **On** - The ServeRAID controller chooses the recovery method when there is a startup error.
Code Block Version	The current version level of the firmware microcode for the ServeRAID controller.
Boot Block Version	The current version level of the microcode loaded in the boot block for the ServeRAID controller.
Concurrent Commands	The maximum numbers of concurrent commands supported.
Maximum Devices Supported	The maximum number of devices supported.
Flash Program Count	The number of times that the ServeRAID controller microcode (Flash EEPROM) has been *flashed* or updated.
Defunct Disk Count	The current number of defunct hard disk drives.
Rebuild Rate	The setting for the rebuild rate can be low, medium, or high priority. (The default setting is high.)
Hot-Swap Rebuild	If hot-swap rebuild is set to enable, the ServeRAID controller will rebuild a defunct drive automatically when all of the following conditions exist:

- The hot-swap rebuild parameter is set to Enable
- The defunct drive is part of a RAID level 1 or RAID level 5 logical drive
- The capacity of the replacement drive is equal to or greater than the capacity of the defunct drive
- No rebuild, synchronization, or RAID level change operation is in progress

When you replace the drive and these requirements are met, the ServeRAID controller automatically initiates a rebuild of the drive without user intervention.

Offline Logical Drive Count	The current number of offline logical drives.
Configuration Update Count	The number of times that the ServeRAID controller configuration information has been updated.

Monitoring Event Logs: The ServeRAID controller stores, in the event logs, information concerning various unexpected events. There are three types of event logs: a device event log, a hard event log, and a soft event log.

To view the event logs:

1. Click on the **adapter** (or controller) on the Main Screen of the Administration and Monitoring utility program.

   A screen similar to the following appears.

```
┌─────────────────────────────────────────────┬───┐
│ Adapter Information                          │ × │
│                                              │───│
│                                              │ ▲ │
│   ┌───────────────────────────────────────┐ │   │
│   │ Adapter Number                1       │ │   │
│   │ Number of Logical Drives      6       │ │   │
│   │ Unattended Mode               Off     │ │   │
│   │ Code Block Version            97125   │ │   │
│   │ Boot Block Version            96340   │ │   │
│   │ Concurrent Commands           64      │ │   │
│   │ Maximum Devices Supported     45      │ │   │
│   │ Flash Program Count           2650    │ │   │
│   │ Defunct Disk Count            0       │ │   │
│   │ Rebuild Rate                  High    │ │   │
│   │ Hot-Swap Rebuild              Disabled│ │   │
│   │ Offline Logical Drive Count 0         │ │   │
│   └───────────────────────────────────────┘ │ ▼ │
│                                              │   │
├────────────────┬───────────────┬────────────┴───┤
│Device Event Log│ Hard Event Log │ Soft Event Log │ OK │
└────────────────┴───────────────┴────────────────┘
```
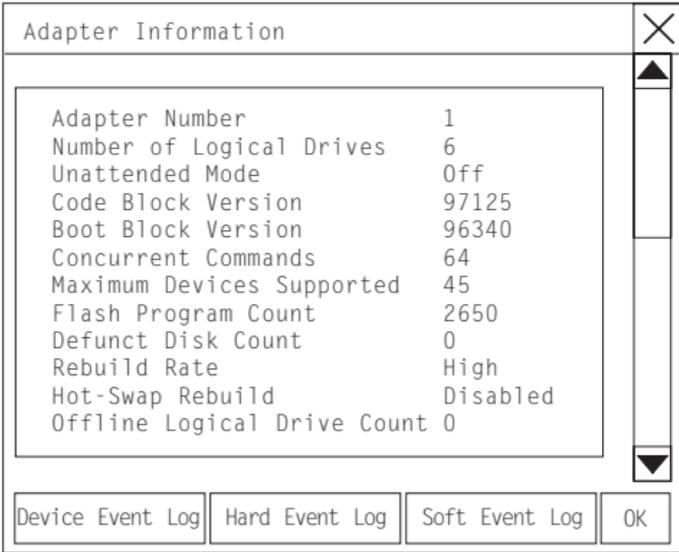
2. Select the appropriate button at the bottom of the screen for the event log you want to view.

**Device Event Log:** The Device Event Log contains event counters for each attached physical device.

```
┌──────────────────────────────────────────────────┬───┐
│ View ServeRAID Device Event Log                   │ × │
│──────────────────────────────────────────────────────│
│ 10/27/97  14:10:48                                 │ ▲ │
│ ServeRAID Device Event Log for Adapter 1           │   │
│ Chn Bay Parity Evt Soft Evt PFA Hard Evt Misc Evt  │   │
│  1   1      0        1      No     1        0      │   │
│  1   2      0        0      No     0        0      │   │
│  1   3      0        0      No     4        0      │   │
│  1   4      0        0      No     0        0      │   │
│  1   5      0        0      No     0        0      │   │
│  1   6      0        1      No     0        0      │   │
│  1   7      0        0      No     0        0      │   │
│  1   8      0        0      No     0        0      │   │
│  1   9      0        0      No     0        0      │   │
│  1  10      0        0      No     0        0      │   │
│  1  11      0        0      No     0        0      │   │
│  1  12      0        0      No     0        0      │   │
│  1  13      0        0      No     0        0      │ ▼ │
│                                                    │   │
│                       ┌───────┐  ┌───────┐         │   │
│                       │ Erase │  │  OK   │         │   │
│                       └───────┘  └───────┘         │   │
└──────────────────────────────────────────────────────┘
```
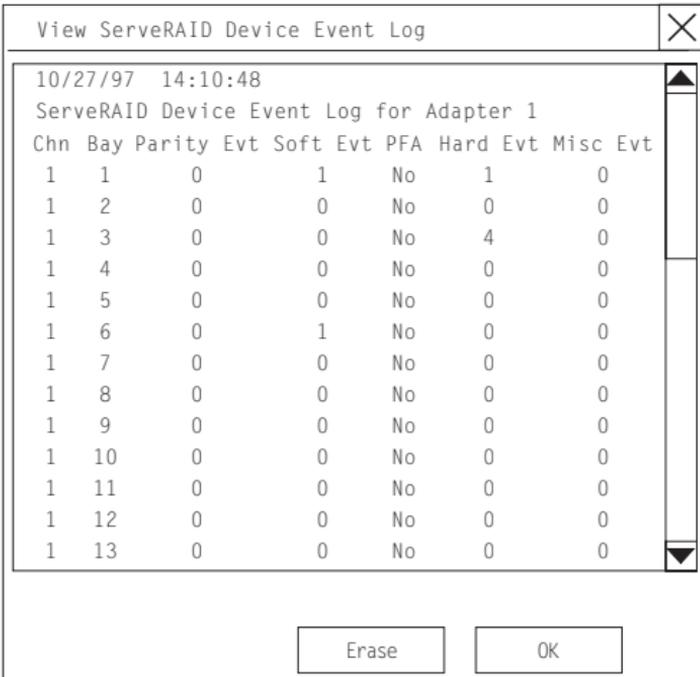
Descriptions of the events logged in the Device Event Log are as follows:

- Parity Event

  The ServeRAID controller detects parity events while transferring data on the SCSI bus. A large number of parity events might indicate a problem with the SCSI cable, connectors, or terminators attached to the devices.

- Soft Event

  SCSI devices detect these events and reports them to the ServeRAID controller through Check Condition status.

- Predictive Failure Analysis (PFA)

  A device has signaled the ServeRAID controller that it might fail in the near future.

- Hard Event

  The ServeRAID controller detects these events. Most likely, these events are caused by the ServeRAID controller.

- Misc Event

  The ServeRAID controller detects these events. Most likely, these events are caused by the SCSI device, such as selection timeout, unexpected bus free, or SCSI phase event.

> **Note**
>
> Under normal operating conditions, the event logs will contain entries that are not errors.

Hard Event Log: You can view the Hard Event Log.

```
┌─ View ServeRAID Hard Event Log ──────────────────── ✕ ┐
│                                                        │
│  10/27/97  14:10:48                                    │
│  ServeRAID Hard Event Log for Adapter 1                │
│  30 Event Log Entries follow:                          │
│                                                        │
│  0000: 1002001A 100000F0 0044210F 1002001A             │
│  0004: 100000F0 005E9DAB 1002001A 100000F0             │
│  0008: 0A6ED1F0 1002001A 100000F0 00B2FEE7             │
│  0012: 1002001A 100000F0 0029A180 1002001A             │
│  0016: 100000F0 0281568D 1002001A 100000F0             │
│  0020: 0008C22E 1002001A 100000F0 0008E05A             │
│  0024: 1002001A 100000F0 034CB715 1002001A             │
│  0028: 100000F0 000AEF3F 00000000 00980000             │
│                                                        │
│                                                        │
│                           ┌────────┐   ┌────────┐      │
│                           │ Erase  │   │   OK   │      │
│                           └────────┘   └────────┘      │
└────────────────────────────────────────────────────────┘
```

Soft Event Log: You can view the Soft Event Log.

```
┌─────────────────────────────────────────────────────┬───┐
│  View ServRAID Soft Event Log                       │ X │
├─────────────────────────────────────────────────────┴───┤
│  06/27/97  14:10:26                                  ▲   │
│  ServeRAID Soft Event Log for Adapter 1              │   │
│  195 Error Log Entries follow:                       │   │
│  0000: 10F15D00 10200002 168A3063 10F15D00           │   │
│  0004: 10010002 178410AC 012B000E 01014000           │   │
│  0008: 0020BB38 012B000E 01004000 00213AB7           │   │
│  0012: 010A000E 01014000 00215C34 0101A00E           │   │
│  0016: 01004000 0021DBB3 0132000E 01014000           │   │
│  0020: 0021FC33 1002001A 100000F0 0044210F           │   │
│  0024: 10F15D00 10110102 0093861B 10F15D00           │   │
│  0028: 10110102 00938A7E 1002001A 100000F0           │   │
│  0032: 005E9DAE 1002001A 100000F0 0A6ED1F0           │   │
│  0036: 10F15D00 10280102 1F78DAC3 10F15D00           │   │
│  0040: 10280102 1F78E00C 10F15D00 103B0002           │   │
│  0044: 22193F15 10F31100 10300102 274E7B75           ▼   │
│                                                          │
├──────────────────────────────────────────────────────────┤
│                         ┌────────┐    ┌────────┐          │
│                         │ Erase  │    │  OK    │          │
│                         └────────┘    └────────┘          │
└──────────────────────────────────────────────────────────┘
```

Monitoring the Logical Drive Information:

You can monitor the logical drive information by clicking on the desired logical drive button on the Main Screen of the Administration and Monitoring utility program.

When you click on the logical drive button, a screen similar to the following appears.

```
┌─────────────────────────────────────────────────────┬───┐
│  Logical Drive Information                          │ X │
├─────────────────────────────────────────────────────┴───┤
│  ┌──────────────────────────────────────────────────┐   │
│  │  Logical Drive Number      1                     │   │
│  │  Blocked                    No                    │   │
│  │  Part of Array              A                     │   │
│  │  Part of Merge Group        1                     │   │
│  │  Date Created               05/19/97              │   │
│  │  State                      OKY                   │   │
│  │  Size                       100MB                 │   │
│  │  RAID Level                 0                     │   │
│  │  Write Policy               WT                    │   │
│  │  Read Ahead                 On                    │   │
│  │  Strip Unit Size            8 KB                  │   │
│  │  Number of Chunks           3                     │   │
│  │  Stripe Order               1,1 1,2 1,4           │   │
│  └──────────────────────────────────────────────────┘   │
├──────────────────────────────────────────────────────────┤
│  ┌────────┐ ┌──────────┐ ┌─────────────┐ ┌╌╌╌╌╌╌╌╌┐      │
│  │Unblock │ │Initialize│ │ Synchronize │ ┊  OK    ┊      │
│  └────────┘ └──────────┘ └─────────────┘ └╌╌╌╌╌╌╌╌┘      │
└──────────────────────────────────────────────────────────┘
```
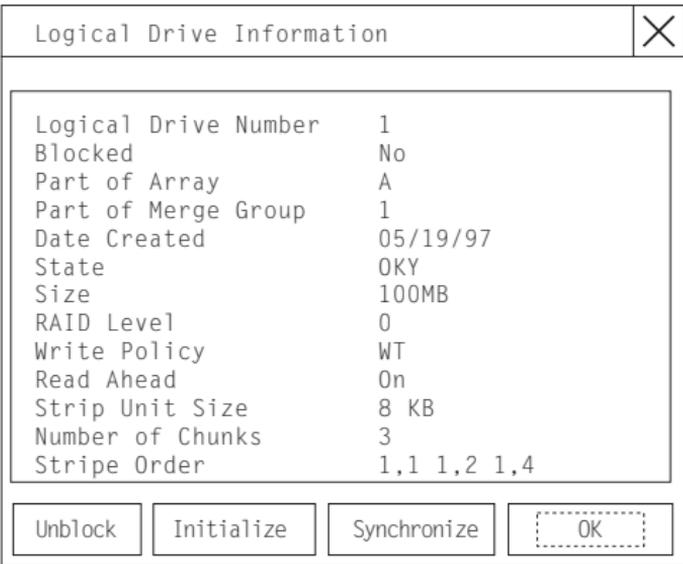
are as follows:

Logical Drive Number	The number of the logical drive.
Blocked	**No** - The logical drive is accessible. **Yes** - The logical drive is not accessible.
Part of Array	The identifier of the logical drive's disk array (A, B, C, D, E, F, G, H).

Part of Merge Group	The identifier of the logical drive's merge group (1 through 254).
Date Created	The date that the logical drive was created.
State	The current drive state (see "Logical Drive States" on page 88 for more information).
Size	The size in megabytes.
RAID Level	RAID level (0, 1, or 5).
Write Policy	**WT** - Write-through. **WB** - Write-back.
Read Ahead	**Off** - Disk Read-Ahead is inactive. **On** - Disk Read-Ahead is active.
Stripe Unit Size	The size of each stripe unit per hard disk (8, 16, 32, 64).
Number of Chunks	The number of hard disk drives that make up the logical drive.
Stripe Order	The channel and bay number of the physical drives that make up the logical drive.

Monitoring the Physical Device

Information: You can monitor the physical device information by clicking on the desired device button on the Main Screen of the Administration and Monitoring utility program.

When you click on the device button, a screen similar to the following appears.

```
┌─────────────────────────────────────────────────────┐
│  Device Management                              [X]   │
│                                                       │
│  ┌─Drive State─┐  ┌─Drive Information──────────┐     │
│  │  ○ EMP      │  │  Channel        1          │     │
│  │  ○ SBY      │  │  Bay            2          │     │
│  │  ○ RDY      │  │  SCSI ID        1          │     │
│  │  ○ DHS      │  │  Vendor         IBM        │     │
│  │  ○ SHS      │  │  Serial Number  003056669  │     │
│  │  ○ HSP      │  │  Size           1003 MB    │     │
│  │  ○ DDD      │  │  State          ONL        │     │
│  │  ◉ ONL      │  │  Soft Event     0          │     │
│  │  ○ RBL      │  │  Hard Event     0          │     │
│  │             │  │  Misc Event     0          │     │
│  │             │  │  Parity Event   0          │     │
│  │             │  │  PFA            No         │     │
│  └─────────────┘  └───────────────────────────┘     │
│                                                       │
│  ┌──────────────┐ ┌──────────────┐ ┌──────────┐     │
│  │Set Device State│ │Rebuild Drive │ │    OK    │     │
│  └──────────────┘ └──────────────┘ └──────────┘     │
└─────────────────────────────────────────────────────┘
```

Descriptions of the information that appears on this screen are as follows:

Channel	The channel to which the device is connected.
Bay	The bay number of the device on a channel (1 to 16).
SCSI ID	The SCSI ID (0 to 15).
Vendor	The drive manufacturer.
Serial Number	The drive manufacturer's identifier.
Size	The size of the drive in megabytes.
State	The current drive state (see "Physical Device States" on page 86 and "Logical Drive States" on page 88 for more information.)
Soft Event	The number of soft events reported from the device event log.
Hard Event	The number of hard events reported from the device event log.
Misc Event	The number of miscellaneous events reported from the device event log.
Parity Event	The number of parity events reported from the device event log.
PFA	**Yes** - Device indicates predictive failure analysis event. **No** - Device does not indicate predictive failure analysis event.

Configuring the Ethernet Controller

Your Netfinity 5500 comes with an Ethernet controller on the system board. The Ethernet controller provides 10BASE-T and 100BASE-TX support through the RJ-45 connector on the back of your server. When you connect your server to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps or 100 Mbps) on the network and then sets the controller to operate at the appropriate rate. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), half duplex (HDX), or full duplex (FDX). This process is also known as *auto-negotiating*. This auto-negotiation occurs without requiring software intervention. The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

Note

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

Fast Ethernet operates at a data rate of 100 Mbps; that is, ten times faster than standard Ethernet. However, except for the different operating speeds, Fast Ethernet and standard Ethernet are structurally identical. Applications and protocols that are currently hosted on a standard Ethernet system can be seamlessly migrated to a Fast Ethernet system. (In a very small number of cases, minor tuning might be required to adjust the application to the higher performance of a Fast Ethernet system). Because of the equivalence of the two types of Ethernet, mixed Ethernet and Fast Ethernet systems also can be designed and implemented.

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

The Ethernet controller is a PCI device, and is therefore, a Plug and Play device. You do not have to set any jumpers or configure the controller for your operating system before you use the Ethernet controller. However, you must install a device driver to enable your operating system to address the Ethernet controller (refer to your ServerGuide documentation or operating-system documentation).

If you need additional Ethernet connections, you can install an Ethernet adapter, such as the IBM 10/100 PCI Ethernet

adapter. Review your network-adapter documentation for any additional configuration requirements and for troubleshooting information.

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 "Configuration/Setup Utility Program" on page 60.
2. Set jumpers or switches on the server system board.

   See "Changing Jumper Positions" on page 151 and "System Board Jumpers" on page 256.
3. Set jumpers or switches on the device.

   See the instructions that came with the adapter.
4. Install the adapter in the server.

   See "Adapters" on page 142.
5. Install software programs.

   See the installation instructions that came with the software.
6. Resolve configuration conflicts.

   See "Resolving Configuration Conflicts" on page 73.

Configuration Overview

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

Your server supports several types of adapters and SCSI devices. Because of this flexibility, you can choose from among many adapters and devices that comply with any of the following standards:

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

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

Your server comes with the following hardware configuration utility programs:

- Configuration/Setup Utility

  With the built-in Configuration/Setup Utility program, you can configure system board functions, such as serial and parallel port assignments; change interrupt request (IRQ) settings; and change the startup sequence for drives that you install. You also can use this utility program to set passwords for starting up the server and accessing the Configuration/Setup Utility program.

- ServeRAID

  You can use ServeRAID programs to define and maintain your disk arrays. You can also use these programs to configure SCSI devices (such as hot-swap drives) that are attached to the ServeRAID controller on the system board. See "Understanding Disk Array Technology" on page 81 for complete instructions.

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 the server system board.

   See "Changing Jumper Positions" on page 151 and "System Board Jumpers" on page 256.
3. Set jumpers or switches on the device.

   See the device installation instructions.

4. Install the device in the server.

   If you install an ISA adapter that is not a Plug and Play device, select the **Plug and Play** choice on the main menu of the Configuration/Setup Utility program to assign the ISA legacy resources. See "Plug and Play" on page 99 for more information.
5. Install software programs.

   See the installation instructions that come with the software.
6. Resolve configuration conflicts.

   See "Resolving Configuration Conflicts" on page 73.

Configuration/Setup Utility Program

> **Note**
>
> To print a copy of the hardware configuration, view
> server configuration information (such as system
> configuration, memory contents, interrupt request
> (IRQ) use, direct memory access (DMA) use, device
> drivers, and so on), do the following:
>
> 1. Start the diagnostic programs (see "Running
>   Diagnostic Programs" on page 13).
> 2. When the Diagnostic Programs screen appears,
>   select **Hardware Info**.

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 nonvolatile
random-access memory (NVRAM). 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. Review
the following information that comes with the option before
making changes. Also, record the current settings before
making any changes.

To start the Configuration/Setup Utility program:

1. Turn on the server and watch the screen.
2. When the message Press F1 for
   Configuration/Setup appears, press **F1.**

   > **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 94 for additional information.

   The Configuration/Setup Utility main menu appears.
   For information about the menu, see "Using the
   Configuration/Setup Utility Main Menu" on page 91.

Configuring ISA and PCI Adapters

You cannot assign an ISA adapter to the same interrupt that you have assigned to a PCI adapter. This is because the Netfinity 5500 does not support interrupt sharing among PCI and ISA adapters.

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

To configure ISA adapters, select **Plug and Play** and follow the instructions on the screen. See "Plug and Play" on page 99 and "Plug and Play Technology" on page 145 for additional information.

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 73.

Multiple-function PCI adapters use more than one interrupt. When you install one of these adapters, review the IRQ assignments in the Configuration/Setup Utility programs (see "PCI Routing" on page 92). Verify that the IRQ assignments are correct.

Your Netfinity 5500 uses a rotational interrupt technique to configure PCI adapters. This technique enables you to install a variety of PCI adapters that currently do not support sharing of PCI interrupts.

Failover for Redundant Ethernet

Your Netfinity 5500 has an integrated Ethernet controller.
The IBM Netfinity 10/100 Fault Tolerant Adapter is an
optional redundant network interface card (NIC adapter)
that you can install in your server. If you install this NIC
adapter and connect it to the same logical segment as the
primary Ethernet controller, you can configure the server to
support a *failover* function. You can configure either the
integrated Ethernet controller or the NIC adapter as the
primary Ethernet controller. In failover mode, if the primary
Ethernet controller detects a link failure, all Ethernet traffic
associated with it is switched to the redundant (secondary)
controller. This switching occurs without any user
intervention. Applications with active sessions do not
experience any data loss. When the primary link is
restored to an operational state, the Ethernet traffic
automatically switches back to the primary Ethernet
controller.

Note that only one controller in the redundant pair is active
at any given time. For example, if the primary Ethernet
controller is active, then the secondary Ethernet controller
cannot be used for any other network operation.

— **Note** —

Your operating system determines the maximum
number of IBM Netfinity 10/100 Fault Tolerant
Adapters that you can install in your server. See the
documentation that comes with the adapter for more
information.

**Special Considerations When Combining
Failover and Hot-Plug Functions:** If your
operating system supports hot-plug PCI adapters and the
optional redundant NIC adapter is installed in a hot-plug
PCI slot, you can replace the NIC adapter without
powering off the server — even if it is the primary Ethernet
controller. Disconnecting the Ethernet cable from the
primary Ethernet controller will cause the Ethernet traffic to
be automatically switched to the secondary Ethernet
controller. This can be very useful when a network
problem is caused by faulty adapter hardware or when you
want to upgrade the primary adapter hardware.

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

1. Add the redundant NIC adapter according to the
   instructions provided with the adapter and in
   "Adapters" on page 142.
2. Use ServerGuide to install the AMD PCNet Ethernet
   Family adapter device driver.

3. Using the MPTS utility program, select the driver from the list and select the **Edit** button.

> **Note**
>
> Only one driver instance needs to be loaded for each redundant pair of Ethernet controllers.

4. Change the PermaNet Server Feature keyword to **True** and specify the Primary and Standby slots that contain the redundant pair. Refer to "System Board Component Locations" on page 254 for the locations and slot numbers of the PCI slots. The integrated controller is located in slot E.
5. To enable the writing of messages to the IBMCOM\LANTRAN.LOG file when a failover occurs:
   a. Copy the file PCNETOS2.EXE from the root directory of the diskette created by ServerGuide to your hard disk drive.
   b. Add the following statement to the CONFIG.SYS file:

      Run=d:\path\PCNETOS2.EXE

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

The failover function is now enabled.

Windows NT

1. Add the redundant NIC adapter according to the instructions provided with the adapter and in "Adapters" on page 142.
2. Use ServerGuide to install the AMD PCNet Ethernet Family adapter device driver.
3. From the NT desktop, select **Control Panel**, then select the **Network** icon, then the **Adapters** tab.
4. Highlight one of the adapters that will be in the redundant pair and then select the **Properties...** button.
5. Check the **Grouping** box. This will show the possible combinations for redundant pairs.
6. Select the adapter pair you want and then select **OK**. Note that the integrated Ethernet controller is located at PCI bus 0, slot 14.
7. Select **Close** to exit from the Network setup.

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

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

IntraNetware

1. Add the redundant NIC adapter according to the instructions provided with the adapter and in "Adapters" on page 142.
2. Load the device driver by using the following command:

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

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

    The slot number associated with the integrated Ethernet controller can vary depending upon the configuration of the server. To determine the slot number, load the driver with no parameters. The driver will display the available slot numbers. The slot number that is greater that 10000 will be the slot number of integrated Ethernet controller. When the slot number of the integrated Ethernet controller is determined, reload the driver with the appropriate parameters.
3. When the driver is loaded, bind it to a protocol stack.

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

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

Note

If the primary adapter was hot-replaced while the Ethernet traffic was being handled by the secondary Ethernet controller, the traffic does not automatically switch back to the primary adapter when the primary adapter comes back online. In this case, issue the command:

LOAD d:\path\PCNTNW SCAN

where d and path are the drive and path where the driver is located. This command causes the device driver to locate the primary adapter and switch the Ethernet traffic to it.

Netfinity System Management Processor

The following information is about the system management processor that is integrated in the server. It also describes how to access the system management processor without Netfinity Manager. The following information is for the Netfinity System Management Processor.

One of the features of the Netfinity 5500 is the integrated system management processor.

Note

To use all of the functions of the system management processor, you must install the Advanced System Management service for Netfinity Manager. You also will need a user-provided modem attached to serial port A to use the remote functions. Refer to "Serial Ports" on page 166 for information about serial port A.

The Advanced System Management service gives you the ability to configure and monitor many features of your server's system management processor. You can connect to, and directly access and control, the system management processor of a remote system. With the Advanced System Management service you can configure Advanced System Management service events (such as, POST, loader, and operating-system timeouts; and critical temperature and voltage failures). If any of these events occur, the Advanced System Management service can be configured to automatically forward a Netfinity alert in one of three ways:

- Alert forwarded to another Netfinity system
- Alert forwarded to a standard numeric pager
- Alert forwarded to an alphanumeric pager

In addition, with the Advanced System Management service you can remotely monitor, record, and replay all textual data generated by a remote system during POST. While monitoring a remote system during POST, you can enter key commands on your keyboard that will then be relayed to the remote system.

The Netfinity Manager software is included in your ServerGuide package. Refer to the documentation that comes with ServerGuide for information on how to install the Netfinity Manager software. Then, refer to the online Netfinity documentation or the online *Advanced System Management Service for Netfinity Manager User's Guide* for information on using the system management processor.

System Requirements for the Advanced System Management Service with Netfinity

Manager: The minimum system requirements for using the Advanced System Management service are:

- System management processor (built into the Netfinity 5500)
- Netfinity Manager or Client Services for Netfinity Manager, version 5.10.4 or later
- 2 MB of available hard disk drive space

Accessing the System Management Processor without Netfinity Manager

If for some reason you are unable to use Netfinity Manager to access and manage your system management processor, you can use a terminal program and a modem to connect directly to the system management processor. This modem should be connected to management port C. (Refer to "Management Port C" on page 167 for information on management port C.) When connected, you will be able to access a variety of monitor, configuration, and error log data. You can also power the remote (Netfinity 5500) system on or off, shutdown and restart the server, and initiate remote video mode on the system management processor. Remote video mode enables you to remotely monitor all textual output generated during POST. All POST data will be displayed in the terminal program window as the remote system completes POST. While you are monitoring POST on the remote system, all local (terminal program) keystrokes are relayed automatically to the remote system, enabling you to use POST utilities (such as system configuration, RAID mini-configuration program, and diagnostic programs) that can be accessed during POST.

To use a terminal program to establish a connection with the system management processor:

1. Use a terminal program to establish a connection with the system management processor modem. The modem settings you should use are:
Baud	57.6 k
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	Hardware

2. Log in to the system management processor.

   When you have established a connection with the system management processor, you will be prompted for a username and password. You must provide a username and password combination that has been previously configured for use with the system

management processor. You can use one of two
username and password combinations:

- The default username (USERID) and password
  (PASSW0RD)

  --- **Note** ---

  The default username and password is case
  sensitive. You must use all caps, and the
  "0" in PASSW0RD is the numeral zero.

- A username and password that you define using
  the Advanced System Management service and
  Netfinity Manager

  --- **Important** ---

  If you update the system management processor
  microcode, the default username (USERID) and
  password (PASSW0RD) are reset. If applicable,
  notify the system administrator.

When you have logged into the system management
processor, the following main menu appears:

2 Monitors
3 Error Logs
4 Service Processor Configuration
5 System Services
6 System Power
7 Boot
B Remote Terminal Status
Y Disconnect Current Logon
Z Start Remote Video

To access a menu item, press the number or letter that
corresponds to the information you want to access. After
you select a menu item, subsequent menus will offer more
specific information that pertains to the selection you made
from the main menu.

--- **Note** ---

- Selecting **Y Disconnect Current Logon** ends
  the current session and requires you to enter a
  new username and password before continuing.
- Selecting **Read** displays the last entry.
- Selecting **Read Last** steps backwards through
  the entries.
- Selecting **Write** executes the command.

Menu Selection	Data Available for Viewing
Monitors	System board temperature, CPU temperatures, power supply temperatures, voltage readings, voltage regulator module readings, fan status, redundant power supply status
Error Logs	Contents of system error log

Menu Selection	Data Available for Viewing
Service Processor Configuration	System management processor modem configuration, dial-out entries, dial-out alerts, dial-in logins, system status, thresholds, system statistics, VPD information and system state
System Services	Status of system management processor watchdog timers and event alerts sent to the server
System Power	Current system power status, power-off configuration and power-off delay values. **Note** You can use selections available from the **System Power** menu to power the system on or off. For more information, see "System Power Menu Selections" on page 68.
Boot	You can use selections available from the **Boot** menu to shutdown and restart your system or to restart the system management processor. For more information, see "Boot Menu Selections" on page 69.
Remote Terminal Status	Current remote terminal status
Start Remote Video	Use **Start Remote Video** to enable your terminal program to remotely monitor and manage the server during POST. For more information, see "Using Remote Video Mode to Monitor and Access POST" on page 71.

When you are finished accessing the system management processor using a terminal program, select **Disconnect Current Logon** from the main menu and then use your terminal program to close the connection to the system management processor.

System Power Menu Selections: You can use the selections available from the System Power menu to:

- View data regarding the current server power status
- View data regarding the server power configuration
- Power the server off
- Power the server on

To access these functions:

1. Use a terminal program to establish a connection with the system management processor modem.
2. Log in to the system management processor.

   When you have established a connection with the system management processor, you will be prompted for a username and password. You must provide a username and password combination that has been previously configured for use with the system management processor. You can use one of two username and password combinations:

- The default username (USERID) and password (PASSW0RD)

  Note

  The default username and password is case sensitive. You must use all caps, and the "0" in PASSW0RD, is the numeral zero.

- A username and password that you define using the Advanced System Management service and Netfinity Manager

  Important

  If you update the system management processor microcode, the default username (USERID) and password (PASSW0RD) are reset. If applicable, notify the system administrator.

When you have logged into the system management processor, the following main menu appears:

```
2 Monitors
3 Error Logs
4 Service Processor Configuration
5 System Services
6 System Power
7 Boot
B Remote Terminal Status
Y Disconnect Current Logon
Z Start Remote Video
```

3. Select **6 System Power**.

   The following System Power menu appears:

   ```
   1 Current Power Status
   2 Power Configuration
   3 Power On
   4 Power Off
   ```

4. Select a System Power menu item.
   - Select **1 Current power Status** for information about the current server power status.
   - Select **2 Power Configuration** for information about the server power configuration.
   - Select **3 Power On** to power the server on (if it is currently powered off).
   - Select **4 Power Off** to power the server off (if it is currently powered on).

Boot Menu Selections: You can use the selections available from the Boot menu to:

- Shutdown the server operating system and then restart the server
- Restart the server immediately, without first performing an operating system shutdown
- Restart the system management processor

To access these functions:

1. Use a terminal program to establish a connection with the system management processor modem.
2. Log in to the system management processor.

   When you have established a connection with the system management processor, you will be prompted for a username and password. You must provide a username and password combination that has been previously configured for use with the system management processor. You can use one of two username and password combinations:

   - The default username (USERID) and password (PASSW0RD)

     Note

     The default username and password is case sensitive. You must use all caps, and the "0" in PASSW0RD, is the numeral zero.

   - A username and password that you define using the Advanced System Management service and Netfinity Manager

   Important

   If you update the system management processor microcode, the default username (USERID) and password (PASSW0RD) are reset. If applicable, notify the system administrator.

   When you have logged into the system management processor, the following main menu appears:

   ```
   2 Monitors
   3 Error Logs
   4 Service Processor Configuration
   5 System Services
   6 System Power
   7 Boot
   B Remote Terminal Status
   Y Disconnect Current Logon
   Z Start Remote Video
   ```

3. Select **7 Boot**.

   The following Boot menu appears:

   ```
   1 Reboot w/OS Shutdown
   2 Reboot immediately
   3 Restart SP
   ```

4. Select a Boot menu item.
   - Select **1 Reboot w/OS Shutdown** to shutdown the server operating system and then restart the server.
   - Select **2 Reboot immediately** to restart the server immediately, without first shutting down the operating system.

- Select **3 Restart SP** to restart the system management processor.

Using Remote Video Mode to Monitor and Access POST: You can use a terminal program to remotely monitor all textual output generated during POST. All POST data will be displayed in the terminal program window as the remote system completes POST. While you are monitoring POST on the remote system, all local keystrokes are relayed automatically to the remote system, enabling you to use POST utilities (such as system configuration, RAID mini-configuration program, or diagnostic programs) that can be accessed during POST.

To use Remote Video Mode to monitor and access POST on the server:

1. Use a terminal program to establish a connection with the system management processor modem.
2. Log in to the system management processor.

   When you have established a connection with the system management processor, you will be prompted for a username and password. You must provide a username and password combination that has been previously configured for use with the system management processor. You can use one of two username and password combinations:

   - The default username (USERID) and password (PASSW0RD)

     --- **Note** ---

     The default username and password is case sensitive. You must use all caps, and the "0" in PASSW0RD, is the numeral zero.

   - A username and password that you define using the Advanced System Management service and Netfinity Manager

     --- **Important** ---

     If you update the system management processor microcode, the default username (USERID) and password (PASSW0RD) are reset. If applicable, notify the system administrator.

   When you have logged into the system management processor, the following main menu appears:

   ```
   2 Monitors
   3 Error Logs
   4 Service Processor Configuration
   5 System Services
   6 System Power
   7 Boot
   B Remote Terminal Status
   Y Disconnect Current Logon
   Z Start Remote Video
   ```

3. Start (or restart) the server.
   - If the remote server is currently powered off:
      a. Select **6 System Power** from the main menu.
      b. Select **4 Power On** from the System Power menu.
   - If the server is currently powered on, you must restart the server. You can use selections from the System Power menu or the Boot menu to restart the server in several ways.

      To restart the server using System Power menu selection:
      a. Select **6 System Power** from the main menu.
      b. Select **3 Power Off** from the System Power menu.
      c. Once the server has powered off, select **4 Power On** to restore power to the server.

      To restart the server using Boot menu selections:
      a. Select **7 Boot** from the main menu.
      b. Select either **1 Reboot w/OS Shutdown** or **2 Reboot Immediately** to restart the server.

      ┌─ **Note** ─────────────────────────────┐
      │ For information on the System Power and │
      │ Boot menus, see "System Power Menu   │
      │ Selections" on page 68 and "Boot Menu   │
      │ Selections" on page 69.   │
      └───┘

4. After you restart the server, return to the main menu and select **Z Start Remote Video**.

Once you have started Remote Video mode on the system management processor, all textual output generated during POST will be sent to your terminal window. Your terminal will also act as a fully-active remote session, enabling you to enter keyboard commands that will be sent to the remote server. In this way, you can enter key commands and key-combinations that access POST operations and utilities such as system setup or the RAID mini-configuration program.

When you have finished using Remote Video mode, press **Ctrl+R**, then press **Ctrl+E**, and then press **Ctrl+T**. This will end Remote Video mode and return you to the main menu.

Resolving Configuration Conflicts

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

Changing the Software Configuration

Setup: The best way to resolve memory-address conflicts is to change the software configuration by changing the addresses that the EMS device driver defined. The SVGA video memory occupies 32 Kb (1 Kb = approximately 1000 bits) of space in the hex C0000 to C7FFF EMS memory area. EMS device drivers must use addresses different from those assigned to video read-only memory (ROM). You can use the Configuration/Setup utility program to view or change the current setting for video ROM. For information about using the configuration programs, see "Using the Configuration/Setup Utility Main Menu" on page 91.

Changing the Hardware Configuration

Setup: An alternative way to resolve memory-address conflicts is to change the address of the conflicting hardware option. See "Plug and Play" on page 99 for information about reserving resources for ISA legacy adapters.

ServeRAID Configuration Program

You can use the IBM ServeRAID Configuration program to view the current disk-array configuration, change or delete existing arrays, create and initialize new disk arrays, and perform many other configuration and maintenance tasks.

You must use the ServeRAID Configuration program or the EZ-RAID configuration feature to configure your disk arrays *before* you partition your hard disk drives and install your operating system. After you configure your disk arrays, use the information provided in the SeverGuide package to install your operating system. Then, return to this manual for information about installing and using the ServeRAID Administration and Monitoring utility program.

Software Installation

Use ServerGuide to verify that you have the proper working environment for the specific operating system you are installing.

1. Follow the instructions provided in your ServerGuide package to install your operating system.

What to do next?

- To install application programs, refer to the application program documentation.

Specifications

The following list contains the specifications for the Netfinity 5500.

Size (Tower Model)

- Depth: 700 mm (27.6 in.)
- Height with NetBAY3: 530 mm (20.9 in.)
- Height without NetBAY3: 356 mm (14 in.)
- Width: 483 mm (19 in.)
- Front clearance: 305 mm (12 in.)
- Rear clearance: 100 mm (4 in.)
- Side clearance: 50 mm (2 in.)

Size (Rack Model)

- Depth: 650 mm (25.6 in.)
- Height: 356 mm (14 in.) (8 U)
- Width: 440 mm (17.3 in.)

Weight

- Unpacked, minimum configuration (with empty NetBAY3): 39 kg (85 lb.)
- Unpacked, maximum configuration: 55 kg (120 lb.)

Heat Output

- Approximate heat output in British thermal units (Btu) per hour:
    - Minimum configuration: 1023.9 Btu
    - Maximum configuration: 2764.6 Btu

Environment

- Air temperature
    - System on: 10° to 35° C (50° to 95° F)
      Altitude: 0 to 914 m (3000 ft.)
    - System on: 10° to 32° C (50° to 89.6° F)
      Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.)
    - System off: 10° to 43° C (50° to 110° F)
      Maximum altitude: 2133 m (7000 ft.)
- Humidity
    - System on: 8% to 80%; maximum wetbulb, 23° C (73.4° F)
    - System off: 8% to 80%; maximum wetbulb, 27° C (80.6° F)
- Altitude: 0 to 2133 m (0 to 7000 ft.)

Acoustical Noise Emissions Values

- Sound power, idling
    - 6.2 bel for open bay system (no hard disk drives installed)
    - 6.2 bel for typical system configuration (3 hard disk drives installed)
- Sound power, operating
    - 6.2 bel for open bay system (no hard disk drives installed)

- 6.4 bel for typical system configuration (3 hard disk drives installed)
- Sound pressure, idling
  - 45 dBA for open bay system (no hard disk drives installed)
  - 45 dBA for typical system configuration (3 hard disk drives installed)
- Sound pressure, operating
  - 45 dBA for open bay system (no hard disk drives installed)
  - 46 dBA for typical system configuration (3 hard disk drives installed)

These levels are measured in controlled acoustical environments according to ISO 7779, and are reported in accordance with ISO 9296. The declared sound power levels indicate an upper limit, below which a large portion of machines operate. Sound pressure levels in your location might exceed the average values stated because of room reflections and other nearby noise.

Electrical Input

- Sine-wave input (50± or 60± Hz) is required
- Input voltage
  - Low range
    - Minimum: 90 V ac
    - Maximum: 137 V ac
  - High range
    - Minimum: 180 V ac
    - Maximum: 265 V ac
  - Input kilovolt-amperes (KVA) approximately
    - Minimum configuration as shipped: 0.2 KVA
    - Maximum configuration: 0.78 KVA

Electrostatic Discharge

- Tested to 14 KV

Immunity

- Verified to comply with EN 50082-2

Safety Standards

- UL 1950
- CSA C22.2 No. 950-M93
- EN 60950 and countries deviations
- IEC 950
- NOM-019

Starting the ServeRAID Configuration Program

You can start the ServeRAID Configuration program in one of three ways. Choose one of these startup methods, and follow the appropriate instructions.

- During the initial startup of your server using ServerGuide (see "During the Initial Startup of Your Server").
- After an operating system is installed using ServerGuide (see "After an Operating System is Installed").
- Using diskettes (see "Using Diskettes to Start the ServeRAID Configuration Program").

During the Initial Startup of Your Server:

Using ServerGuide, insert the *HardwareGuide* CD in the CD-ROM drive and start the server. Follow the instructions in your ServerGuide package to start the ServeRAID Configuration program.

When the ServeRAID Configuration program starts, go to "Using the ServeRAID Configuration Program" on page 101 for more information.

After an Operating System is Installed

- **Notes**

    1. Ensure that the CD-ROM is enabled as the startup drive. (See "Start Options" on page 97 for additional information.)
    2. If a screen appears asking you to select an operating system, select the operating system that you have installed. This does not reinstall the operating system. This is for information only.

Insert the *HardwareGuide* CD in the CD-ROM drive and start the server. Follow the instructions in your ServerGuide package to start the ServeRAID Configuration Program.

When the ServeRAID Configuration Program starts, go to "Using the ServeRAID Configuration Program" on page 101 for more information.

Using Diskettes to Start the ServeRAID Configuration Program:

If you choose to use diskettes to configure your ServeRAID controller, you must first make the ServeRAID diskettes. You can make the diskettes using the Diskette Factory feature of ServerGuide. Refer to your ServerGuide documentation for instructions. You can also download the diskette images from the World Wide Web. See "Online Support"

on page iv for information about pages IBM maintains on the World Wide Web.

Once you have made the ServeRAID diskettes, do the following to start the ServeRAID Configuration program.

Insert the ServeRAID Configuration Diskette into the primary diskette drive; then, turn on the system. If the system is already turned on, press **Ctrl**+**Alt**+**Del.**

Each time your system starts, the ServeRAID controller performs a power-on self-test (POST). The POST checks the configuration information for the ServeRAID controller and for the configured hard disk drives. When POST detects a problem, an error message appears on the screen. If this occurs, see "Symptom-to-FRU Index" on page 263.

When the ServeRAID Configuration program starts, go to "Using the ServeRAID Configuration Program" on page 101 for more information.

Status LEDs

Your server has LEDs to help you identify problems with some server components (see, "Symptom-to-FRU Index" on page 263).

Status LEDs are located on the following components:

- Information panel

  For more information, see "Information LED Panel" on page 189.
- Hard disk drive trays

  For more information, see "Controls and Indicators" on page 158.
- Power supply

  For more information, see "Power Supply LEDs."
- Diagnostic panel

  For more information, see "Diagnostics Panel LEDs" on page 164.
- Processor board

  See "Processor Board Component Locations" on page 227 for locations of the LEDs on the processor board.
- System board

  See "System Board Component Locations" on page 254 for locations of the LEDs on the system board.

Power Supply LEDs: The AC and DC Power LEDs on the power supply provide status information about the power supply. See "Power Supplies" on page 224 for the location of these LEDs.

The following table describes the AC and DC Power LEDs.

AC Power LED	DC Power LED	Description and Action
On	On	The power supply is on and operating correctly.

On	Off	There is a DC power problem.
		
		Possible causes:
		
		1. The Power Control button on the front of the server is in the Off position.
		
		   Action: Press the Power Control button to start the server.
		2. The Power switch on the power supply is in the Off position.
		
		   Action: Turn the Power switch to the On position.
		3. The power supply has failed.
		
		   Action: Replace the power supply.

Off	Off	There is an AC power problem.
		
		Possible causes:
		
		1. There is no AC power to the power supply.
		
		   Actions: Verify that:
		   • The power cord is properly connected to the server.
		   • The power outlet functions properly.
		2. The power supply has failed.
		
		   Action: Replace the power supply.

Understanding Disk Array Technology

When you connect several hard disks together and configure the RAID controller to access them in a predetermined pattern, you create a *disk array.* The ServeRAID controller on your system board supports up to eight independent arrays.

Disk arrays are used to improve security, performance, and reliability. The amount of improvement depends on the application programs that you run on the server and the RAID levels that you assign to the logical drives in your arrays. The ServeRAID controller supports RAID levels 0, 1, and 5.

Your server has space for up to six hot-swap hard disk drives.

Hard Disk Drive Capacities: Hard disk drive capacities influence the way you create arrays. Drives in the array can be of different capacities (1 GB[1] or 2 GB, for example), but the ServeRAID controller treats them as if they all have the capacity of the *smallest* disk drive.

For example, if you group three 1 GB drives and one 2 GB drive into an array, the total capacity of the array is 1 GB times 4, or 4 GB, not the 5 GB physically available. Conversely, if you add a smaller drive to an array of larger drives, such as a 1 GB drive to a group containing three 2 GB drives, the total capacity of that array is 4 GB, not the 7 GB physically available. Therefore, the optimal way to create arrays is to use hard disk drives that have the same capacity.

Logical Drives: When you create an array, you group hard disk drives into one storage area. You can define this storage area as a single *logical* drive, or you can subdivide it into several logical drives. Each logical drive appears to the operating system as a single physical hard disk drive.

The ServeRAID controller on your system board supports up to eight logical drives. If you have only one array, you can define it as a single logical drive, or you can divide it into several logical drives. The first logical drive that you define will be your startup (boot) drive. If you have two or more arrays, each array can be one logical drive, or you can divide each array into multiple logical drives, as long as the total number of logical drives for all of the arrays does not exceed eight.

---

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

RAID Classifications: With RAID technology, data is *striped* across an array of hard disk drives. This data-distribution technique complements the way the operating system requests data.

The six basic RAID classifications are RAID level 0 through RAID level 5. The ServeRAID controller on your system board supports three, industry-recognized RAID levels: 0, 1, and 5.

RAID Level 0: RAID level 0 stripes the data across all the drives in the array. This offers substantial speed enhancement, but provides for no data redundancy. The ServeRAID controller automatically assigns RAID level 0 to all logical drives in an array containing only one hard disk drive.

A hard disk failure within the array results in loss of data in the logical drive assigned level 0, but *only in that logical drive.* If you have logical drives assigned RAID level 1 or 5 in the same array, they will not lose data.

When you replace the failed drive, the ServeRAID controller automatically rebuilds all the logical drives assigned RAID levels 5 and 1 onto the replacement hard disk drive and defines the level 0 logical drive. However, the data that was in the failed level 0 logical drive is lost.

Though the risk of data loss is present, you might want to assign RAID level 0 to one of the logical drives, to take advantage of the speed offered with this RAID level. You could use this logical drive to enter data that you back up each day and for which safety is not of primary importance; that is, data that you can re-create easily. You also might want to use a level 0 logical drive when the work you are doing requires maximum capacity. RAID level 0 provides the largest capacity of the three RAID levels offered, because no room is taken up for redundant data or data parity storage.

RAID Level 1: RAID level 1 provides 100% data redundancy and requires two hard disk drives. With RAID level 1, the first stripe is the data stripe; the second stripe is the *mirror* (copy) of the first stripe, but written to another drive. If one of the hard disk drives fails, the ServeRAID controller switches read and write requests to the remaining functional drive in the array.

Because the data is mirrored, the capacity of the logical drive when assigned level 1 is 50% of the physical capacity of the grouping of hard disk drives in the array.

RAID level 1 requires two drives. When you group more than two drives into a RAID level 1 array, the ServeRAID controller automatically assigns the Enhanced RAID level 1.

The Enhanced RAID level 1 stripes data and copies of the data across all the drives in the array. As with the standard RAID level 1, the data is mirrored, and the capacity of the logical drive is 50% of the physical capacity of the grouping of hard disk drives in the array.

The following illustration shows data arranged in an array with three hard disk drives. The logical drive is assigned the Enhanced level 1. Notice that the mirror of the first data stripe (XXX YYY ZZZ) is shifted one drive. The other data stripes in level 1 follow the same pattern.

Stripe	XXX	YYY	ZZZ
Mirrored stripe	ZZZ	XXX	YYY
Stripe	AAA	BBB	CCC
Mirrored stripe	CCC	AAA	BBB

Table 1. Enhanced RAID Level 1

If you have only two drives available, the second drive is a mirror copy of the first drive.

RAID Level 5: RAID level 5 stripes data and parity across all drives in the array. When an array is assigned level 5, the capacity of the logical drive is reduced by one drive (for data parity storage).

RAID level 5 is generally the most desirable choice, because it offers both data protection and increased throughput. RAID level 5 gives you higher capacity than level 1, but level 1 offers better performance.

If you want to have a hot-spare drive (that is, a drive that can be automatically used to replace a similar drive that fails) and also assign RAID level 5, you must have at least four hard disk drives in your server.

ServeRAID Menus, Screens, and Drive States: The following information describes the Main Menu, the ServeRAID screens and pop-up windows, the physical device states, and the logical drive states.

Main Menu: The following illustration shows the Main Menu of the IBM ServeRAID Configuration program.
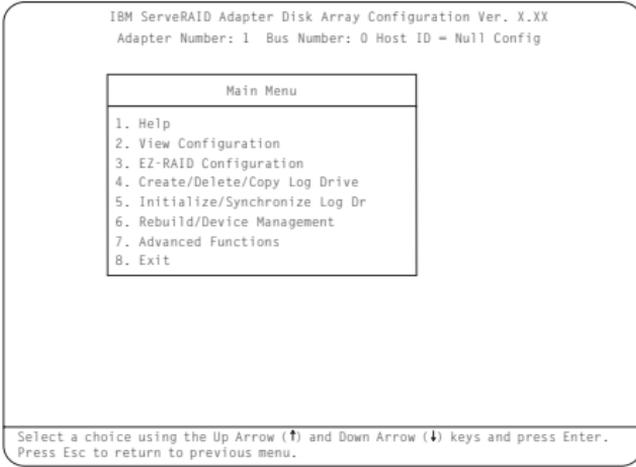
```
        IBM ServeRAID Adapter Disk Array Configuration Ver. X.XX
          Adapter Number: 1  Bus Number: 0 Host ID = Null Config

                          ┌─────────────────────────────┐
                          │          Main Menu          │
                          ├─────────────────────────────┤
                          │ 1. Help                     │
                          │ 2. View Configuration       │
                          │ 3. EZ-RAID Configuration    │
                          │ 4. Create/Delete/Copy Log Drive │
                          │ 5. Initialize/Synchronize Log Dr │
                          │ 6. Rebuild/Device Management │
                          │ 7. Advanced Functions       │
                          │ 8. Exit                     │
                          └─────────────────────────────┘




  Select a choice using the Up Arrow (↑) and Down Arrow (↓) keys and press Enter.
  Press Esc to return to previous menu.
```

Descriptions of the choices available from the Main Menu are as follows:

1. Help provides information about the choices available on the menu. You also can press F1 from any screen to obtain online Help.

2. View Configuration displays the existing disk-array configuration information. See "Viewing or Changing the Configuration" on page 113 for more information.

3. EZ-RAID Configuration automatically creates a configuration based on the number of physical drives installed in your system. See "Using the EZ-RAID Configuration Feature" on page 102 for more information.

4. Create/Delete/Copy Log Drive lets you manually create your disk arrays. You can select the drives that you want to include in an array. (See "Creating Disk Arrays Manually" on page 104 for more information.) You also can select this choice to define, delete, or copy logical drives and to define hot-spare drives.

5. Initialize/Synchronize Log Dr prepares the drives for data storage. RAID level 5 logical drives are automatically synchronized when you initialize them. See "Initializing/Synchronizing Logical Drives at the Same Time" on page 108 for more information.

6. Rebuild/Device Management rebuilds RAID level 1 and RAID level 5 logical drives. You also can select this choice to define or change the state of a physical drive, view drive information, and clear the Device Event Log. (See "Maintaining the Disk-Array Configuration" on page 125 for more information.)

7. Advanced Functions lets you change the write policy (the way data is written to the drive), save your configuration information to a diskette, restore your configuration from a diskette, or change the ServeRAID

controller parameters. You also can select this choice to run the RAID subsystems diagnostics, initialize the controller configuration, reset the configuration values to the factory defaults, and select a source (hard disk, NVRAM, Flash) from which to synchronize the ServeRAID controller configuration.

8. Exit lets you exit from the Main Menu of the ServeRAID Configuration program.

Screens and Pop-Up Windows: The following illustration is a compilation of several configuration screens that appear when you use the IBM ServeRAID Configuration program.
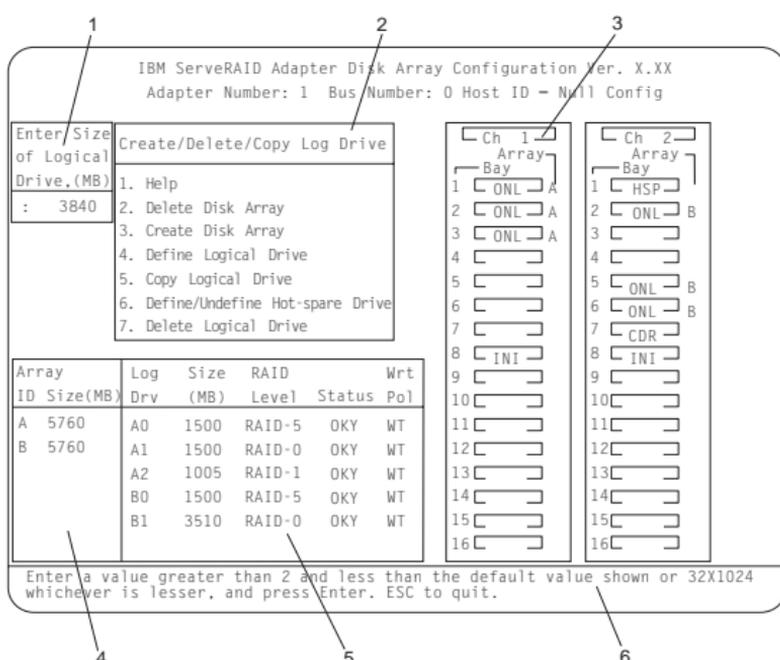
Descriptions of the labeled areas in this illustration are as follows:

1 Pop-up windows that apply to the current menu appear in this area of the screen. For example, when you need to confirm an action, the Confirm pop-up window appears in this area.

2 You can select any of the choices that appear on the menu. To make a selection from a menu, type the highlighted number of the menu item, or use the Up Arrow (↑) or Down Arrow (↓) key to highlight your choice; then, press **Enter.** You can press the **Esc** key to return to a previous menu, to a previous work area of a screen, or to the Main Menu.

3 The Array/Bay selection list shows the bays for the ServeRAID controller. For each bay that contains a drive, the list indicates the array in which the drive is grouped and the physical device state. (See "Physical Device States" on page 86 for more information.) For example, in the illustration, the

drive in Channel 1, Bay 1 has a drive state of online (ONL) and is part of Array A.

> **Notes**
>
> 1. The Array/Bay selection list does not reflect the physical configuration of the server. (See "Internal Drive Bays" on page 197 for the physical location of the hard disk drives.)
> 2. The SCSI IDs for the hot-swap hard disk drives is set by the backplane. The backplane allows you to define the IDs as low (0 to 5) or high (8 to 13). See "SCSI Backplane Option Jumpers" on page 249 for more information about setting jumpers on the backplane.
> 3. The bay number corresponds to the SCSI ID of the device plus 1. For example, the ServeRAID controller (INI) uses SCSI ID 7 and its bay number is 8 (7 + 1).
> 4. Bay Number 8 (SCSI ID 7) is reserved for the ServeRAID controller (also known as the initiator, INI); therefore do not set the SCSI ID of non-hot-swap device, such as a tape drive, to 7.

4 The Array list indicates the array IDs and the sizes (in megabytes) of the arrays. When a drive is being rebuilt, this list and the Logical Drive list show the progression of the rebuild process.

5 The Logical Drive list shows the size, RAID level, status, and write policy for each logical drive. (See "Logical Drive States" on page 88 for more information.)

6 This area provides information and instructions about the actions you can perform on the current screen or pop-up window.

Physical Device States: Descriptions of the physical device states, which appear in the Array/Bay selection list, are as follows:

State	Meaning
CDR	A CD-ROM drive is installed.
DDD	The physical hard disk drive is defunct (DDD). A drive in the Online (ONL) or Rebuild (RBL) state has become defunct (DDD). It does not respond to commands, which means that the ServeRAID controller cannot communicate properly with the drive.
	A hard disk drive in the DDD state does not necessarily mean that you need to replace the

drive. Before you replace the drive, ensure that:

1. All cables are connected correctly to the backplane and to the hard disk drive. Also, check to ensure that all cables inside the server are connected correctly.
2. The hot-swap drive tray is seated properly in the drive bay.
3. See "Symptom-to-FRU Index" on page 263.

DHS A drive enters the Defunct Hot-spare (DHS) state if:

1. A defunct (DDD) drive has been rebuilt to another drive, such as a hot-spare drive.
2. A hot-spare (HSP) or standby hot-spare (SHS) drive fails to respond to commands from the ServeRAID controller.

EMP No device is present in the bay. This state appears as dashes (– – –) on the ServeRAID configuration screen, or as a blank space on the Administration and Monitor utility screen.

HSP A hot-spare (HSP) drive is a hard disk drive that is defined for automatic use when a similar drive fails. (See "Defining Hot-Spare Drives" on page 111 for more information.)

INI The INI represents the initiator for the ServeRAID controller.

ONL The drive is online (ONL). It is functioning properly and is part of an array.

PRC The device is a generic SCSI controller (for example, a hot-swap backplane that has onboard systems-management support).

RBL The drive is being rebuilt. (See "Understanding the Drive Rebuild Process" on page 131 for more information.)

RDY The ServeRAID controller recognizes a ready (RDY) drive as being available for definition. The ready drive state changes to empty (EMP) when the drive is physically removed from the bay.

SBY A standby (SBY) drive is a hard disk drive that the ServeRAID controller has spun down.

SHS A standby hot-spare (SHS) is a hot-spare drive that the ServeRAID controller has spun down. If an online (ONL) drive becomes defunct and no suitable hot-spare drive is available, a standby hot-spare of the appropriate size automatically spins up, and enters the rebuild (RBL) state.

TAP   A tape drive is installed.

Logical Drive States: Descriptions of the logical drive
states, which appear in the Logical Drive list, are as
follows:

State	Meaning
CRM	A logical drive undergoing a logical-drive migration (LDM) is in the critical state.
CRS	The ServeRAID controller uses this reserved state during a logical-drive migration (LDM).
CRT	A RAID level 1 or 5 logical drive that contains a defunct physical drive is in the critical state. A critical (CRT) logical drive is accessible, despite a physical drive failure.
FRE	The drive is in a free (FRE) state. It is not defined.
LDM	The logical drive is undergoing a logical-drive migration (LDM); that is, a change in RAID levels, a change in logical drive size, or an increase in free space.
OFL	The logical drive is offline (OFL) and not accessible. This state occurs if one or more physical drives in a RAID level 0 logical drive are defunct. This state also occurs when two or more physical drives in a RAID level 1 or RAID level 5 logical drive are defunct.
OKY	The drive is okay (OKY). It is in a good, functional state.
SYS	The ServeRAID controller uses this reserved state during logical-drive migration (LDM).

If the state of the logical drive is critical (CRT), you must
replace and rebuild the defunct drive. See "Understanding
the Drive Rebuild Process" on page 131 for more
information.

Using the Advanced Configuration Functions

The Advanced Functions choice allows you to initialize the configuration (reset the ServeRAID controller settings), import the configuration information from the drives, enable and disable the Boot CD-ROM and INT13 extensions, and view the controller and PCI information.

When you select Advanced Functions from the Main Menu, a screen similar to the following appears.

```
    IBM ServeRAID Adapter Disk Array Mini-Configuration Ver. X.XX

              Advanced Functions

     Initialize Configuration
     Import Configuration from Drive(s)
     Configure BIOS Settings
     Adapter and PCI Information
     Exit




  Select a choice using the Up and Down Arrow keys, then press Enter.
```
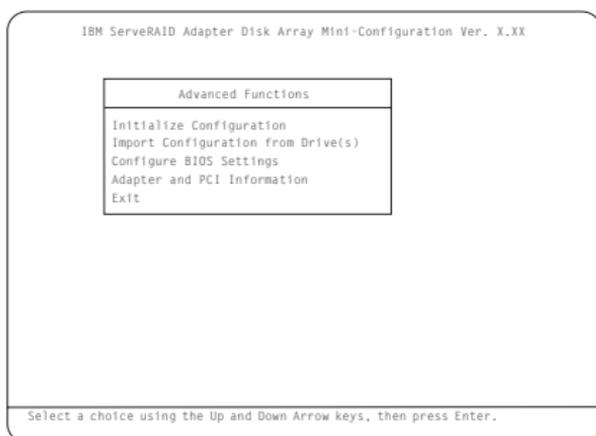
Descriptions of the choices available from the Advanced Functions menu are as follows:

> **Attention**
>
> The following choices might result in loss of data due to changes in the configuration.

- **Initialize Configuration** resets the ServeRAID controller settings to their factory defaults and sets all functional hard disk drives to the RDY state.
- **Import Configuration from Drive(s)** reads the most common configuration information from the drives in the server and copies it to the controller's NVRAM and to the controller's EEPROM module.
- **Boot CD-ROM and INT13 Extensions** is used to configure the **BootCd** feature. When **BootCd** is enabled, the ServeRAID controller attempts to start (boot) from a CD, if the CD-ROM drive contains a startable (boot-enabled) CD, and no other controller is currently using INT13 extensions.

  Attention:
  Only one controller can support INT13 extensions.
- **Adapter and PCI Information** displays the ServeRAID controller hardware and PCI register information, as shown in the following example screen.

```
  IBM ServeRAID Adapter Disk Array Mini-Configuration Utility Ver. X.XX

  Adapter Information           PCI Reg Information

  Code Seg.(Cs):  CBB0h      Dev. Ven Id (00h):  002Eh 1014h
  Data Seg.(Ds):  9A00h        Status, Cmd(04h):  0200h 0107h
    Adapter No:  1            Class, Rev Id(08h):  010000h 04h
       Intr No:  0009h  Bist.Hdr.Lat.Cach (0Ch):  00h 00h 40h 08h
       I/O Adr:  F400h      Base Adr Reg0(10h):  0000F401h
       Mem Adr:  FDFFE000h    Base Adr Reg1(14h):  FDFFE000h
        Bus No:  00h         Base Adr Reg2(18h):  00000000h
     Device No:  0Eh         Base Adr Reg3(1Ch):  00000000h
  StatusQ Start: 0009E814h   Base Adr Reg4(20h):  00000000h
    StatusQ End: 0009E82Ch   Base Adr Reg5(24h):  00000000h
   StatusQ Head: 0009E818h        Reserved(28h):  00000000h
    Status Tail: 0009E814h        Reserved(2Ch):  00000000h
     OS/2 Table: 4800h      Exp ROM Adr(30h):  00000000h
    Part Number: 01K8562          Reserved(34h):  00000000h
                                  Reserved(38h):  00000000h
                         MaxLat.MinG.IntP.Intl(3Ch):  00h 00h 00h 00h

                    Press any key to continue.
```

Setting the BootCd Feature: When you select
Boot CD-ROM and INT13 Extensions, a screen similar to
the following appears.

```
  IBM PC ServeRAID Adapter Disk Array MiniConfiguration Utility Ver. X.XX



     Boot CD-ROM Configuration

     BIOS Support for Bootable CD-ROM            No
     Display Boot CD-ROM Menu                    No
     BIOS Support for Int13 Extensions           No
     BIOS Support for reading Partition tables  Yes
     BIOS Support for Service Processor          No
     Save Configuration in Adapter
     Exit






  Select a choice using the Up and Down Arrow keys, then press Enter.
```
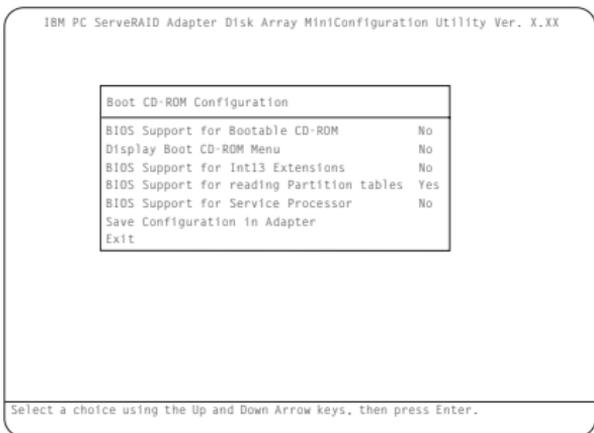
To enable the BootCd feature:

1. Use the Up Arrow (↑) or Down Arrow (↓) key to
   highlight **BIOS Support for Bootable CD-ROM**.
   Press **Enter** to change No to Yes. This also changes
   No to Yes next to **Display Boot CD-ROM Menu** and
   BIOS Support for INT13 Extensions.
2. Ensure that the screen displays Yes next to **BIOS
   Support for reading Partition tables**. If not, use the
   Up Arrow (↑) or Down Arrow (↓) key to highlight **BIOS
   Support for reading Partition tables**; then, press
   Enter to change No to Yes.
3. Highlight **Save Configuration for Adapter**; then,
   press **Enter**. A Configuration Saved message
   appears. The Main Menu of the Mini-Configuration
   program returns.

   - **Note**

   Highlighting **Exit**, instead of **Save Configuration
   for Adapter**, and pressing **Enter** causes any
   changes you made **not** to be saved.

4. Press **Ctrl**+**Alt**+**Del** to restart the server.

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:

```
┌─────────────────────────────────────────────────────┐
│        IBM SurePath Setup - © IBM Corporation        │
│   ┌─────────────────────────────────┐                │
│   │ Configuration/Setup Utility     │                │
│   │ • System Summary                │                │
│   │ • System Information            │                │
│   │ • Devices and I/O Ports         │                │
│   │ • Date and Time                 │                │
│   │ • System Security               │                │
│   │ • Start Options                 │                │
│   │ • Advanced Setup                │                │
│   │ • Plug and Play                 │                │
│   │ • Error Logs                    │                │
│   │                                 │                │
│   │   Save Settings                 │                │
│   │   Restore Settings              │                │
│   │   Load Default Settings         │                │
│   │                                 │                │
│   │   Exit Setup                    │                │
│   └─────────────────────────────────┘                │
│                                                       │
│  <F1>  Help              < ↑ > < ↓ > Move             │
│  <Esc> Exit              <Enter> Select               │
└─────────────────────────────────────────────────────┘
```
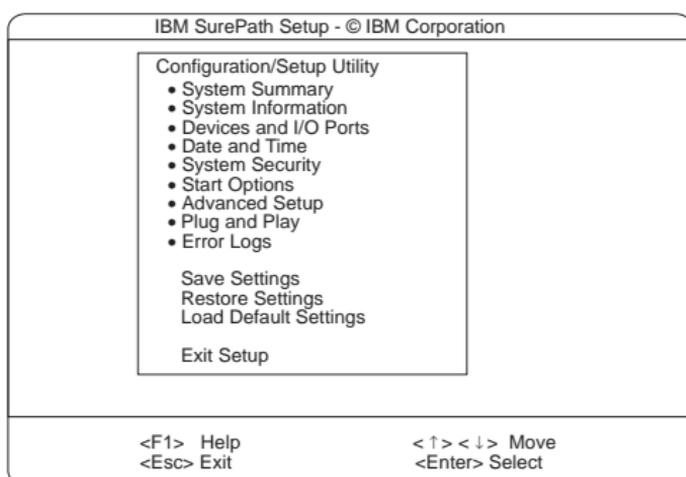
Pressing **F1** displays Help information for a selected menu item.

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

To change configuration settings:

1. Use the Up Arrow (↑) 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 step 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.
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 microprocessor and amount of memory.

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

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

System Information: Select this choice to display information about your Netfinity 5500, and to view the IRQ settings for the RAID and Ethernet controllers on the system board, and other PCI adapters that you purchase and install.

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

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

Product Data: Select this choice to view system information, such as the machine type and model, the system serial number, the system board identifier, and the revision level or issue date of the flash electronically erasable programmable ROM (EEPROM) for the system management processor, diagnostics, and BIOS.

System Card Data: Select this choice to view information for the system board, processor board, power supply, power backplane, DASD backplane, etc..

PCI Routing: Select this choice to view the IRQ settings for PCI adapters and for the Ethernet, SCSI, and other controllers on the system board. See "PCI Bus Control" on page 98 for information about changing the PCI IRQ settings.

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.

Note

Serial port A can be shared by the system management processor and operating system. Serial port B is used by the operating system only. Management port C is controlled exclusively by the system management processor, cannot be used by the operating system, and cannot be configured using the Configuration/Setup utility program.

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

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

You can configure the parallel port as *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, serial ports, or the 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 available.

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

Notes

1. When you configure the parallel port as bidirectional, use an IEEE 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 feet).
2. The universal serial bus (USB) is configured automatically. For further details about Plug and Play devices, see "Plug and Play" on page 99.
3. If you install a USB keyboard that has a mouse port, the USB keyboard emulates a mouse and you will not be able to disable the mouse setting in the Configuration/Setup Utility.

Date and Time: Select this choice to set the system date and time.

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

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

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

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

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 menu.

To set, change, or delete a password:

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

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

Type of Password	Results
No password set	• No password required to start system. • You can access all choices on the Configuration/Setup Utility main menu.
Power-on password only	• You must enter the password to complete the system startup. • You can access all the choices on the Configuration/Setup Utility main menu.
Administrator password only	• You must enter the password to complete the system startup. • Administrator password provides access to all choices on the Configuration/Setup Utility main menu.

Administrator *and* power-on password	• You can enter either password to complete the system startup.
	  – 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.
	  – Power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This might include changing or deleting the power-on password.
	  – If you forget the power-on password, and the administrator password has been set, use the administrator password at the power-on password prompt; then, start the Configuration/Setup Utility program and change the power-on password.

Using the Power-On Password Menu: When a power-on password is set, you must enter a password each time that you start the system.

To set a power-on password:

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

   The Power-on Password menu appears.

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

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

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

   > **Note**
   >
   > A message appears if the two passwords do not match. If this happens, press **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.**

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

- If an administrator password has been set, enter the administrator password at the power-on prompt. (See "Using the Administrator Password Menu" on page 96 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).
- You can change the position of the Power-On Password Override jumper, as described in "Bypassing an Unknown Power-on Password" on page 257.
- You can remove the battery as described in "Battery Replacement" on page 147 and then reinstall the battery.

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 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.**

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 replace the system board.

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.
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 menu. The System Security menu contains the **Power-on Password** choice.

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 in disketteless and monitorless operation.

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.

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 menu.

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

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 menu.

ACPI Control: Select this choice to enable or disable the advanced configuration and power management interface (ACPI) in the BIOS. You can choose to change the ACPI hardware signature or select an IRQ for ACPI.

Cache Control: Select this choice to enable or disable the microprocessor cache. In addition, you can define the microprocessor cache mode as write-back (WB) or write-through (WT).

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

> **Note**
>
> If the system does not start (boot) successfully after three attempts, the default configuration is loaded, disabling the cache.

PCI Bus Control: Select **PCI Bus Control** to get the following choices:

- PCI-PCI Bridge Pre-fetching: Set **PCI-PCI bridge pre-fetching** to **Enabled** for maximum performance. If you experience problems running peer-to-peer adapters, disable this function.
- PCI Primary Bus MLT: This setting is for the primary master latency timer (MLT). It can be used to help tune performance of the server.
- PCI Secondary BUS MLT: This setting is for the secondary master latency timer (MLT). It can be used to help tune performance of the server.
- PCI Interrupt Routing: This choice can be used to manually override the interrupts for PCI devices. Any changes that you make in PCI Interrupt Routing will not be reflected in the IRQ settings displayed in the PCI Routing selection of the System Information menu until you restart the server.

Memory Settings: Select this choice to manually disable or enable a row of memory.

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

Advanced ISA Settings: Select this choice to select the I/O recovery timer settings.

System Service Processor Settings: Select this choice to change the system management processor IRQ.

Plug and Play: Before you can install Plug and Play adapters, you must configure ISA legacy adapters (if applicable) and assign the resources that are used by these adapters. When you install an ISA legacy adapter, you must allocate the system resources that the adapter will use. Select **Plug and Play** to view and identify these resources, which include:

- Memory
- I/O ports
- Direct memory access (DMA)
- Interrupt

> **Note**
>
> These menus do not display the resources that are required for the system or by Plug and Play devices.

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

Enter the appropriate values in the **Interrupt Resources** data fields. These values range from 0 through 15.

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

> **Note**
>
> For further details about Plug and Play devices, see "Plug and Play Technology" on page 145.

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 the three most recent error errors detected and logged during POST. You can clear the Post error log from this screen by selecting **Clear error logs**.

System Error Log: Select **System Error Log** to view the system error log. The system error log contains all of the error and warning messages generated during POST and all system status messages from the system management processor. The most recent error is displayed first. Use the Up Arrow (↑) and Down Arrow (↓) keys to move through the system error log. You can clear the system error log by selecting **Clear error logs**.

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.

Exit Setup: Select to exit from the Configuration/Setup utility program. If you have made any changes, you will be asked if you want to make the changes or exit without making the changes.

Using the ServeRAID Configuration Program

After the ServeRAID Configuration program starts, one of the following screens will appear:

- If you have more than one ServeRAID controller in your system, a screen similar to the following appears.

  > **Note**
  >
  > You can install multiple ServeRAID adapters in your server, but you must configure each adapter separately.

```
        IBM ServeRAID Adapter Disk Array Configuration Utility Ver. X.XX


                        Select Adapter

             1. Help
             2. ServeRAID Adapter 1
             3. ServeRAID Adapter 2
             4. Exit













   Multiple IBM ServeRAID Adapter found in the system. Select a choice using the Up
   Arrow (↑) and Down Arrow (↓) keys and press Enter.
```
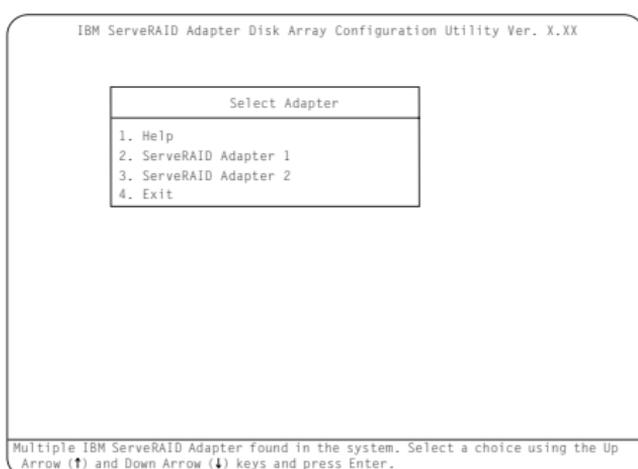
  > **Note**
  >
  > In the upper-right corner of the screen, you will see Ver. x.xx. On your screen, the x.xx is replaced by the version number of the configuration program.

  Use the Up Arrow (↑) or Down Arrow (↓) key to highlight your choice; then, press **Enter.** The Main Menu appears.

- If you have only one ServeRAID controller installed in your server, the Main Menu appears.
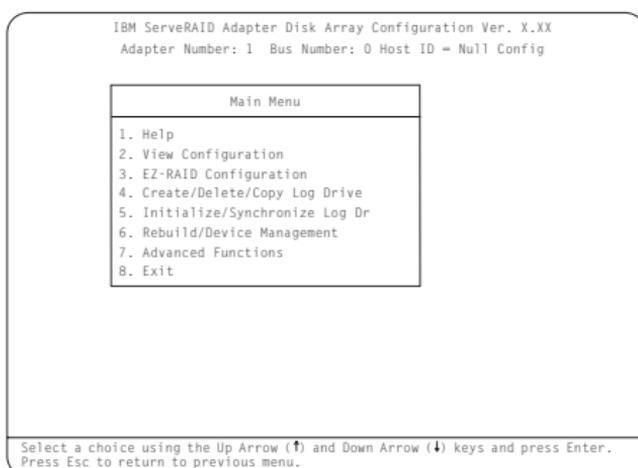
```
        IBM ServeRAID Adapter Disk Array Configuration Ver. X.XX
        Adapter Number: 1  Bus Number: 0  Host ID = Null Config


                        Main Menu

             1. Help
             2. View Configuration
             3. EZ-RAID Configuration
             4. Create/Delete/Copy Log Drive
             5. Initialize/Synchronize Log Dr
             6. Rebuild/Device Management
             7. Advanced Functions
             8. Exit








   Select a choice using the Up Arrow (↑) and Down Arrow (↓) keys and press Enter.
   Press Esc to return to previous menu.
```

Type the highlighted number of the menu item, or use the Up Arrow (↑) or Down Arrow (↓) key to highlight your choice; then, press **Enter.** You can also press **Esc** to return to the previous menu, the previous work area of a screen, or to the beginning of the Main Menu.

If you are not familiar with the ServeRAID Configuration program, review the information in "ServeRAID Menus, Screens, and Drive States" on page 83.

Creating Disk Arrays: The ServeRAID controller on your system board supports up to eight independent arrays. You must use the EZ-RAID configuration feature or the Create/Delete/Copy Log Drive menu to configure your disk arrays *before* you partition your hard disk drives and install your operating system.

The EZ-RAID configuration feature provides an easy way for you to quickly configure your disk arrays. This feature automatically creates a disk array, based on the number of RDY physical drives in your system. The EZ-RAID feature defines, initializes, and synchronizes the logical drive for you. If four or more RDY physical drives are available, this feature also will define a hot-spare drive. (See "Using the EZ-RAID Configuration Feature" for more information.)

The Create/Delete/Copy Log Drive menu enables you to configure your arrays manually. You can use this menu to select the physical drives that you want to include in your disk arrays. You also can use this menu to define the logical and hot-spare drives for your arrays. (See "Creating Disk Arrays Manually" on page 104 for more information.)

For Advanced Users

If you want to change the stripe-unit size to maximize performance, see to "Changing the RAID Parameters" on page 118.

Using the EZ-RAID Configuration Feature: The EZ-RAID configuration feature groups up to eight ready (RDY) drives into one disk array and defines one logical drive. The size of the logical drive depends on the amount of free space available, and the RAID level assigned to the logical drive depends on the number of physical drives available.

The following table provides information about how EZ-RAID configuration defines a logical drive, based on the number of ready (RDY) drives available.

Physical RDY Drives Available	Logical Drive RAID Level	Hot-Spare Available
1	0	No
2	1	No
3	5	No
4-9	5	Yes

For example, if your server contains six drives that are in the RDY state, the EZ-RAID configuration feature will use five drives to create one disk array and define it as one RAID level 5 logical drive. The remaining drive is defined as a hot-spare drive.

If you want to use the EZ-RAID configuration feature to create multiple disk arrays, you might need to change the device states of some of your drives to prevent them from being included in the first array.

To create a disk array using the EZ-RAID configuration feature:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. If you want to include all RDY drives in the array, continue with step 3. Otherwise, change the device states of the RDY drives that you do not want to include in the array to SBY. To do this:
   a. Select **Rebuild/Device Management** from the Main Menu; then, press **Enter.**
   b. Select **Set Device State** from the next menu; then, press **Enter.**
   c. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the drive that you do not want to include in the array; then, press **Enter.**
   d. When the drive states pop-up window appears, select **SBY**; then, press **Enter.**
   e. Repeat steps 2b through 2d for each RDY drive that you do not want to include in the array; then, press **Esc** to return to the Main Menu.

   > **Note**
   >
   > After you run EZ-RAID configuration, you can change the device states back to RDY.

3. Select **EZ-RAID Configuration** from the Main Menu; then, press **Enter.** Information about the disk-array configuration appears on the screen.
4. When the Confirm pop-up window appears, select **Yes**; then, press **Enter**. The drives are automatically initialized. RAID level 5 drives are synchronized in the background.
5. If you are creating multiple arrays and you set some of your devices to another state using the procedure in step 2, use that procedure to set the devices for

your next array to RDY. Then, return to step 3 to create the next array. If you have finished creating your arrays, continue with step 6 on page 104.

6. When the initialization process completes, you have completed the required steps for creating a ServeRAID disk-array configuration.

7. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

8. You are now ready to install your operating system. Refer to the information provided in the SeverGuide package.

Creating Disk Arrays Manually: You can use the Create/Delete/Copy Log Drive menu to create your disk arrays manually. You also can use this menu to define the logical and hot-spare drives for your arrays. You must define at least one logical drive for each array.

To create a disk array manually:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).

2. Select **Create/Delete/Copy Log Drive** from the Main Menu; then, press **Enter.**

   A screen similar to the following appears.
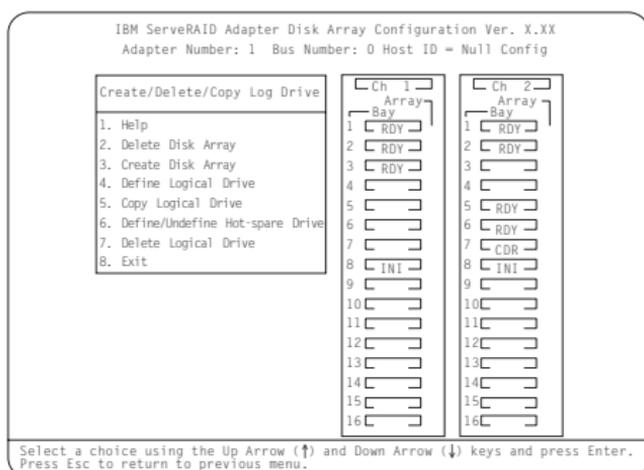
3. Select **Create Disk Array;** then, press **Enter.**

4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight each drive that you want to include in the array; then, press **Enter.** The cursor is active in the Array/Bay selection list. (You must press **Enter** to select each drive. As you select each drive, the state of that drive changes from ready (RDY) to online (ONL).)

> **Notes**
>
> 1. Hard disk drive capacities influence the way you create arrays. Drives in the array can be of different capacities, but the ServeRAID controller treats them as if they all have the capacity of the *smallest* disk drive. (See "Hard Disk Drive Capacities" on page 81 for more information.)
> 2. If you change your mind after selecting the drives for an array, you can delete the array (by selecting **Delete Disk Array** from the Create/Delete Copy Log Drive menu); then, begin again.

5. After you select all of the drives that you want to include in the array, press **Esc** to return to the Create/Delete Copy Log Drive menu.

> **Note**
>
> When the stripe-unit size is 8 K (the default setting) or 16 K (a manual setting), the maximum number of physical drives in an array is 16. When the stripe-unit size is 32 K or 64 K (both are manual settings), the maximum number of physical drives in an array is eight.

6. If you want to create another array, return to step 3 on page 104. Otherwise, continue with step 7.
7. You must define at least one logical drive for each new array. Continue with "Defining Logical Drives."

Defining Logical Drives: You must define at least one logical drive for each array. The ServeRAID controller supports up to eight logical drives. If you have only one array, you can define it as a single logical drive, or you can divide it into several logical drives. If you have two or more arrays, each array can be one logical drive, or you can divide each array into multiple logical drives, as long as the total number of logical drives for all of the arrays does not exceed eight.

> **Note**
>
> Refer to the documentation provided with your operating system for information about the recommended logical drive size.

To define a logical drive:

1. Select **Define Logical Drive** from the Create/Delete/Copy Log Drive menu; then, press **Enter.**
2. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the array for which you want to define a logical drive; then, press **Enter.**

The Select RAID Level pop-up window appears.

```
┌─ Notes ──────────────────────────────────┐
│   1. Typically, the first logical drive that you │
│      define will be your startup (boot) drive.   │
│   2. The ServeRAID Configuration program         │
│      automatically assigns RAID level 0 to any   │
│      logical drives defined in an array containing│
│      only one hard disk drive.  When this is the │
│      case, the Select RAID Level pop-up window   │
│      will not appear.                            │
│   3. If you have two hard disk drives in the array,│
│      the Select RAID Level pop-up window         │
│      appears, but RAID level 5 is not available. │
│      You need at least three hard disk drives in │
│      an array to assign RAID level 5 to the logical│
│      drives.                                     │
│   4. The RAID level that you assign to a logical │
│      drive can influence the amount of space that│
│      the drive requires; therefore, you must     │
│      assign a RAID level before you enter the    │
│      size of the logical drive.                  │
│   5. For a description of RAID levels 0, 1, and 5,│
│      see "RAID Classifications" on page 82.      │
│   6. You can define up to eight logical drives for│
│      your array.  If you plan to use the         │
│      logical-drive migration (LDM) procedure, do │
│      not define more than seven logical drives.  │
│      The LDM procedure requires one free         │
│      logical drive.  (See "Logical Drive Migration│
│      Administration" on page 38 for more         │
│      information.)                               │
│   7. If you plan to use the Change RAID Level    │
│      feature of the LDM, you must assign the     │
│      same RAID level to all of the logical drives│
│      in the array.  (See "Changing RAID Levels"  │
│      on page 39 for more information.)            │
└──────────────────────────────────────────┘
```

3. Use the Up Arrow (↑) or Down Arrow (↓) key to
   highlight the RAID level that you want to assign to the
   logical drive; then, press **Enter.** The Logical Drive
   Size pop-up window appears.

   If this is the first logical drive you are defining, the
   Logical Drive Size pop-up window will show the
   amount of free space available in the array.

   ```
   ┌─ Note ────────────────────────────────────┐
   │  Typically, the first logical drive that you define will │
   │  be your startup (boot) drive.                   │
   └──────────────────────────────────────────┘
   ```

   If you already defined other logical drives for this
   array, the Allocation Table appears showing the
   existing logical drive sizes and the amount of free
   space available.

The size of a logical drive is determined by several factors, but the size must be divisible by the number of data drives in the array. A logical drive in an array can be any size you choose within the size limitations of the array. Consider the following examples:

Example 1. The array consists of three 1 GB drives.[2] You assign RAID level 0, which uses all the drives in the array with no redundant or parity storage; then, you type 1000. The number 999 will appear in the Size (MB) field because it is the number closest to and lower than 1000 that is divisible by 3.

Example 2. The array consists of three 1 GB drives. You assign RAID level 1, which provides disk mirroring and stripes data across all drives in the array. Because the data is mirrored, the capacity of the logical drive is 50% of the physical capacity of the hard disk drives grouped in the array. If you type 1000, the number 999 will appear in the Size (MB) field. The physical capacity used is 2000 MB, twice that of the logical drive size. The number that is closest to and lower than 2000 that is divisible by 3 is 1998. The logical drive size is 999 MB, which is 50% of the physical capacity.

Example 3. The array consists of three 1 GB drives and you assign RAID level 5. Data is striped across all three drives in the array, but the space equivalent to that of one drive is used for redundant storage. Therefore, if you type 1000, the number 1000 remains in the Size (MB) field because it is divisible by 2 (drives), which is the space available for data. The physical capacity used is 1500 MB.

4. Type the size, in megabytes, that you want for the logical drive; then, press **Enter.**

5. When the Confirm pop-up window appears, select **Yes**; then, press **Enter.**

   Information about the new logical drive appears in the Logical Drive list. If you did not use all of the available free space, you can create another logical drive. You can assign the same or a different RAID level to additional logical drives.

6. When a message appears, stating that all logical drives must be initialized, press any key to continue.

---

2 When referring to hard disk drive capacity, MB stands for 1 000 000 bytes and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

> ─── **Note** ───
>
> To ensure that your server operates correctly,
> you *must* initialize the new logical drive. A quick
> initialization of a logical drive erases the first
> 1024 sectors on the drive.

7. When the Confirm pop-up window appears, you have
   two choices:
   - Select **Yes** to perform a quick initialization; then,
     press **Enter.** When the quick initialization is
     complete, go to step 8.
   - Select **No** and if the drive is a RAID level 5
     drive, it will be automatically synchronized in the
     background. Go to "Initializing Logical Drives"
     on page 109 to perform a complete initialization.
8. If you just performed a quick initialization of a RAID
   level 5 logical drive, a message appears, stating that
   the logical drive that you just created is being
   synchronized in the background and is ready for data
   storage. You have now completed the required steps
   for creating a ServeRAID configuration. Continue
   with the next step in this procedure.
9. Back up the disk-array configuration information to
   diskette. See "Backing Up the Disk-Array
   Configuration" on page 126 for instructions.

   If you have not already done so, use the information
   provided in the SeverGuide package to install your
   operating system.

***Initializing/Synchronizing Logical Drives at the
Same Time:*** Initializing a logical drive sets the drive to
a predetermined state. The initialization process
overwrites any data on the drive with zeros, and all
existing data is lost. The purpose of synchronizing logical
drives is to compute and, if necessary, write the parity data
on the selected RAID level 5 logical drive. If you did not
initialize your logical drives when you defined them, you
can now initialize multiple logical drives at the same time.
However you can still initialize and synchronize multiple
logical drives in separate steps (see "Initializing Logical
Drives" on page 109 and "Synchronizing Logical Drives"
on page 110 for instructions).

To initialize/synchronize logical drives:

1. Select **Initialize/Synchronize Log Drive** from the
   Main Menu; then, press **Enter.**
2. Select **Initialize/Synchronize Log Drive** from the
   next menu; then, press **Enter.**
3. Use the Up Arrow (↑) or Down Arrow (↓) key to
   highlight the logical drive that you want to
   initialize/synchronize; then, press the **Spacebar** to
   select the drive. Continue doing this until you have

selected all of the drives that you want to
initialize/synchronize; then, press **Enter**.
4. When the Confirm pop-up window appears, select
   Yes to initialize/synchronize the logical drive or drives;
   then, press **Enter**.

   The initialization/synchronization process begins. You
   can see the progress in the **Pct. I/S.** (percent
   initialized/synchronized) column of the Logical Drive
   list.

   - **Note** -

   Once the synchronization process begins, it
   cannot be interrupted.

5. Once you have completed initializing/synchronizing
   your logical drives, then you have completed the
   required steps for creating a ServeRAID configuration.
6. Back up the disk-array configuration information to
   diskette. See "Backing Up the Disk-Array
   Configuration" on page 126 for instructions.

   If you have not already done so, use the information
   provided in the SeverGuide package to install your
   operating system. then you have completed the
   required steps for creating a ServeRAID configuration.

Initializing Logical Drives: Initializing a logical drive
sets the drive to a predetermined state. You can initialize
multiple logical drives at the same time.

   - **Note** -

   The initialization process overwrites any data on the
   drive with zeros, and all existing data is lost.

If you did not initialize your logical drives when you defined
them, you must use the following instructions to initialize
the drives *before* storing data.

To initialize logical drives:

1. Select **Initialize/Synchronize Log Drive** from the
   Main Menu; then, press **Enter.**
2. Select **Initialize Logical Drive** from the next menu;
   then, press **Enter.**
3. Use the Up Arrow (↑) or Down Arrow (↓) key to
   highlight the logical drive that you want to initialize;
   then, press the **Spacebar** to select the drive.
   Continue doing this until you have selected all of the
   drives that you want to initialize; then, press **Enter**.

The Confirm pop-up window appears.

> **Attention**
>
> When you select **Yes** in the Confirm pop-up window, information in the logical drive will be overwritten with zeros. All existing data is lost.

4. Select **Yes** to initialize the logical drive or drives; then, press **Enter.**

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

   You can pause the initialization at any time by pressing **Esc.** Press **Esc** to stop the initialization and return to the previous menu. Press **Enter** to continue initializing the drive.

   > **Note**
   >
   > You do not need to synchronize RAID level 0 or 1 logical drives before storing data.

5. You *must* synchronize all RAID level 5 logical drives before storing data. If you just initialized RAID level 5 logical drives, continue with "Synchronizing Logical Drives." Otherwise, continue with step 6.
6. If you have completed initializing your logical drives and do not have to synchronize any RAID level 5 logical drives, then you have completed the required steps for creating a ServeRAID configuration.
7. When the initialization process completes, back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

   If you have not already done so, use the information provided in the SeverGuide package to install your operating system.

Synchronizing Logical Drives: The purpose of synchronizing logical drives is to compute and, if necessary, write the parity data on the selected RAID level 5 logical drive. Synchronizing a RAID level 1 logical drive copies the data from the primary disk to the mirrored disk.

RAID level 5 logical drives are automatically synchronized when you define them. You do not need to synchronize RAID level 0 or 1 logical drives before storing data. Also, the *data scrubbing* feature of the ServeRAID controller continuously reads all sections of RAID level 1 and RAID level 5 logical drives "in the background" while your system is running. If a defective sector is found, it is automatically repaired. As a result, you no longer have to synchronize RAID level 1 and RAID level 5 logical drives on a weekly basis.

To synchronize logical drives:

1. Select **Initialize/Synchronize Log Drive** from the Main Menu of the ServeRAID Configuration program; then, press **Enter.**

2. Select **Synchronize Logical Drive** from the next menu; then, press **Enter.**

3. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the logical drive that you want to synchronize; then, press the **Spacebar** to select the drive. Continue doing this until you have selected all of the drives that you want to synchronize; then, press **Enter**.

4. When the Confirm pop-up window appears, select **Yes** to synchronize the logical drive or drives; then, press **Enter.**

   The synchronization progress appears in the **Pct. Syn.** (percent synchronized) column of the Logical Drive list.

   ┌─ **Note** ─────────────────────────────────┐
   │ Once the synchronization process begins, it │
   │ cannot be interrupted.   │
   └───┘

5. Once you have completed synchronizing your logical drives, then you have completed the required steps for creating a ServeRAID configuration.

6. When the synchronization process completes, back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

   If you have not already done so, use the information provided in the SeverGuide package to install your operating system.

Defining Hot-Spare Drives: A hot-spare (HSP) drive is a hard disk drive that is defined for automatic use when a similar drive fails. The drive capacity of the HSP drive must be equal to or greater than the capacity of the drive being replaced.

Notes:

1. If you want to have a hot-spare drive (HSP) or a standby hot-spare drive (SHS) and also assign RAID level 5 to one of your logical drives, you must have at least four hard disk drives.

2. In the event of a drive failure in an array that contains a logical drive assigned RAID level 0, the ServeRAID controller will not activate a hot-spare drive.

You can use the Create/Delete/Copy/Log menu to define a RDY drive as a hot-spare drive. Or, you can change the state of a SBY, DHS, SHS, or RDY drive to HSP (see "Changing Device States" on page 116).

To define a RDY drive as a hot-spare drive:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Create/Delete/Copy Log Drive** from the Main Menu; then, press **Enter.**
3. Select **Define/Undefine Hot Spare Drive** from the next menu; then, press **Enter.**
4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the RDY drive that you want to define as the hot spare (HSP); then, press **Enter.**

   The drive state changes from RDY to HSP. You can press **Enter** to toggle between the HSP and RDY states.
5. Press **Esc** to make the change; then, press **Esc** again to return to the Main Menu.
6. To enable or disable the hot-swap rebuild parameter, continue with "Enabling or Disabling Hot-Swap Rebuild."
7. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

Enabling or Disabling Hot-Swap Rebuild: The default setting for the hot-swap rebuild parameter is Disable. When you set the hot-swap rebuild parameter to Enable, the ServeRAID controller can automatically rebuild a defunct (DDD) drive when you replace it.

The ServeRAID controller will rebuild a defunct drive automatically when all of the following conditions exist:

- The hot-swap rebuild parameter is set to Enable.
- The defunct drive is part of a RAID level 1 or RAID level 5 logical drive.
- The capacity of the replacement drive is equal to or greater than the capacity of the defunct drive.
- No rebuild, synchronization, or RAID level change operation is in progress.

When these requirements are met, the ServeRAID controller automatically initiates a rebuild of the drive without user intervention.

To enable or disable hot-swap rebuild:

1. Start the ServeRAID configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **Display/Change Adapter Parameters** from the next menu; then, press **Enter.**
4. Select **Enable/Disable Hot Swap Rebuild**; then, press **Enter.**

A screen similar to the following appears:

```
          IBM ServeRAID Adapter Disk Array Configuration Ver. X.XX
          Adapter Number: 1  Bus Number: 0  Host ID = BIOSNull Cfg

  ┌─ Display/Change Adapter Parameter ─┐    ┌─ Ch 1 ─┐   ┌─ Ch 2 ─┐
                                              Array       Array
   1. Help                                  ┌ Bay ┐     ┌ Bay ┐
   2. Display Adapter Status              1 ┌────┐ A  1 ┌ ONL ┐ A
   3. Change Adapter Host/SCSI ID         2 ┌────┐    2 ┌ RDY ┐
   4. Set BIOS Compatability Mapping      3 ┌────┐    3 ┌ RDY ┐
   5. Set Channel -> Bank Mapping         4 ┌────┐    4 ┌ RDY ┐
   6. Enable/Disable Hot Swap Rebuild     5 ┌────┐    5 ┌ RDY ┐
   7. Exit                                6 ┌────┐    6 ┌ RDY ┐
  └────────────────────────────────────┘  7 ┌────┐    7 ┌ CDR ┐
                                           8 ┌ INI ┐    8 ┌ INI ┐
  ┌──── Hot Swap Rebuild State ────────┐   9 ┌────┐    9 ┌────┐
               Disabled                  10 ┌────┐   10 ┌────┐
                                         11 ┌────┐   11 ┌────┐
   1. Enable Hot Swap Rebuild            12 ┌────┐   12 ┌────┐
   2. Disable Hot Swap Rebuild           13 ┌────┐   13 ┌────┐
                                         14 ┌────┐   14 ┌────┐
                                         15 ┌────┐   15 ┌────┐
                                         16 ┌────┐   16 ┌────┐

  Select a choice using the Up Arrow (↑) and Down Arrow (↓) keys and press Enter.
  Press Esc to return to previous menu.
```

5. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight your selection - enable or disable; then, press **Enter.**

6. Press **Esc** to return to the Advanced Functions menu.

7. Back up the disk-array configuration information to diskette. See to "Backing Up the Disk-Array Configuration" on page 126 for more information.

Viewing or Changing the Configuration:

This section contains the following information and instructions for using the ServeRAID Configuration program to view or change your existing configuration.

- "Viewing the Disk-Array Configuration"
- "Viewing the Drive Information" on page 114
- "Viewing or Changing the ServeRAID Controller Parameters" on page 115
- "Changing Device States" on page 116
- "Changing the RAID Parameters" on page 118
- "Changing the Write Policy" on page 120

You also can use the Administrator Monitor utility program to view or change your existing configuration. (See "Using the Administration and Monitoring Utility Program" on page 26 for more information.)

Viewing the Disk-Array Configuration: To view the current configuration:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).

2. Select **View Configuration** from the Main Menu; then, press **Enter.** The current disk-array configuration information appears on the screen.

3. To see the stripe order (the channel and bay numbers of the physical drives that make up the logical drives):

   a. Press **Enter.** The stripe order will appear in a separate window.

   b. Press any key to return to the View Configuration screen.

4. Press **Esc** to return to the Main Menu.

Viewing the Drive Information: You can use the
ServeRAID Configuration program to view the vendor ID,
model number, serial number, and capacity of each hard
disk drive attached to the ServeRAID controller.

You also can use this program to view information about
the number and types of events that occurred. The Device
Event Log, in nonvolatile random-access memory
(NVRAM), collects event information for each hard disk
drive attached to the ServeRAID controller.

To view the drive information:

1. Start the ServeRAID Configuration program (see
   "Starting the ServeRAID Configuration Program" on
   page 77).
2. Select **Rebuild/Device Management** from the Main
   Menu; then, press **Enter.**
3. Select **Display Drive Information** from the next
   menu; then, press **Enter.**

   A screen similar to the following appears.
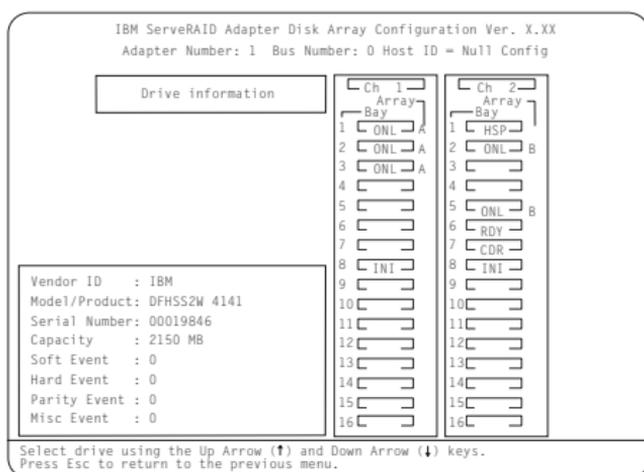
4. Use the Up Arrow (↑) or Down Arrow (↓) key to
   highlight the drives in the Array/Bay selection list.

   When you highlight the drive, the drive information
   appears as follows:

   - **Vendor ID** displays the name of the
     manufacturer or vendor.
   - **Model/Product** displays the 4-digit model
     number, the 4-digit product number, the 2-digit
     ROM code revision level, and the 2-digit RAM
     code revision level.
   - **Serial Number** displays the unit serial number of
     the device.
   - **Capacity** displays the size of the device.
   - **Soft Event** displays the number of SCSI Check
     Condition status messages returned from the
     drive (except Unit Attention and SCSI parity
     events) since the Device Event Log was last
     cleared.

- **Hard Event** displays the number of SCSI I/O processor events that occurred on the drive since the Device Event Log was last cleared. It also indicates if the drive exceeded the Predictive Failure Analysis (PFA) threshold.

  --- **Notes** ---

  1. If a PFA event is detected, it appears beside the hard event information.
  2. If the drive exceeded the PFA threshold, back up your RAID level 0 logical drives. Then, replace the drive.

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

5. Press **Esc** to return to the Main Menu.

Viewing or Changing the ServeRAID Controller Parameters: You can use the ServeRAID Configuration program to view or change the ServeRAID controller parameters.

To view or change the ServeRAID controller parameters:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **Display/Change Adapter Params** from the next menu; then, press **Enter.**

   A screen similar to the following appears.

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

  ┌─────────────────────────────┐  ┌─ Ch  1 ─┐  ┌─ Ch  2 ─┐
  │ Display/Change Adapter Parameter│  ┌─Array─┐    ┌─Array─┐
  │                             │  ┌─Bay─┐      ┌─Bay─┐
  │ 1. Help                     │  1 └ ONL ┘ A  1 └ HSP ┘
  │ 2. Display Adapter Status   │  2 └ ONL ┘ A  2 └ ONL ┘ B
  │ 3. Change Adapter Host/SCSI ID │ 3 └ ONL ┘ A  3 └     ┘
  │ 4. Set BIOS Compatability Mapping │ 4 └     ┘  4 └     ┘
  │ 5. Set Channel -> Bank Mapping │ 5 └     ┘  5 └ ONL ┘ B
  │ 6. Exit                     │  6 └     ┘    6 └ RDY ┘
  │                             │  7 └     ┘    7 └ CDR ┘
  │                             │  8 └ INI ┘    8 └ INI ┘
  │                             │  9 └     ┘    9 └     ┘
  │                             │ 10 └     ┘   10 └     ┘
  │                             │ 11 └     ┘   11 └     ┘
  │                             │ 12 └     ┘   12 └     ┘
  │                             │ 13 └     ┘   13 └     ┘
  │                             │ 14 └     ┘   14 └     ┘
  │                             │ 15 └     ┘   15 └     ┘
  │                             │ 16 └     ┘   16 └     ┘
  └─────────────────────────────┘

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

Descriptions of the choices available from this menu are as follows:

> **1. Help** provides information about the choices
> available on the menu. You also can press F1
> from any screen to obtain online Help.
> **2. Display Adapter Status** lets you view the
> current settings (On or Off) for Unattended
> Mode, CD-ROM Boot, and Read Ahead. You
> also can select this choice to view information
> about BIOS Compatibility Mapping, logical drive
> sizes, and logical drives that are blocked or have
> a bad stripe. (See "Changing the RAID
> Parameters" on page 118 for more information.)
> **3. Change Adapter Host/SCSI ID** lets you
> change the SCSI configuration ID or the SCSI
> transfer rate for the ServeRAID controller. You
> can change the ServeRAID controller host
> configuration ID to any 12 characters. If you are
> using Ultra Fast/Wide SCSI-3 drives, you can
> change the default SCSI transfer rate from 10
> MHz to a maximum of 20 MHz. When the
> transfer rate is set to 20 MHz, the SCSI bus for
> the ServeRAID controller provides a
> data-transfer rate of up to 40 MB per second. In
> addition, this choice lets you change the number
> of hard disk drives in a group that will start up
> simultaneously, and set the start-up delay (in
> seconds) between groups of drives.
> **4. Set BIOS Compatibility Mapping** lets you
> change the basic input/output system (BIOS)
> mapping from 8 GB (default setting) to 2 GB.
> (For your server, use the default setting.)
> **5. Set Channel → Bank Mapping** lets you
> specify which direct access storage device
> (DASD) bank is connected to the ServeRAID
> controller. This mapping is critical for the correct
> operation of the Administrator Monitor utility
> program, which uses the settings to identify
> drives, to control power to specific drives, and to
> operate the SCSI LEDs.

4. Use the Up Arrow (↑) or Down Arrow (↓) key to
   highlight your choice; then, press **Enter.**
5. Press **Esc** to return to the Advanced Functions menu.
6. Back up the disk-array configuration information to
   diskette. See "Backing Up the Disk-Array
   Configuration" on page 126 for instructions.

Changing Device States: You can use the
ServeRAID Configuration program to change the state of a
physical hard disk drive attached to the ServeRAID
controller.

To change the state of a physical hard disk drive:

1. Start the ServeRAID Configuration program (see
   "Starting the ServeRAID Configuration Program" on
   page 77).

2. Select **Rebuild/Device Management** from the Main Menu; then, press **Enter.**
3. Select **Set Device State** from the next menu; then, press **Enter.**
4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the appropriate drive; then, press **Enter.**

   A screen similar to the following appears.


```
                IBM ServeRAID Adapter Disk Array Configuration Ver. X.XX
                Adapter Number: 1  Bus Number: O Host ID = Null Config

 ┌─────────────────────────────────┐    ┌─ Ch  1 ─┐    ┌─ Ch  2 ─┐
 │   Rebuild/Device Management      │    ┌── Array ┐    ┌── Array ┐
 │                                  │    ├── Bay ──┤    ├── Bay ──┤
 │ 1. Help                          │   1 └ ONL ┘ A   1 └ HSP ┘
 │ 2. Set Device State              │   2 └ ONL ┘ A   2 └ ONL ┘ B
 │ 3. Rebuild Drive                 │   3 └ ONL ┘ A   3 └     ┘
 │ 4. Display Drive Information      │   4 └     ┘    4 └     ┘
 │ 5. Erase Device Event Log        │   5 └     ┘    5 └ ONL ┘ B
 │ 6. Exit                          │   6 └     ┘    6 └ RDY ┘
 │        ┌─ Device States ─┐       │   7 └     ┘    7 └ CDR ┘
 │        │ 1. EMP          │       │   8 └ INI ┘    8 └ INI ┘
 │        │ 2. SBY          │       │   9 └     ┘    9 └     ┘
 │        │ 3. DHS          │       │  10 └     ┘   10 └     ┘
 │        │ 4. SHS          │       │  11 └     ┘   11 └     ┘
 │        │ 5. DDD          │       │  12 └     ┘   12 └     ┘
 │        │ 6. RDY          │       │  13 └     ┘   13 └     ┘
 │        │ 7. HSP          │       │  14 └     ┘   14 └     ┘
 │        │ 8. ONL          │       │  15 └     ┘   15 └     ┘
 │        │ 9. RBL          │       │  16 └     ┘   16 └     ┘
 └────────┴─────────────────┴───────┘
 Select the state to change the drive to and press Enter.  Please wait.
```

The Drive States pop-up window lists all hard disk drive states. (See "Physical Device States" on page 86 for more information.) The following table shows the current device states and the valid alternate device states that you can assign. For example, you can change the state of a standby hot-spare drive from SHS to HSP or DHS.

> **Note**
>
> Setting a DDD drive that is part of a CRT logical drive to ONL without performing the rebuild process might result in loss of data. (See "Understanding the Drive Rebuild Process" on page 131 for more information.)

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

5. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight a valid alternate drive state; then, press **Enter.** The new state appears in the Array/Bay selection list.
6. If you want to change the state of another drive, return to step 4. Otherwise, continue with step 7.
7. Press **Esc** to return to the Main Menu.

8. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

Changing the RAID Parameters: You can use the ServeRAID Configuration program to set the stripe-unit size, to set the rebuild priority, to turn Unattended Mode On or Off, or to turn Read Ahead On or Off.

To change the RAID parameters:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **Change RAID parameters** from the next menu; then, press **Enter.**

   A screen similar to the following appears.

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

  ┌──────────────────────────┐      ┌─ Ch  1 ─┐   ┌─ Ch  2 ─┐
  │   Advanced Functions     │      │  Array  │   │  Array  │
  │                          │     Bay         Bay
  │ 1. Help                  │   1 └─ ONL ─┘ A  1 └        ┘
  │ 2. Backup IPS ServeRaid Config│ 2 └─ ONL ─┘ A  2 └─ ONL ─┘ B
  │ 3. Restore/Convert Saved Config│3 └─ ONL ─┘ A  3 └        ┘
  │ 4. Logical Drive Params Management│4 └     ┘   4 └        ┘
  │ 5. Change RAID Parameters│       5 └     ┘   5 └─ ONL ─┘ B
  │ 6. IBM RAID Subsystem Diagnostic│6 └     ┘   6 └─ RDY ─┘
  │ 7. Init/View/Synchronize Config│7 └     ┘   7 └─ CDR ─┘
  │ 8. Display/Change Adapter Params│8 └     ┘   8 └        ┘
  └──────────────────────────┘
  ┌────────┐ ┌────────┐ ┌─────────┐ ┌──────┐
  │ Stripe │ │ Rebuild│ │Unattended│ │ Read │
  │Unit Size│ │Priority│ │  Mode   │ │ Ahead│
  │   8K    │ │  High  │ │   Off   │ │  On  │
  │ 1.  8K  │ │1. Medium│ │ 1. On  │ │1. On │  14 └   ┘  14 └  ┘
  │ 2. 16K  │ │2. High │ │ 2. Off │ │2. Off│  15 └   ┘  15 └  ┘
  │ 3. 32K  │ │3. Low  │ └─────────┘ └──────┘  16 └   ┘  16 └  ┘
  │ 4. 64K  │ └────────┘
  └────────┘
  Select a choice using the Up Arrow, Down Arrow, Left Arrow and Right Arrow keys.
  Press Enter to change parameter.  Press Esc to return to menu.
```

Descriptions of the RAID parameters that you can change are as follows:

- **Stripe Unit Size:** The default setting is 8 K data bytes.

  The stripe-unit size is the amount of data written on a given disk before writing on the next disk. To maximize the overall performance, choose a size that is close to the size of the system I/O request.

  Note

  The size of the system I/O request depends on your operating system. If you are not sure of the size, use the default setting.

  Attention

  After you set a stripe-unit size and store data in the logical drives, you cannot change the size without destroying data in the logical drives.

You can set the stripe-unit size to 8 K, 16 K, 32 K, or 64 K.

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

- **Rebuild Priority:** The default setting is High.

  The rebuild priority can be set to High, Medium, or Low.

  - When the rebuild priority is set to High, the rebuild I/O request gets highest priority in the execution order.
  - When the rebuild request is set from High to Medium in a heavily loaded system, it can increase the disk rebuild time, but provide better system performance.
  - When the rebuild request is set from High or Medium to Low in a moderate to heavily loaded system, it can increase the disk rebuild time, but provide better system performance.

- **Unattended Mode:** The default setting is Off.

  You can enable the ServeRAID controller to accept changes in the configuration without user input.

  When unattended mode is set to Off, the program waits for user input when an event is detected.

  When unattended mode is set to On, the ServeRAID controller pauses briefly to permit a user to override the default action; then, the controller makes the necessary changes. Unattended mode also clears any blocked drives. This mode is useful when the server operates remotely.

  When unattended mode is set to On, the ServeRAID controller "chooses" an action that is equivalent to pressing one of the function keys.

  > **Note**
  >
  > When F5 is selected, non-responding ONL and RBL drives become DDD, RDY and SBY drives become EMP, and HSP drives become DHS.

  F5: The server continues the startup operation after identifying a defunct drive. For example, an HSP drive failed to respond during POST. Startup continues, but the ServeRAID controller changes the state of the HSP drive to DHS.

> **F6:** When a drive is removed from the server (for example, for maintenance or security), but is returned to a different bay, the ServeRAID controller adjusts the configuration to the drive's new location.
>
> **F7:** A ServeRAID controller, with stored configuration information that does not match that of the configured drives present, imports the configuration information from the drives.

- **Read Ahead:** The default setting is On.

  Normally, the ServeRAID controller transfers data from disk to its local cache in increments equal to the stripe-unit size. This provides excellent overall performance when workloads are steady and sequential. However, if the workload is random or the system I/O requests are smaller than the stripe-unit size, reading ahead to the end of the stripe might degrade performance.

  When read ahead is set to Off, the ServeRAID controller transfers data from disk to its local cache in increments equal to the system I/O request size, without reading ahead to the end of the stripe.

  You can change the read-ahead setting without destroying data in a logical drive.

4. Use the Up Arrow (↑), Down Arrow (↓), Right Arrow (→), or Left Arrow (←) key to highlight the parameter that you want to change; then, press **Enter.**
5. Press **Esc** to return to the Advanced Functions menu.
6. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions. (The backup procedure also saves the RAID parameters to diskette.)

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

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

To change the write policy:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **Logical Drive Parms Management** from the Advanced Functions menu; then, press **Enter.**
4. Select **Change Write Policy** from the next menu; then, press **Enter.**

   A screen similar to the following appears.

```
            IBM ServeRAID Adapter Disk Array Configuration Ver. X.XX
            Adapter Number: 1  Bus Number: O Host ID = Null Config

                                             ┌─ Ch  1 ─┐   ┌─ Ch  2 ─┐
   ┌───────────────────────────────┐         ┌─Array─┐     ┌─Array─┐
   │ Logical Drive Params Management│         ┌─Bay─┐       ┌─Bay─┐
   │                               │        1 └ ONL ┘ A   1 └ HSP ┘
   │ 1. Help                       │        2 └ ONL ┘ A   2 └ ONL ┘ B
   │ 2. Change Write Policy        │        3 └ ONL ┘ A   3 └     ┘
   │ 3. Set NVRAM Cache Controller │        4 └     ┘     4 └     ┘
   │ 4. Exit                       │        5 └     ┘     5 └ ONL ┘ B
   └───────────────────────────────┘        6 └     ┘     6 └ RDY ┘
   ┌──────┬──────────────────────┐          7 └     ┘     7 └ CDR ┘
   │Array │Log  Size  RAID    Wrt│          8 └ INI ┘     8 └ INI ┘
   │ID Size│Drv  (MB)  Level Status Pol│    9 └     ┘     9 └     ┘
   │A  1920│A0   100   RAID-0  OKY  WT│   10 └     ┘    10 └     ┘
   │B  2006│B0   100   RAID-0  OKY  WT│   11 └     ┘    11 └     ┘
   │       │A1   200   RAID-0  OKY  WT│   12 └     ┘    12 └     ┘
   │       │B1   200   RAID-1  OKY  WT│   13 └     ┘    13 └     ┘
   │       │                      │     14 └     ┘    14 └     ┘
   │       │                      │     15 └     ┘    15 └     ┘
   │       │                      │     16 └     ┘    16 └     ┘
   └───────┴──────────────────────┘
   Select logical drive and press Enter to toggle the write policy. Press the ESC
   key to make the change.
```

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

   The write policy is shown as either write through (WT), which is the default setting, or write back (WB).
6. Select the logical drive whose write policy you want to change.

   Attention

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

   ---

7. Press **Enter** to change the write policy. (You can press **Enter** to toggle between WT and WB.)
8. Press **Esc.** The Confirm pop-up window appears.
9. Select **Yes** to save the changes, or select **No** to return the setting to its original state; then, press **Enter.**
10. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for more information.

Copying Logical Drives and Disk Arrays:

You can use the ServeRAID Configuration program to make backup copies of the logical drives and disk arrays in your server. You also might want to use this program to create a duplicate copy of a logical drive or array for use in another system.

Copying Logical Drives: You can use this feature to create a backup copy of the data on an existing logical drive, or to duplicate data for use in another system.

The copy logical drive feature does not copy the RAID configuration information. If you want to copy an existing array for use in another system, use the instructions provided in "Copying an Existing Disk Array" on page 123.

Note

If you have a RAID level 5 logical drive, make sure that your target drive is synchronized *before* starting this procedure.

To copy a logical drive:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Create/Delete/Copy Log Drive** from the Main Menu; then, press **Enter.**
3. Select **Copy Logical Drive** from the next menu; then, press **Enter.**
4. Select the source and target drives:

   Notes

   • The size of the target logical drive must be equal to or greater than the size of the source logical drive.
   • You can select up to four source/target pairs at a time.

   ---

   a. From the Logical Drive list, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the source logical drive that you want to copy from; then, press the **Spacebar** to select the drive.
   b. From the Logical Drive list, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the target logical drive that you want to copy to; then, press the **Spacebar** to select the drive.
   c. Select another source and target drive, if desired.
5. To start the copy process, press **Enter.**

   The Confirm pop-up window appears.

6. Select **Yes** to copy the logical drive; then, press
   Enter.

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

  Confirm  Create/Delete/Copy Log Drive       ┌ Ch 1 ┐        ┌ Ch 2 ┐
  1. No                                        ┌Array┐         ┌Array┐
  2. Yes   . Help                              ─Bay─           ─Bay─
                                             1 └ ONL ┘ A     1 └ HSP ┘
           Source  0 1 2 3 4 5 6 7           2 └ ONL ┘ A     2 └ ONL ┘ B
           Target  1                         3 └ ONL ┘ A     3 └     ┘
                                             4 └     ┘       4 └     ┘
  Array   Log  Size  RAID           Pct      5 └     ┘       5 └ ONL ┘ B
  ID Size Drv  (MB)  Level Status   R/W      6 └     ┘       6 └ RDY ┘
  A  3009 A0   100   RAID-5  OKY             7 └     ┘       7 └ CDR ┘
  B  4126 B0   100   RAID-1  OKY             8 └ INI ┘       8 └ INI ┘
                                             9 └     ┘       9 └     ┘
                                            10 └     ┘      10 └     ┘
                                            11 └     ┘      11 └     ┘
                                            12 └     ┘      12 └     ┘
                                            13 └     ┘      13 └     ┘
                                            14 └     ┘      14 └     ┘
                                            15 └     ┘      15 └     ┘
                                            16 └     ┘      16 └     ┘

  Copy operation will destroy data on target logical drive.  Confirm start.
```

The copy progress appears in the percent Read/Write
(Pct. R/W) column as a percentage of the total
number of sectors read and written.

7. When the copy process completes, back up the
   disk-array configuration information to diskette. See
   "Backing Up the Disk-Array Configuration" on
   page 126 for instructions.

Copying an Existing Disk Array: You can use the
following instructions to create a complete copy (including
the RAID configuration information) of an existing array.
You can use this procedure to duplicate your current
disk-array configuration for use on another system.

To copy an existing disk array:

1. Back up the configuration of the source system to a
   diskette. (See "Backing Up the Disk-Array
   Configuration" on page 126.)
2. On the source system, create a copy of the disk array
   that you want to use on another system.

   For example, if you want a copy of Array A to use on
   another system, create an Array B that is identical to
   Array A. (See "Creating Disk Arrays Manually" on
   page 104.)
3. Copy all logical drives from the source array to the
   target array.

   For example, if you made an identical copy of Array A
   and that copy is Array B, you would copy all logical

drives in Array A to Array B. (See "Copying Logical Drives" on page 122.)

4. Physically remove the hard disk drives that contain the copy from the source system; then, install them in the same bays on the target system.

   - **Note**

   Ensure that you install the drives in the same bays on the target system that the drives of the source array occupy in the source system. (Remember, the bay number is equal to the SCSI ID of the device + 1.)

5. Using ServerGuide, insert the *HardwareGuide* CD in the CD-ROM drive and start the server.

6. Using the diskette that contains the backup copy of the source configuration (you created this diskette in step 1 on page 123), *restore* the configuration to the target system. (See "Restoring the Disk-Array Configuration" on page 127.)

Deleting Logical Drives and Disk Arrays: This section contains instructions for deleting logical drives and disk arrays. In all cases, when you delete an array or its associated logical drives, all the data and programs in the array are lost. Before proceeding, back up any data and programs that you want to save. You might want to use a high-speed back up device, such as a tape drive, to back up large amounts of data.

Deleting Logical Drives: In some operating systems, deleting a logical drive might change the drive letters assigned to the existing logical drives.

To delete a logical drive:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).

2. Select **Create/Delete/Copy Log Drive** from the Main Menu; then, press **Enter.**

3. Select **Delete Logical Drive** from the next menu; then, press **Enter.**

4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the logical drive that you want to delete; then, press the **Del** key. The Confirm pop-up window appears.

   - **Attention**

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

5. Select **Yes** to delete the logical drive, or select **No** if you do not want to delete the drive; then, press **Enter.**

6. Select **Exit** or press **Esc** to return to the Main Menu.
7. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

Deleting Disk Arrays: Deleting a disk array deletes all logical drives that are defined in that disk array. All data and programs are lost once you perform the procedure.

To delete a disk array:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Create/Delete/Copy Log Drive** from the Main Menu; then, press **Enter.**
3. Select **Delete Disk Array** from the next menu; then, press **Enter.**
4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the array that you want to delete; then, press the **Del** key. The Confirm pop-up window appears.

   Attention:

   All data and programs in the array are lost during this procedure. Before proceeding, back up any data and programs that you want to save.
5. Select **Yes** to delete the array, or select **No** if you do not want to delete the array; then, press **Enter.**

   If you delete an array of Online (ONL) drives, the state of the ONL drives changes to Ready (RDY). If the array contains a defunct drive (DDD), the state of the DDD drive changes to defunct hot spare (DHS). You can reset the drive state as follows:

   - If the drive is good, change the device state from DHS to HSP; then, select the drive again and change the device state from HSP to RDY. (See "Changing Device States" on page 116 for instructions.)
   - If the drive is defective, physically replace it with a good drive; then, set the state for the new drive to RDY. (See "Internal Drive Installation" on page 197 and "Changing Device States" on page 116 for instructions.)
6. Select **Exit** or press **Esc** to return to the Main Menu.
7. Back up the disk-array configuration information to diskette. See "Backing Up the Disk-Array Configuration" on page 126 for instructions.

Maintaining the Disk-Array Configuration:

This section contains the following information and instructions for using the ServeRAID Configuration program to maintain your existing disk-array configuration.

- "Backing Up the Disk-Array Configuration" on page 126
- "Restoring the Disk-Array Configuration" on page 127

Backing Up the Disk-Array Configuration: The disk-array configuration is *vital information.* To protect this information, back up the information to diskette as soon as you complete your tasks.

The ServeRAID controller maintains a record of the disk-array configuration information in its NVRAM, in an electrically erasable programmable read-only memory (EEPROM) module, and on each ONL and RBL drive.

Attention:
Dynamic changes in the configuration of your disk arrays can occur due to hot-spare drive replacement or other drive maintenance activity. It is important that you back up the disk-array configuration information frequently, to keep the backup information on the diskette current.

You need a blank, 3.5-inch, 2MB, formatted diskette to create a backup copy.

To back up the disk-array configuration information:

1. Label a blank diskette "Disk-Array Configuration Backup" and date it.
2. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
3. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
4. Select **Backup IPS ServeRAID Config** from the next menu; then, press **Enter.** (The disk-array configuration is also known as the *IBM ServeRAID (IPS) configuration.*)
5. Insert the blank *Disk-Array Configuration Backup* diskette into the diskette drive.
6. A pop-up window appears with a default file name of CONFIG; change the file name by typing over the default; then, press **Enter.** The Backup program assigns a file-name extension of *.ips.*
7. The Confirm pop-up window appears.

   Select **Yes** to confirm that you want to copy the file to the backup diskette, or select **No** to return to the previous menu; then press **Enter.**
8. Remove the backup diskette from the drive and store it in a safe place.
9. Press **Esc** to return to the Main Menu.

Restoring the Disk-Array Configuration: To restore the disk-array configuration information for the ServeRAID controller, use the *ServRAID II Configuration CD* and an up-to-date disk-array configuration backup diskette.

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

To restore the ServeRAID configuration information:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **Restore/Convert Saved Configuration** from the next menu; then, press **Enter.**
4. Insert your Disk-Array Configuration Backup diskette into the diskette drive; then, press **Enter.**
5. A list of backup file names appears. Use the Up Arrow (↑) or Down Arrow (↓) key to select the file name that you want to restore; then, press **Enter.**
6. The Confirm pop-up window appears.

   Select **Yes** to restore the configuration information, or select **No** to return to the previous menu; then, press **Enter.**
7. Press **Esc** to return to the Main Menu.

Testing the RAID Subsystem: You can use the RAID Subsystem Diagnostic program to test the ServeRAID controller and the devices connected to the controller.

To test the RAID subsystem:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **IBM RAID Subsystem Diagnostic** from the next menu; then, press **Enter.**
4. Select the diagnostic test that you want to run; then, press **Enter.**

   Descriptions of the diagnostic tests available are as follows:

- **Run Adapter Self-tests** tests the ServeRAID controller. Restart your server after the self-test completes.
- **SCSI Device Self-test** runs diagnostic tests on the SCSI devices attached to the ServeRAID controller.
- **Drive Media Test** verifies that all sectors on the hard disk drive are accessible. The drive must be in the RDY or HSP state.
- **Format Drive** performs a low-level format on a hard disk drive. For more information, see "Formatting Drives."

5. Follow the instructions that appear on the screen.

Formatting Drives: The Format Drive feature provides a low-level format on a hard disk drive. If you install a new hard disk drive that requires a standard format, use your operating system Format command to format the drive. You can use the Format Drive feature to low-level format hard disk drives that are in the Ready (RDY), Empty (EMP), Standby (SBY), Standby Hot-Spare (SHS), or Hot-Spare (HSP) states. This feature can low-level format multiple drives simultaneously.

To perform a low-level format:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**
3. Select **IBM RAID Subsystem Diagnostic** from the next menu; then, press **Enter.**

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

   —— **Attention** ——

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

4. Select **Format Drive**; then, press **Enter.**

   —— **Note** ——

   If formatting is interrupted, the state of the drive being formatted might appear as Empty (EMP) in the Array/Bay selection list. If this occurs, select the drive and format it again.

5. Follow the instructions that appear on the screen. When a message similar to Formatting Complete appears, press **Esc** to return to the Main Menu.

Clearing the Device Event Log: The Device Event Log, located in the ServeRAID controller, collects statistics on the number and type of events that occur on all of the hard disk drives attached to the ServeRAID controller.

After you correct a disk-array problem, you might want to clear the Device Event Log so that you can quickly identify any subsequent errors.

To clear the Device Event Log:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Rebuild/Device Management** from the Main Menu; then, press **Enter.**
3. Select **Erase Device Event Log** from the next menu; then, press **Enter** to clear the log.

Replacing a Faulty Drive: To avoid the loss of critical data, it is important that you replace and rebuild a defunct (DDD) drive promptly.

The results of hard disk drive failures depend on the configuration of your disk arrays and the number of drives that fail. Before you remove or replace a DDD drive, review the following examples.

> **Example 1.** One hard disk drive becomes defunct, but a hot-spare (HSP) drive of the same size exists.
> - If the failing drive is part of a redundant (RAID level 1 or RAID level 5) logical drive, the hot-spare drive takes over immediately.
> - RAID level 1 and RAID level 5 logical drives within the array change to the critical (CRT) state and remain in the CRT state until the rebuild process completes.
> - The RAID level 0 logical drives within the array change to the offline (OFL) state.
> - All data in the RAID level 0 logical drives within the array is lost.
>
> **Example 2.** One hard disk drive becomes defunct, and an appropriate hot-spare (HSP) drive is not available.
> - The RAID level 1 and RAID level 5 logical drives change to the CRT state and remain in the CRT state until the rebuild process completes. Data is not lost from logical drives in the CRT state, but you must replace the DDD hard disk drive promptly to avoid the loss of data. (If two drives within the same array become DDD, all data within the array is lost.)
> - The RAID level 0 logical drives change to the OFL state.
> - All data in the RAID level 0 logical drives within the array is lost.

Example 3. Multiple drives within an array become defunct.
- All logical drives in the array change to the offline (OFL) state.
- All data from the array is lost, regardless of the RAID levels assigned to the logical drives.

To replace a faulty drive:
1. Before you remove or replace a drive that you suspect to be defective, verify that the drive is defective. To do this:
    a. Check the drive for damage.
    b. Verify that the drive is positioned correctly. If the drive is not installed correctly, reposition the drive.
    c. Check the lights on the drive tray. (See the following information for a description of the lights.) Verify that you can remove the drive safely.

    The lights on the hot-swap drive tray provide drive status information, as follows:
    - **Hard Disk Activity Light:** When this green light is flashing, it indicates that the server is accessing the drive.
    - **Hard Disk Status Light:** When this amber light is lit continuously, it indicates that the drive has failed. When the light flashes slowly (one flash per second), it indicates that the hard disk drive is part of a disk array and is being rebuilt. When the light flashes rapidly (three flashes per second), it indicates that the controller is identifying the drive. The drive *should not* be replaced if this light is blinking; the drive has just been replaced and the disk array is being rebuilt.
2. Physically replace the defective drive or use an existing RDY drive that has a capacity equal to or greater than the drive that you are replacing as a hot-spare replacement drive.

    > **Attention**
    >
    > Removing the wrong hard disk drive might cause loss of all data in the array.

    .
    a. To physically replace the defective hard disk drive, follow the instructions in "Internal Drive Installation" on page 197 and "Installing a Drive in a Hot-Swap Bay" on page 203; then, follow the instructions in "Understanding the Drive Rebuild Process" on page 131.
    b. To rebuild the defunct drive to an existing RDY drive, follow the instructions in "Understanding the Drive Rebuild Process" on page 131.

Note

You can use the Administration and Monitoring utility program to identify a defunct drive and designate a replacement drive without restarting the server. Review the information in "Understanding the Drive Rebuild Process" on page 131; then, see "Using the Administration and Monitoring Utility Program" on page 26 for more information.

Understanding the Drive Rebuild Process: This section contains guidelines and instructions for rebuilding a defunct (DDD) drive using the ServeRAID Configuration program.

If you are using the Administration and Monitoring utility program, review the guidelines and information in this section; then, see "Physical Device Administration" on page 42 for instructions.

Automatic Rebuild Process: The ServeRAID controller will rebuild a defunct drive automatically when all of the following conditions exist:

- The physical drive that failed is part of a RAID level 1 or 5 logical drive.
- A HSP or SHS drive with a capacity equal to or greater than the original drive is available the moment that the drive fails.
- No rebuild, synchronization, or RAID level change operation is in progress.

If multiple hot-spare drives are available, the ServeRAID controller searches all bays for a hot-spare drive of the appropriate size. The first drive that meets this requirement enters the rebuild state.

A physical hard disk drive can enter the rebuild (RBL) state if:

- You physically replace a defunct drive that is part of the critical (CRT) logical drive.

  When you physically replace a defunct drive in a critical (CRT) logical drive, the ServeRAID controller rebuilds the data on the new physical drive *before* it changes the logical drive state back to Okay (OKY).
- The ServeRAID controller adds a hot-spare or a standby hot-spare drive to the array and changes its state from HSP or SHS to RBL.
- A ready or standby drive replaces a defunct drive that is part of the critical (CRT) logical drive.

Guidelines for Rebuilding a Drive

Before you rebuild a drive, review the following guidelines:

- If the state of the logical drive is critical (CRT), you must rebuild the defunct hard disk drive promptly.
- The replacement hard disk drive must be the same size or larger than the failed drive.
- If the hard disk drive being rebuilt is part of a RAID level 0 logical drive, the RAID level 0 drive is blocked to external access during the rebuild process.
    - If you use the ServeRAID Configuration program to initiate the rebuild process, the program unblocks the RAID level 0 logical drive when the rebuild process completes. If the rebuild process is interrupted, you must restart the server to unblock the blocked RAID level 0 logical drive.
    - If you use the Administrator Monitor utility program to initiate the rebuild process, you must unblock the RAID level 0 logical drive when the rebuild process completes. (See "Unblocking Logical Drives" on page 38 for more information.)
- Data that was stored in a RAID level 0 logical drive is lost during the rebuild process. If you backed up your data before the drive failed, you can restore the data to the new drive.

Rebuilding a Drive

To rebuild a physical drive:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).
2. Select **Rebuild/Device Management** from the Main Menu; then, press **Enter.**
3. Select **Rebuild Drive** from the next menu; then, press **Enter.** The cursor is active in the Array/Bay list.
4. A pop-up window appears. Select one of the following:
    - Select **Same Location** if you physically replaced a hard disk drive in the same bay; then, press **Enter.** A Confirm pop-up window appears. Select **Yes** and continue with step 5.
    - Select **New Location** to assign a hard disk drive in a new location. Use the Up Arrow (↑) or Down Arrow (↓) key to select the replacement drive that you want to use for the rebuild operation; then, press **Enter.**

    Information and status messages about each stage of the rebuild process appear on the screen.
5. When the rebuild process completes, press **Esc** to return to the Main Menu. The new configuration is saved.
6. Back up the new configuration to diskette (see "Backing Up the Disk-Array Configuration" on page 126).

7. Select **Exit** to leave the ServeRAID Configuration program.

8. Remove the *HardwareGuide CD* and press **Ctrl**+**Alt**+**Del** to restart the server.

Initializing, Viewing, or Synchronizing the ServeRAID II Controller Configuration: The ServeRAID configuration information stored in nonvolatile random-access memory (NVRAM) is critical to the reliable operation of the disk array. To protect the integrity of the configuration information, the configuration information is also stored in an EEPROM and on each RBL and ONL hard disk drive. Each time you change the configuration information, all corresponding copies are updated automatically.

During POST, if the NVRAM configuration information does not match the configuration information stored in the EEPROM or on the hard disk drives, an error message appears.

You can use the Init/View/Synchronize Config menu to initialize, view, or synchronize the ServeRAID controller configuration information.

To initialize, view, or synchronize the configuration information:

1. Start the ServeRAID Configuration program (see "Starting the ServeRAID Configuration Program" on page 77).

2. Select **Advanced Functions** from the Main Menu; then, press **Enter.**

3. Select **Init/View/Synchronize Config** from the next menu; then, press **Enter.**

   A screen similar to the following appears.
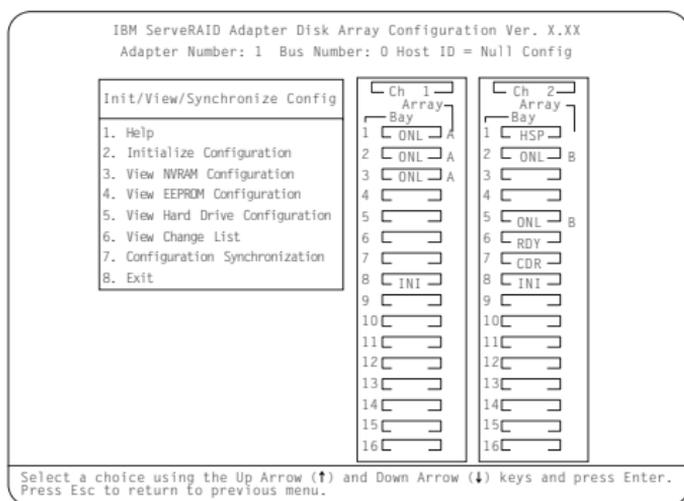
   Descriptions of the choices available from this menu are as follows:

   • **Help** provides information about the choices available on the menu. You also can press F1 from any screen to obtain online Help.

- **Initialize Configuration** lets you set the configuration of the ServeRAID controller to its default settings. This choice sets the states for all powered-on hard disk drives to RDY, all CD-ROM drives to CDR, and all tape drives to TAP. This choice also deletes all previously defined arrays and logical drives. This choice writes a "Null Configuration" for the ServeRAID controller.

  You must select this choice if a message appears stating that you have an unrecoverable configuration error, because valid configuration information does not exist.
- **View NVRAM Configuration** displays the current configuration settings stored in the controller's NVRAM.
- **View EEPROM Configuration** displays the current configuration settings stored in the the controller's EEPROM.
- **View Hard Drive Configuration** displays the configuration settings for the selected ONL or RBL hard disk drive. To view the stripe order, press **Enter.**
- **View Change List** displays the device state configuration changes that the ServeRAID controller reported since you restarted or turned on the server.
  - **View Power-on Change List** displays the hard disk drive device state changes since the last time that you restarted or turned on the server.
  - **View Wrong SCSI ID List** provides a list of hard disk drives that were found at a different SCSI ID location (bay) when you restarted or turned on the server.
  - **View Unidentified Drive List** provides a list of hard disk drives that have identifiers that do not match the stored configuration information.

    The identifier consists of both the configuration host ID and a time stamp. You can define the host ID (for example, a host ID can be the serial number of the server) as any string up to 12 characters. (See "Viewing or Changing the ServeRAID Controller Parameters" on page 115 for more information.)
- **Configuration Synchronization**. See "Configuration Synchronization" on page 135 for a description of this choice.

4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight your choice from the menu; then, press **Enter.**

5. Follow the instructions that appear on the screen.

Configuration Synchronization: When the
configuration information stored in NVRAM, in the
EEPROM, and on the hard disk drives does not match,
you can select one source; then, copy the selected
configuration information to the other locations.

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

If a message appears stating that you have a recoverable
configuration error, one of the following conditions exists:

- The configuration information in NVRAM is valid, but
  the configuration information in the EEPROM is
  invalid.
- The configuration information in the EEPROM is valid,
  but the configuration information in NVRAM is invalid.
- The configuration information in NVRAM is valid and
  the configuration information in the EEPROM is valid,
  but they do not match.

If a message appears stating that you have an
unrecoverable configuration error, valid configuration
information does not exist. If this occurs, you must
initialize the configuration immediately. See "Initializing,
Viewing, or Synchronizing the ServeRAID II Controller
Configuration" on page 133 for instructions.

Descriptions of the choices available from the
Configuration Synchronization menu are as follows:

- **EEPROM as Source** copies configuration information
  from the the controller's EEPROM to NVRAM and to
  all configured RBL and ONL hard disk drives defined
  in the the controller's EEPROM configuration.
- **NVRAM as Source** copies configuration information
  from NVRAM to the EEPROM and to all configured
  RBL and ONL hard disk drives defined in the NVRAM
  configuration.
- **NVRAM and POCL as Source** updates information
  from the power-on change list (drive state changes at
  power-on time) with the information in NVRAM, then
  copies this updated configuration information to the
  EEPROM and to all configured RBL and ONL hard
  disk drives defined in the NVRAM configuration.
- **Hard Disk Drive as Source** retrieves configuration
  information from the most common hard disk drive
  configuration, then copies the configuration
  information to NVRAM and to the EEPROM.
- **Identified HDD as Source** updates the configuration
  information with configuration information from hard
  disk drive that matches the identifiers stored in
  NVRAM. The updated configuration information is

then copied to NVRAM, to the EEPROM, and to the configured hard disk drives in the array.

- **Specific HDD as Source** retrieves the configuration information from the hard disk drive that you select. The updated configuration information is then copied to NVRAM, to the EEPROM, and to the configured hard disk drives.

Using the ServeRAID Mini-Configuration Program

The ServeRAID Mini-Configuration program is a quick way to view the ServeRAID controller settings and to perform a limited set of the configuration functions. The ServeRAID Mini Configuration program is stored in read-only memory (ROM).

To access the ServeRAID Mini-Configuration program:

1. Start the server. If the system is already turned on, press **Ctrl**+**Alt**+**Del** to restart the server.

   Each time your system starts, the ServeRAID controller performs a power-on self-test (POST). The POST checks the configuration information for the ServeRAID controller and for the configured hard disk drives, to see if any changes have occurred.

   - If POST does not detect changes in the configuration or encounter any hardware problems, continue with step 2.
   - If POST detects changes in the configuration or encounters a hardware problem, messages appear on the screen. If this occurs, see "Symptom-to-FRU Index" on page 263 and correct the problem; then, return here and continue with step 2.

2. Press **Ctrl**+**I** immediately when a screen similar to the following Mini-Configuration screen appears.

```
IBM ServeRAID Adapter Disk Array Mini-Configuration Utility Ver. X.XX

                    IBM ServeRAID Adapter BIOS
                    Copyright IBM Corp. 1995, 1997

                    Ver: X.XX.X     MM/DD/YY


                Press <Ctrl+I> for Mini-Config Utility


    Initializing Adapter Number 1. Please wait Starting drives.
    Firmware Version: NNNNN
    NvRAM cache controller was found.
    4 logical drives are installed.
    NonDisk SCSI Devices Found : CDROM: 0  Tape: 0  Removable Disk:  1  Other: 0
```

Note

In the preceding figure, the version number will be replaced by the version number of your Mini-Configuration program, the MM/DD/YY will be replaced by the date of the version of your Mini-Configuration program, and NNNNN will be replaced by the version number of the firmware.

3. If you have more than one ServeRAID controller installed, a selection screen appears. Use the Up Arrow (↑) or Down Arrow (↓) key to select your choice; then, press **Enter.** Otherwise, the Main Menu of the Mini-Configuration program appears, similar to the following screen.

```
  IBM ServeRAID Controller Disk Array Mini-Configuration Ver. X.XX

                    ┌─────────────────────┐
                    │      Main Menu      │
                    ├─────────────────────┤
                    │ View Adapter Status │
                    │ View Configuration  │
                    │ Advanced Functions  │
                    │ Exit                │
                    └─────────────────────┘




 Select the choice using the Up Arrow (↑) & Down Arrow (↓) keys, then press Enter.
```
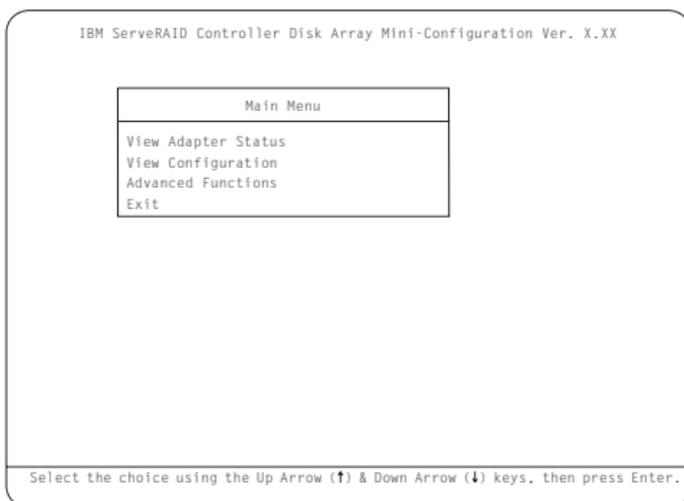
Descriptions of the choices available from the Main Menu are as follows:

- **View Adapter Status** displays the current status of the ServeRAID controller. (See "Viewing the ServeRAID II Controller Status" on page 139.)
- **View Configuration** displays the current configuration information for the ServeRAID controller. (See "Viewing the Configuration" on page 140.)
- **Advanced Functions** lets you initialize the configuration (that is, reset the ServeRAID controller settings to their factory defaults), import the configuration from drives, enable and disable the Boot CD-ROM and INT13 extensions, and view the controller and PCI information. (See "Using the Advanced Configuration Functions" on page 89.)

4. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight your choice; then, press **Enter.**
5. Follow the instructions that appear on the screen.
6. Select **Exit** to leave the Main Menu.

Viewing the ServeRAID II Controller

Status: When you select View Adapter Status from the Main Menu, a screen similar to the following appears.

```
        IBM ServeRAID Adapter Disk Array Mini-Configuration Utility Ver. X.XX

                                                     ┌─Ch 1─┐   ┌─Ch 2─┐
            ┌──────────────────────┐                 ┌─Array─┐  ┌─Array─┐
            │ Status for Adapter: 1 │                 ┌─Bay─┐    ┌─Bay─┐
            └──────────────────────┘               1 └────┘   1 └ONL┘ A
                                                    2 └────┘   2 └ONL┘ A
   Hdwr: ISPR-EF1Oh BCS-OFh ESC-OOh                 3 └────┘   3 └ONL┘ A
   Unattended: Off ReadAhead: On BootCd:On          4 └OPT┘    4 └ONL┘ A
   CompMode: On Clustered: Off                       5 └────┘   5 └ONL┘ A
   Boot Bk : 97115 Code Bk 97115                     6 └────┘   6 └ONL┘ A
   Rebuild Rate    : High                            7 └────┘   7 └CDR┘
   No. Of DDD Drv. : O                              8 └INI┘    8 └INI┘
   No. Of OFL Drv. : O                              9 └────┘   9 └────┘
   No. Of CRT Drv. : O                             10 └────┘  10 └────┘
   Cfg. Updates: 1    Flash Pgms.: 1O              11 └────┘  11 └────┘
   ─────────────────────────────────              12 └────┘  12 └────┘
   Locked, Bad Stripe, or Blocked Drive            13 └────┘  13 └────┘
                                                   14 └────┘  14 └────┘
   Bad Stripe     : None                           15 └────┘  15 └────┘
   Locked Drive   : None                           16 └────┘  16 └────┘
   Blocked Drive  : None

                          Press any key to continue.
```

The screen contains the following fields:

- **Unattended** shows the current state of the Unattended Mode, On or Off. (See "Changing the RAID Parameters" on page 118.)
- **Read Ahead** shows the current state of the Read Ahead Cache Mode, On or Off. (See "Changing the RAID Parameters" on page 118.)
- **BootCd** shows the current state of the BootCd function, On or Off. (See "Setting the BootCd Feature" on page 90.)
- **CompMode** shows the BIOS compatibility mode. **On** indicates 8 GB Extended; **Off** indicates 2 GB Limited.
- **Boot Bk** shows the current version number of the startable code stored in the Boot Block.
- **Code Bk** shows the current version number of the firmware (microcode) for the ServeRAID controller.
- **Rebuild Rate** shows the current speed of the rebuild process: High (default), Medium, or Low. (See "Changing the RAID Parameters" on page 118.)
- **No. of DDD Drv.** shows the current number of defunct drives.
- **No. of OFL Drv.** shows the current number of offline logical drives.
- **No. of CRT Drv.** shows the current number of critical logical drives.
- **Cfg. Updates** shows the current number of times that the configuration has been updated. When you initialize the configuration, the Cfg. Update is reset to zero.
- **Flash Pgms** shows the current number of times that the firmware EEPROM has been updated.
- **Locked, Bad Stripe, or Blocked Drive** identifies the logical drives that are affected, and contains the following fields:

- **Bad Stripe** indicates the logical drives that contain bad stripes.
- **Locked Stripe** is a reserved field.
- **Blocked Drive** indicates the logical drives that are blocked. The drives that are blocked cannot be used until they are unblocked. (See "Unblocking Logical Drives" on page 38.)

Viewing the Configuration: The View Configuration choice provides configuration and status information about your logical drives.

When you select View Configuration from the Main Menu, a screen similar to the following appears. You can view the number and size of logical drives installed, RAID level, current state, stripe unit size, write policy, read-ahead status, and the date that the logical drive was created.

```
        IBM ServeRAID Adapter Disk Array Mini-Configuration Ver. X.XX

               Adapter  1  Logical Drive Configuration


 Logical | Size  RAID   Current Stripe  Wrt  Read    Date Created
 Drive   | (MB)  Level  State   Size    Pol  Ahead   mm/dd/xx
    0    | 100    5     OKY     8K      WT   NO      10/31/97
    1    | 100    5     OKY     8K      WT   NO      10/31/97
    2    | 100    5     OKY     8K      WT   NO      10/31/97
    3    | 100    5     OKY     8K      WB   NO      10/31/97
    4    | 100    5     OKY     8K      WB   NO      10/31/97
    5    |  99    1     OKY     8K      WT   NO      10/31/97
    6    | 200    5     OKY     8K      WT   NO      10/31/97
    7    | 300    1     OKY     8K      WT   NO      10/31/97


                      Press any key to continue
```

Locations

The following information supports the Netfinity 5500 -
Type 8660 server.

Adapters

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

You can install up to seven adapters in the expansion connectors, called slots, on the system board of your server. Six of the slots are peripheral component interconnect (PCI) expansion slots and one is an industry standard architecture (ISA) expansion slot.

Four of the PCI slots allow you to 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, if these features are supported by your operating system. These slots are called *hot-pluggable* PCI slots. They are also referred to as hot-plug PCI slots.

The expansion slots have Plug and Play capabilities. See "Plug and Play Technology" on page 145 for additional information.

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

The integrated video controller is not removable. If you want to disable this controller and use a video adapter instead, you can install a video adapter in an expansion slot. When you install a PCI video adapter, the server BIOS automatically disables the integrated video controller. When you install an ISA video adapter, you must move a jumper to disable the integrated video controller. See "System Board Jumpers" on page 256 for more information.

The following illustration shows the location of the PCI and ISA expansion slots on the system board.
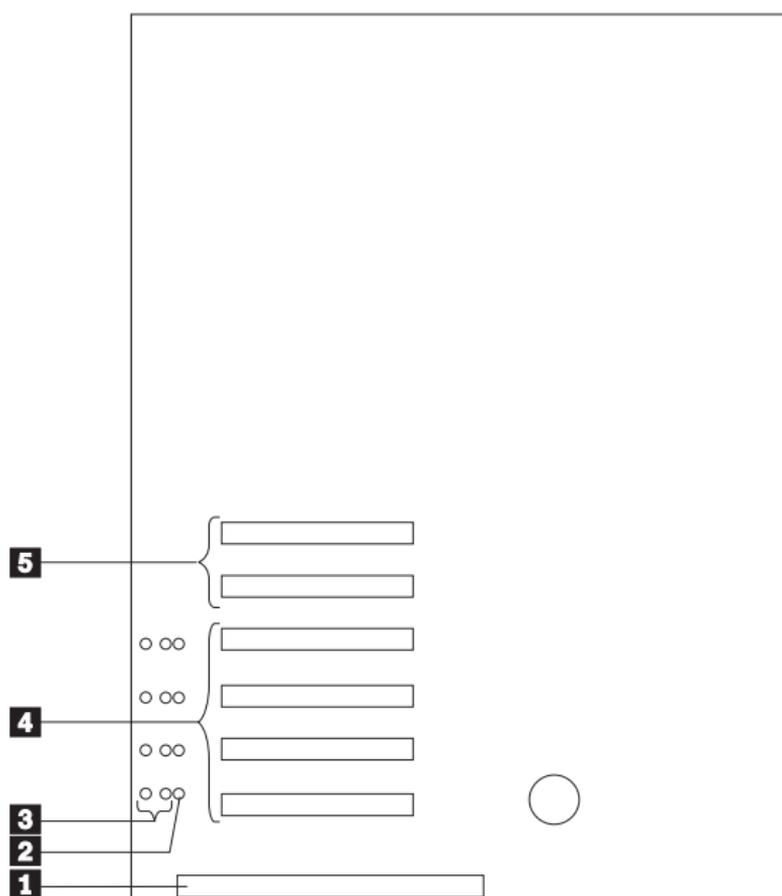
1. 16-bit ISA slot
2. Power LEDs for hot-swap slots
3. Attention LEDs for hot-swap slots
4. Hot-plug 32-bit PCI slots 1–4
5. Non-hot-plug 32-bit PCI slots 5 and 6

LEDs for Hot-Plug PCI Slots: Each hot-plug PCI slot has three LEDs associated with it — two Attention LEDs and one Power LED.

- **Power LED:** This LED is on when the hot-plug PCI slot is active and has power. An adapter **must not** be added to or removed from the PCI slot when the Power LED is on. When this LED is off, the PCI slot is inactive and has no power applied. An adapter can be installed when the Power LED for the PCI slot is off. Refer to your operating system documentation to determine if it supports hot-plug PCI adapters, and, if so, how to disable the hot-plug PCI slot.
- **Attention LEDs:** Each hot-plug PCI slot has an Attention LED that is visible from the rear of the server and one that can be seen from inside the server. (The LEDs have the same meaning; they are duplicated to be visible from outside or inside the server.) An Attention LED flashes approximately once per second when it is on. The meaning of the Attention LEDs is defined by your operating system. Refer to your operating system documentation to determine if it supports hot-plug PCI adapters and, if so, what the Attention LEDs indicate.

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The following table describes the LEDs:

Power LED	Attention LED	Description
On	Flashing	The adapter required attention. **Slot still has power applied.** Do not remove or install an adapter in the slot. Refer to your operating system documentation for instructions.
On	Off	Normal operation; no intervention is required.
Off	Flashing	The adapter requires intervention. **Power is removed from the slot.** An adapter can be removed or installed in the slot.
Off	Off	**Power is removed from the slot.** An adapter can be removed or installed in the slot.

Adapter Considerations: Before you continue with the adapter-installation procedure:

- Review the documentation that comes with the adapter and follow those instructions in addition to these instructions. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter documentation.
- You can install a full-length ISA adapter in the ISA expansion slot.
- You can install full-length adapters in all PCI expansion slots.
- You can install hot-plug PCI adapters in PCI slots 1–4, if your operating system supports this feature. Non-hot-plug PCI adapters can also be installed in these slots.
- Your server supports 5.0 V and universal PCI adapters; it does not support 3.3 V adapters.

> **Note**
>
> A universal PCI adapter supports both 3.3 V and 5.0 V operation.

- Your server uses a rotational interrupt technique to configure PCI adapters. This technique enables you to install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- PCI slots 5 and 6 are on the primary PCI bus and PCI slots 1–4 are on the secondary PCI bus. The performance of the PCI adapters depends on the configuration of adapters in your system.

Plug and Play Technology: *Plug and Play* is an
ISA technology designed to make expanding your server
easier. Plug and Play adapter support is built into the
system board in your server. If your operating system
supports Plug and Play technology, your server will
automatically configure itself when you install an ISA Plug
and Play device.

---- **Note** ----

PCI adapters are also often referred to as plug and
play because they configure automatically.

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

A Plug and Play adapter comes with built-in identification
and configuration specifications (set in memory on the
adapter) that provide installation information to the server
during startup. This information is 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.

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

Configuration/Setup Utility Program: Within the
Configuration/Setup utility program, the Plug and Play
screen displays server resources that are typically required
by adapters:

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

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

Notes
---

1. Refer to the documentation that comes with the adapter for information about required system resources. Then, make the appropriate jumper or switch settings on the adapter.
2. If you have a resource conflict, set the resources that are used by the ISA legacy adapter to [**ISA Legacy**]. This will manually configure the ISA legacy adapter to that specific server resource. Once Plug and Play detects that a resource is not available, it will skip that resource, and reconfigure to other available system resources. (See "Plug and Play" on page 99.)

Battery Replacement

> **Note**
>
> If the battery is remover, the stand by light will not blink until after the first completion of the POST.

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

> **Caution**
>
> When replacing the battery, use only IBM IBM FRU number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.
>
> **Do not:**
>
> - Throw or immerse into water
> - Heat to more than 100°C (212°F)
> - Repair or disassemble
>
> Dispose of the battery as required by local ordinances or regulations.

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

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

> **Before you begin, be sure you have:**
>
> - Read "Safety Information" on page 300
> - Followed any special handling and installation instructions supplied with the replacement battery.

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

To replace the battery:

1. Turn off the server and peripheral devices and
   disconnect all external cables and power cords (see
   "Preparing to Install Options" on page 220); then
   remove the top cover (see "Top Cover Removal" on
   page 261).
2. Locate the battery on the system board (see "System
   Board Component Locations" on page 254).
3. Remove any adapters that are installed in PCI slots 1
   and 2, so you can access the battery. (See "Hot-Plug
   PCI Adapter Installation" on page 173 for information
   about installing and removing adapters from the
   hot-plug PCI slots.)
4. Lift and remove the plastic dividers between PCI slot
   1 and the ISA slot and between PCI slot 1 and PCI
   slot 2 by pressing the latches on the top ends of the
   dividers toward the dividers and lifting the dividers
   from the server.
5. Remove the battery:
   a. Use one finger to lift the battery clip over the
      battery.
   b. Use one finger to slightly slide the battery toward
      the rear of the server. The spring mechanism
      behind the battery will push it out toward you as
      you slide it forward.
   c. Use your thumb and index finger to pull the
      battery from under the battery clip.
   d. Ensure that the battery clip is touching the base
      of the battery socket by pressing gently on the
      clip.
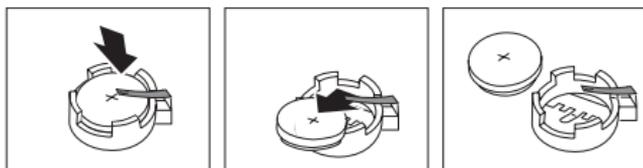
6. Insert the new battery:
   a. Tilt the battery so that you can insert it into the
      front of the socket, under the battery clip.
   b. As you slide it under the battery clip, press the
      battery down into the socket.
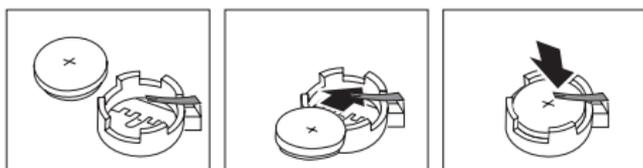
7. Reinstall any adapters you removed. (See "Hot-Plug
   PCI Adapter Installation" on page 173 for information

about installing and removing adapters from the hot-plug PCI slots.)

8. Insert the plastic dividers into the divider guides beside PCI slots 1 and 2.

9. Reinstall the top cover and complete the installation (see "Completing the Installation" on page 154).

> --- **Note** ---
>
> You will have to wait approximately 20 seconds after you plug the power cord of your server into an electrical outlet for the Power Control button to become active.

10. Start the Configuration/Setup utility program and reset configuration parameters as needed.
    .
    - To reset the system date and time, go to "Date and Time" on page 93.
    - To reset the power-on password, go to "Using the Power-On Password Menu" on page 95.
    - To reconfigure your server, follow the instructions given in "Configuration/Setup Utility Program" on page 60 (all models).

Before You Begin

Notes:

1. You do not need to turn the server off to install or replace hot-swap power supplies, hot-swap drives, hot-swap fans, or hot-plug PCI adapters.
2. The color orange on components or labels in your Netfinity 5500 indicates hot-plug components.

- Become familiar with the safety procedures, see "Safety Information" on page 300.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Place your server in a location that is dry. Rain or spilled liquids might damage your server.
- Leave about 50 mm (2 inches) of ventilated space on the right and left sides of the server to allow the server cooling system to work properly. Leave 100 mm (4 inches) of clearance at the rear of the server for cables.
- Have a supply of 1 MB and 2 MB, 3.5-inch diskettes available.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.
- For a list of supported options for the Netfinity 5500, refer to http://www.pc.ibm.com/us/compat on the World Wide Web.

Changing Jumper Positions

Jumpers located on the system board and the processor board help you to customize the way your server operates.

Your system board, processor board, and SCSI backplane contain two-pin and three-pin jumper blocks.

In some cases, groups of jumpers might combine to define a function.

Two-Pin Jumper Blocks: Covering both pins with a jumper defines one function of the jumper block. To change the function of the jumper block, cover one pin only or remove the jumper entirely.

The following illustration identifies pins 1 and 2 on a two-pin jumper block.
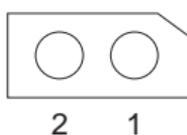
To change a jumper's position for a two-pin jumper block:

1. Turn off the server; then, disconnect the server power cords.
2. Remove the server cover (see "Preparing to Install Options" on page 220).
3. Do one of the following:
   - Lift the jumper straight off the pin block.
   - Align the holes in the bottom of the jumper with the two pins on the pin block, and then slide the jumper onto these pins.
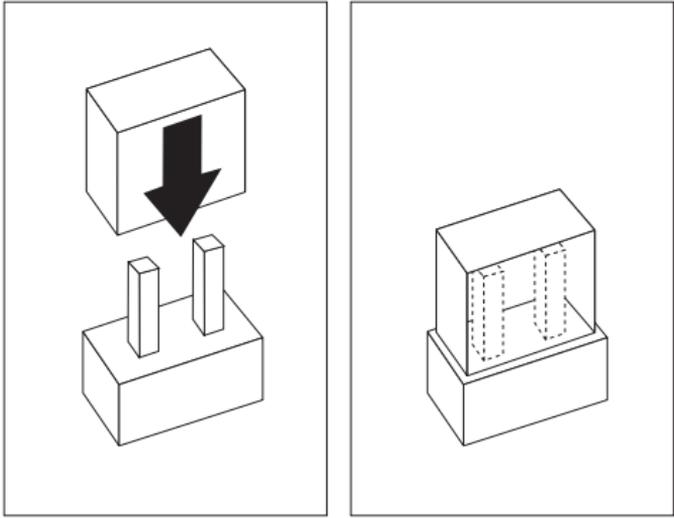
   - Align one of the holes in the bottom of the jumper with one of the pins on the pin block, and then slide the jumper onto that pin only.
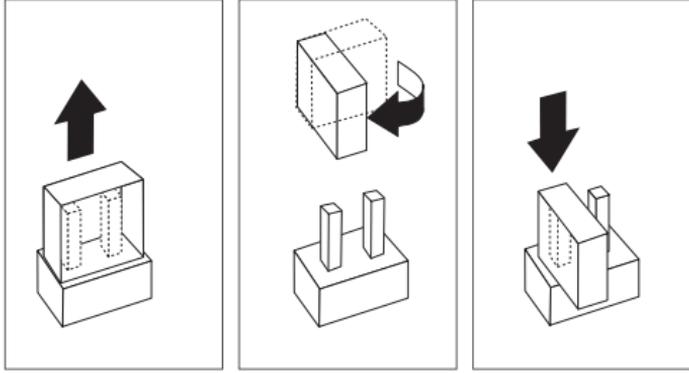
4. Reinstall the server cover and connect the cables (see "Completing the Installation" on page 154).

Three-Pin Jumper Blocks: With the three-pin jumper blocks, each jumper covers two of the three pins on a pin block. You can position the jumper to fit over the center pin and either of the other two pins.

The following illustration identifies pins 1, 2, and 3 on a three-pin jumper block.
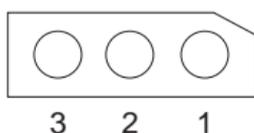
To change a jumper's position for a three-pin jumper block:

1. Turn off the server; then, disconnect the server power cords.
2. Remove the server cover (see "Preparing to Install Options" on page 220).
3. Lift the jumper straight off the pin block.
4. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.
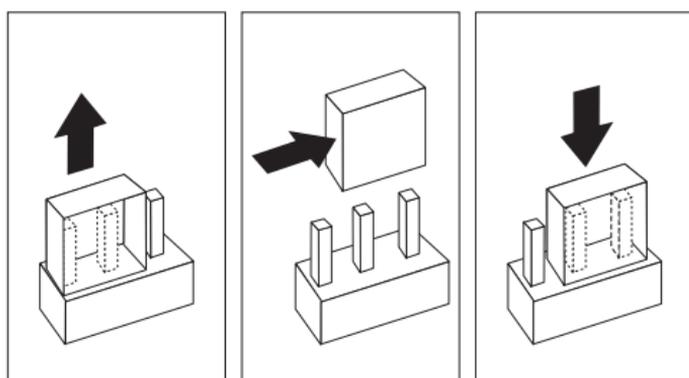
5. Slide the jumper fully onto these pins.
6. Reinstall the server cover and connect the cables (see "Completing the Installation" on page 154).

Completing the Installation

To complete your installation, you must reinstall the side and top covers, reconnect all the cables that you disconnected in "Preparing to Install Options" on page 220, and, for certain options, run the Configuration utility program. Follow the instructions in this section.

Attention

For correct cooling and airflow, install the top cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the top cover removed might damage server components.

Installing the Top Cover: To install the server top cover:

1. Before installing a cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Lower the cover **2** with the rear edge of the cover about 25 mm (1 inch) back from the rear edge of the server.
3. Slide the cover forward.
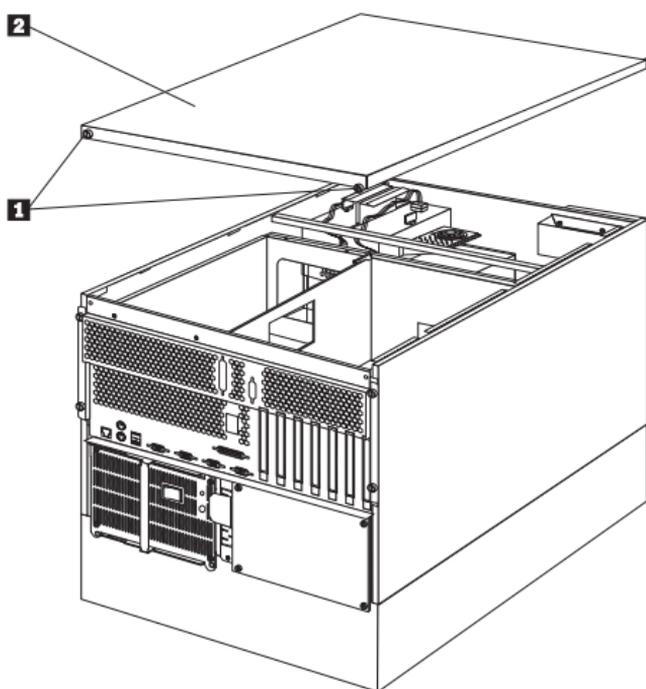
4. Tighten the two thumbscrews **1** on the back edge of the cover.
5. If you disconnected any cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

> **Notes**
>
> 1. If you are in the United Kingdom and have a modem or fax machine attached to your server, reconnect the telephone line *after* you plug in the power cords.
> 2. If necessary, see "Input/Output Connectors and Expansion Slots" on page 194 for connector locations.

Installing the Trim Bezels and Server Door:

Refer to the following illustration while you perform the steps in this procedure.
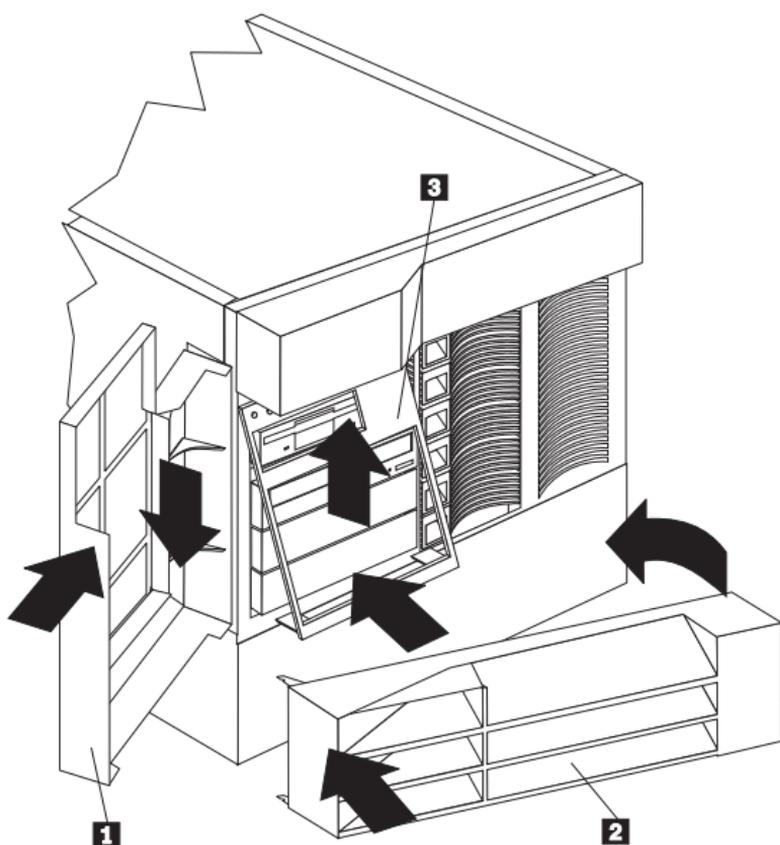
To install the media-bay trim bezel:

1. Insert the two tabs on the top of the media-bay trim bezel **3** in the matching holes on the server chassis.
2. Push the bottom of the bezel toward the server until the two tabs at the bottom of the bezel snap into place.

To install the NetBAY3 bezel:

1. Hook the tabs on the left side of the NetBAY3 bezel **2** around the posts on the NetBAY3.
2. Gently push the right side of the bezel toward the server until the bezel snaps into place.
3. Lock the NetBAY3 bezel.

To install the server front door:

1. Align the pins on the server door **1** with the hinges on the server and slide the door down.
2. Close and lock the door.

Updating Device Records and

Reconfiguring the Server: 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.

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.

If you have installed a new microprocessor, you might want to upgrade your operating system. Refer to your ServerGuide package. If you have installed or removed hard disk drives, see "ServeRAID Configuration Program" on page 74 for information about reconfiguring your disk arrays.

Run the Configuration/Setup utility program to save the new configuration information. See "Configuration Overview" on page 58.

Controls and Indicators

The most commonly used controls and indicators on the front of the server appear in the following illustration.
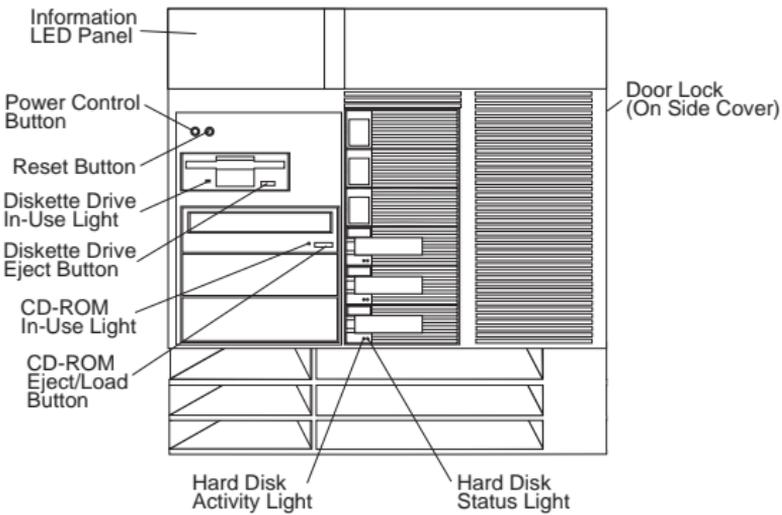
Door Lock (Tower Model Only): You can lock the door on your server to deter tampering with the internal components. This same lock also locks the top cover in place.

Power Control Button: Press this button to manually turn the server on or off.

⚠️

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.

  Note

  If you have just plugged the power cord of your server into an electrical outlet, you will have to wait approximately 20 seconds before pressing the Power Control button.

- If the server is activated and a power failure occurs, the server will start automatically.

- The server can also be powered on by the system management processor.

The server can be deactivated as follows:

- You can turn the server off by pressing the Power Control button on the front of the server. Pressing the Power Control button starts a graceful shutdown of the operating system, if this feature is supported by your operating system, and places the server in standby mode.

  Note

  After turning off the server, wait at least 5 seconds before pressing the Power Control button to power the server on again.

- Pressing and holding the Power Control button for more than 4 seconds causes an immediate shutdown of the server and places the server in standby mode. This feature can be used if the operating system hangs.
- Disconnecting the server power cords from the electrical outlets will shut off all power to the server.

  Note

  Wait about 15 seconds after disconnecting the power cord for your system to stop running. Watch for the System Power light on the information LED panel to stop blinking.

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

Information LED Panel: The lights on this panel give status information for your server. See "Information LED Panel" on page 189 for more information.

Diskette-Eject Button: Press this button to eject a diskette from the drive.

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.

CD-ROM Drive In-Use Light: When this light is lit, the CD-ROM drive is being accessed.

Diskette Drive In-Use Light: When this light is lit, the diskette drive is being accessed.

Hard Disk Lights: Each of the six hot-swap drive bays has a set of two lights, which indicate the following:

- **Hard Disk Status Light:** When the amber light for a hard disk drive is lit 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 controller is identifying the drive.

- **Hard Disk Activity Light:** When the green light for a hard disk drive is flashing, the drive is being accessed.

CD-ROM Drive

An IDE CD-ROM drive is a standard feature on your
server. CD-ROM drives can play back or read from a CD,
but cannot write information to it. CD-ROM drives use
industry standard, 12 cm (4.75-inch) CDs.

Follow these guidelines when using a CD-ROM drive:

- Do not place the server where the following
  conditions exist:
    - High temperature
    - High humidity
    - Excessive dust
    - Excessive vibration or sudden shock
    - An inclined surface
    - Direct sunlight
- Do not insert any object other than a CD into the
  drive.
- Before moving the server, remove the CD from the
  drive.

The following illustration shows the front of the CD-ROM
drive.

CD-ROM Drive   Emergency-Eject   Eject/Load
In-Use Light   Hole   Button
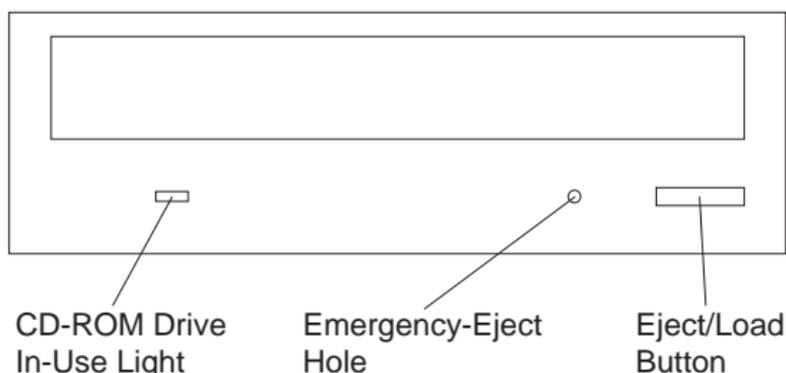
Handling a CD: When handling a CD, follow these
guidelines:

- Hold the CD by its edges. Do not touch the surface.
- To remove dust or fingerprints, wipe the CD from the
  center to the outside with a soft, nonabrasive cloth.
  Wiping the CD in a circular direction might cause loss
  of data.
- Do not write or stick paper on the CD.
- Do not scratch or mark the CD.
- Do not place or store the CD in direct sunlight.
- Do not use benzene, thinners, or other cleaners to
  clean the CD.
- Do not drop or bend the CD.

Loading a CD: **To load a CD into a CD-ROM drive:**

1. Press the Eject/Load button. The tray slides out of
   the drive. (Do not manually force the tray open.)
2. Place the CD in the tray with the label facing up.
3. Close the tray by pressing the Eject/Load button, or

by gently pushing the tray forward. When the tray is closed, the CD-ROM drive In-Use light on the front of the drive will activate to indicate that the drive is in use.

4. To eject the CD, press the Eject/Load button. When the tray slides out, carefully remove the CD.

5. Close the tray by pressing the Eject/Load button, or by gently pushing the tray forward.

Note

1. If the tray does not slide out of the drive when you press the Eject/Load button, insert the pointed end of a large paper clip into the emergency-eject hole located on the front of the CD-ROM drive.

2. In some models, you might have to remove the front bezel that houses the CD-ROM drive so that you can access the emergency-eject hole.

DASD Backplane Removal

Before you begin:

Read "Safety Information" on page 300.

To remove the DASD backplane, do the following:

1. Remove the top cover (see "Top Cover Removal" on page 261).
2. To access the cable(s) attached to the DASD backplane, slide the shuttle to the rear of the system, see "Shuttle Removal" on page 252.
3. Disconnect the DASD backplane cables.
4. Remove the DASD backplane.
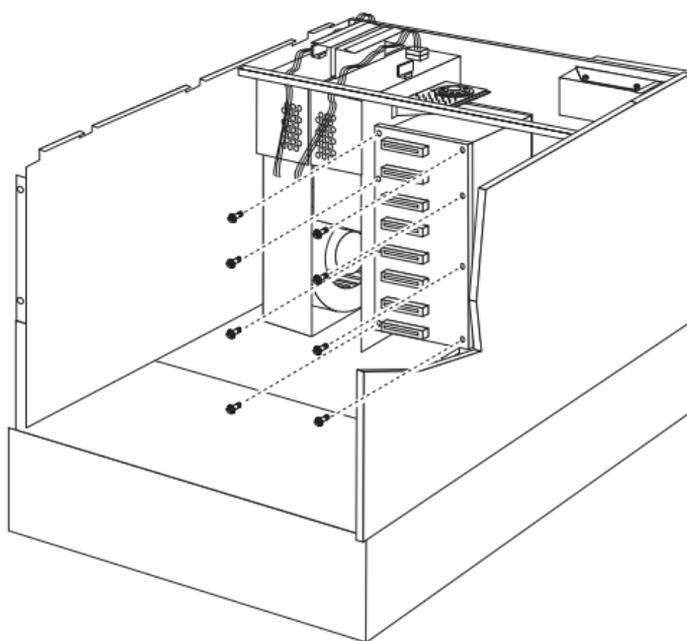
a. Remove the DASD backplane screws **1**, then; remove the DASD backplane.

Diagnostics Panel LEDs

The following illustration shows the LEDs on the diagnostics panel inside the server. See "Symptom-to-FRU Index" on page 263 for information on identifying problems using these LEDs.
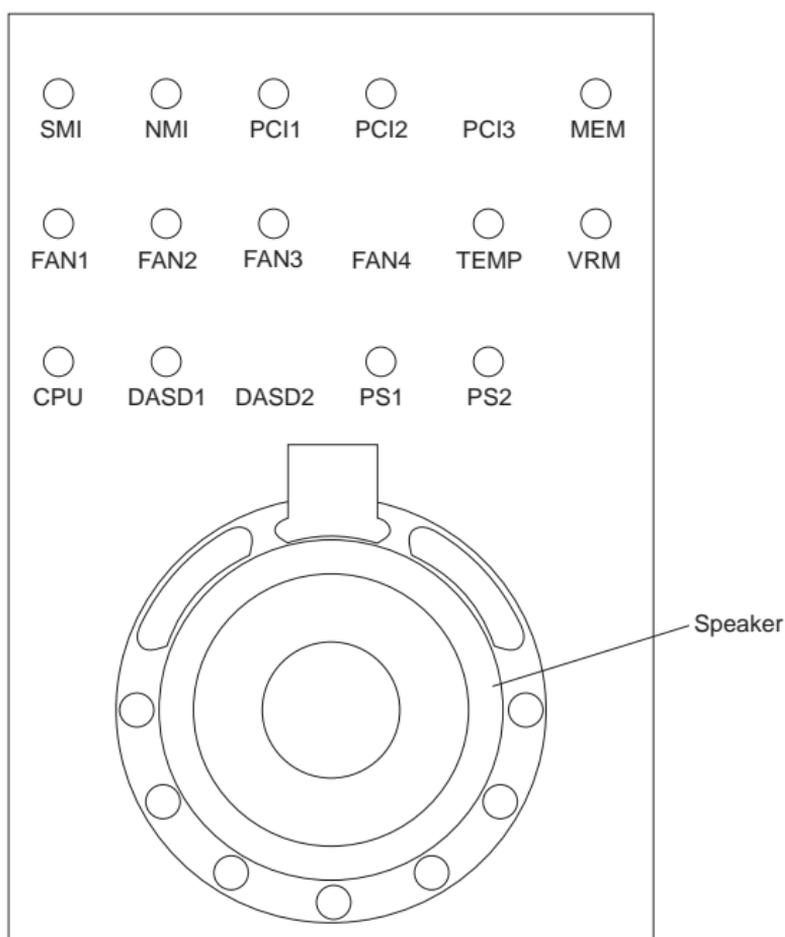
To replace the diagnostics panel LEDs, you must replace the interior LED and speaker assembly, see "Interior LED and Speaker Assembly" on page 196.

External Options

> **Before you begin:**
> - Read "Safety Information" on page 300.
> - Read the documentation that comes with your options.

Connecting External SCSI Devices: You can attach a SCSI storage expansion enclosure to your server.

Cabling Requirements: The ServeRAID controller in your server has one channel that can be used to attach external devices.

If you plan to install external SCSI devices, you must order additional SCSI cables. The cables must have the proper connectors for the ServeRAID controller 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 provided 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 ANSI SCSI Standards:

- X3.131-1986 (SCSI)
- X3.131-1994 (SCSI-2)
- X3T10/1071D

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. See "SCSI IDs" on page 199 and to the instructions that come with the SCSI devices for more information about setting a SCSI ID.

Installation Procedure: **To attach an external device:**

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

- Two serial-port connectors
- One systems management connector
- One parallel-port connector
- One video-port connector
- One keyboard-port connector
- One auxiliary-device-port connector
- One Ethernet-port connector
- Two USB-port connectors

See the illustration in "Input/Output Connectors and Expansion Slots" on page 194 for the locations of the connectors.

Serial Ports: Your server comes with two serial ports. (See "Input/Output Connectors and Expansion Slots" on page 194 for the locations of the connectors.) These ports are used to communicate with printers, plotters, external modems, scanners, and auxiliary terminals. These ports also enable you to transfer data between computers.

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 115 000 bits per second.

Serial port A is shared by the operating system and the integrated system management processor. Serial port B can be used by only by the operating system.

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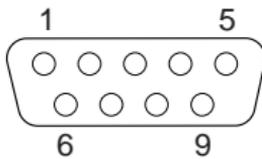
The following table shows the pin-number assignments for the serial-port connectors.

Table 2. Serial Port Pin-Number Assignments			
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.

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

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

Parallel Port: The parallel port usually is used to communicate with printers, and transfers data one byte at a time. The parallel port has a 25-pin, female D-shell connector on the back of your server. It support three standard IEEE 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capacity Port (ECP). (See "Input/Output Connectors and Expansion Slots" on page 194 for the location of the connector.)

```
 13                                        1
 ┌─────────────────────────────────────────┐
 │  ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○  │
 │   ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○    │
 └─────────────────────────────────────────┘
 25                                       14
```
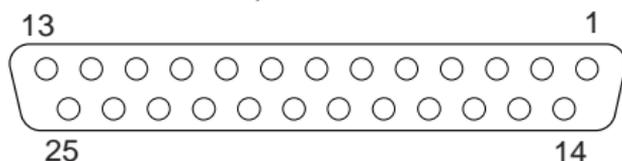
The following table shows the pin-number assignments for the parallel-port connector.

Table 3. Parallel Port Pin-Number Assignments

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

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 system board 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. (See "Input/Output Connectors and
Expansion Slots" on page 194 for the location of the
connector.)

```
    5         1
  ┌─────────────┐
  │ ○ ○ ○ ○ ○ │
  │  ○ ○ ○ ○ ○ │
  │ ○ ○ ○ ○ ○ │
  └─────────────┘
   15        11
```
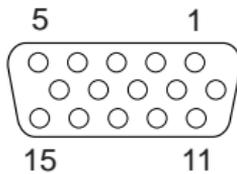
The following table shows the pin-number assignments for
the video connector.

Table 4. Video Port Pin-Number Assignments	
Pin	**Signal**
1	Red
2	Green or monochrome
3	Blue
4	Monitor ID bit 2
5	Ground
6	Ground
7	Ground
8	Ground
9	+5 V
10	Ground
11	Monitor ID bit 0
12	DDC SDA
13	Horizontal synchronization (Hsync)
14	Vertical synchronization (Vsync)
15	DDC SDL

Keyboard and Auxiliary-Device Ports: The system board has one keyboard port and one auxiliary-device port that supports a mouse or other pointing device. (See "Input/Output Connectors and Expansion Slots" on page 194 for the locations of the connectors.)
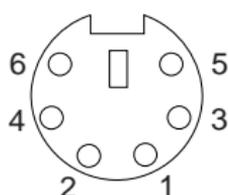
The following table shows the pin-number assignments for the connectors used by the keyboard and auxiliary-device ports.

Table 5. 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

Ethernet Port: The system board in your Netfinity 5500 contains an Ethernet *controller*. The controller has an external RJ-45 connector on the rear of the server that is used with a category 3, 4, or 5 unshielded twisted-pair (UTP) cable. The connector enables an Ethernet network to attach to the internal transceiver in your server.

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

See "Configuring the Ethernet Controller" on page 55 for additional information about the Ethernet controller.

Table 6 shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

10BASE-T or 100 BASE-TX UTP Cable

RJ-45 Modular Plug Connector

Pins 1 2 3 6
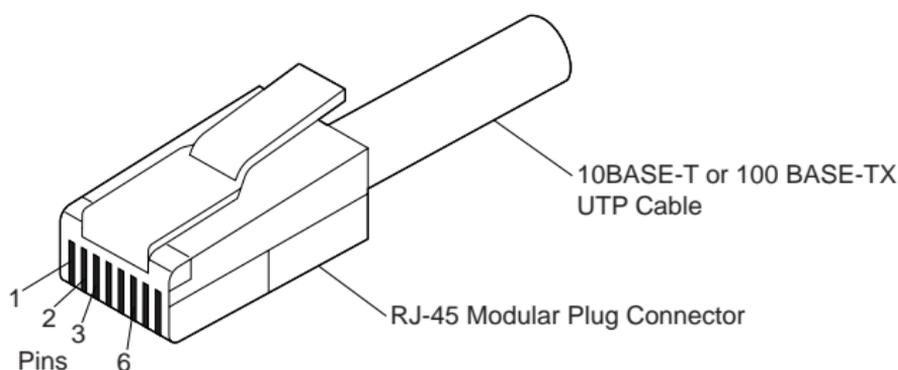
Table 6. Ethernet Connector Pin-Number Assignments

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

> **Note**
>
> The wrap plug must have pin 1 connected to pin 3 and pin 2 connected to pin 6.

Universal Serial Bus Ports: The system board in your Netfinity 5500 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 peripherals can be attached. USB provides 12 megabits-per-second (Mbps) bandwidth with a maximum of 63 peripherals and a maximum signal distance of five meters (16 ft.) per segment.

Note

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

Table 7 shows the pin-number assignments for the USB connectors.

Table 7. USB Connector Pin-Number Assignments	
Pin	**Signal**
1	VCC
2	–Data
3	+Data
4	Ground

Front Bezel Removal

```
┌─ Before you begin: ────────────────────┐
│ Read "Safety Information" on page 300.  │
└─────────────────────────────────────────┘
```

To remove the front bezel, do the following:

1. Remove the top cover, see "Top Cover Removal" on page 261.
2. Remove the information panel cover, see "Information Panel Cover Removal" on page 191.
3. Remove the door and trim bezel, see "Server Door and Trim Bezels Removal" on page 251.
4. Remove the side covers, see "Side Cover(s) Removal" on page 253.
5. Remove the front bezel.
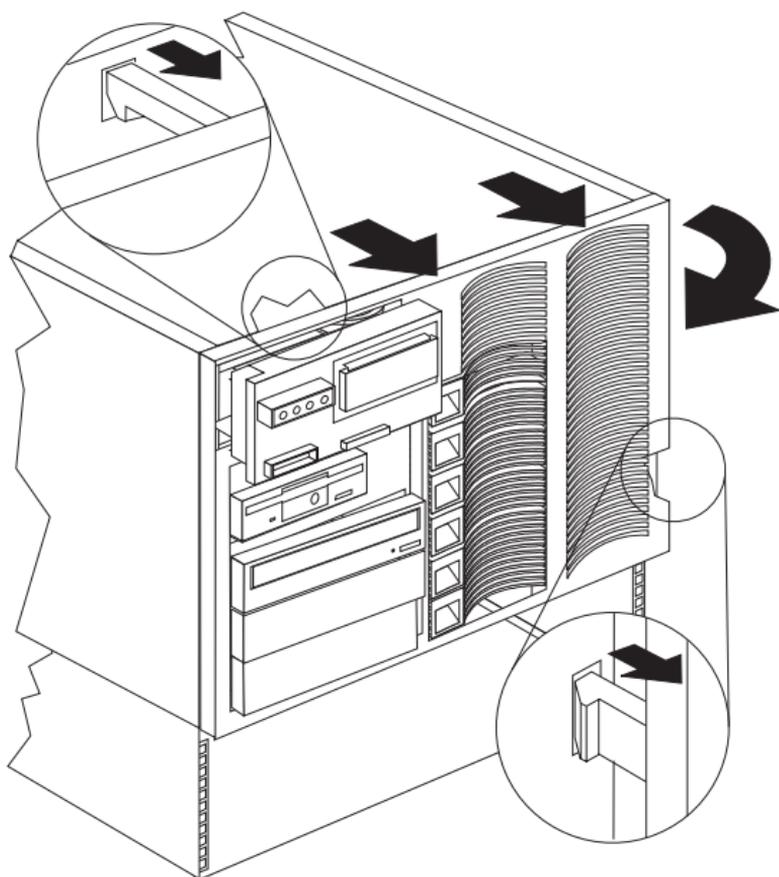
a. While releasing the top and side bezel tabs, rotate the left side of the bezel away from the system.

Hot-Plug PCI Adapter Installation

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-replace 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. If your operating system and adapter also support the hot-add feature, you can install a new adapter without turning off the power to the server.

Note

You do not need to turn the server off to install or remove a hot-plug PCI adapter.

Before you begin:

- Read "Safety Information" on page 300.
- Read the documentation that comes with your adapter for any special requirements or restrictions.
- Read the documentation that comes with your operating system.

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.
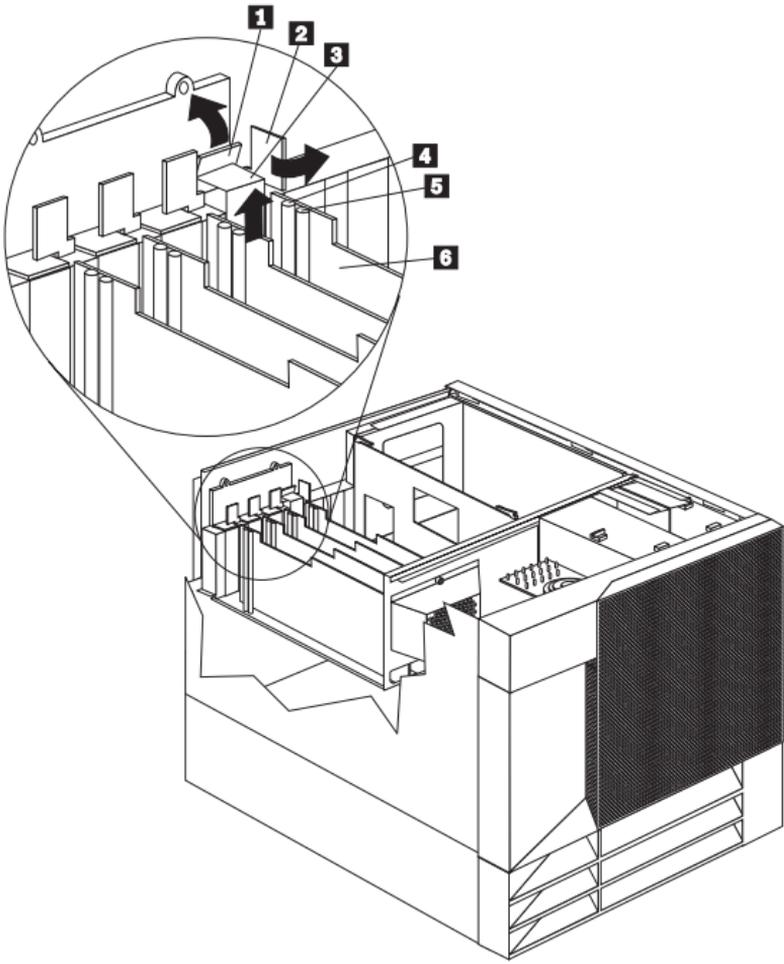
1 Tab
2 Adapter retention latch
3 Expansion-slot cover
4 Attention light
5 Power light
6 Plastic divider
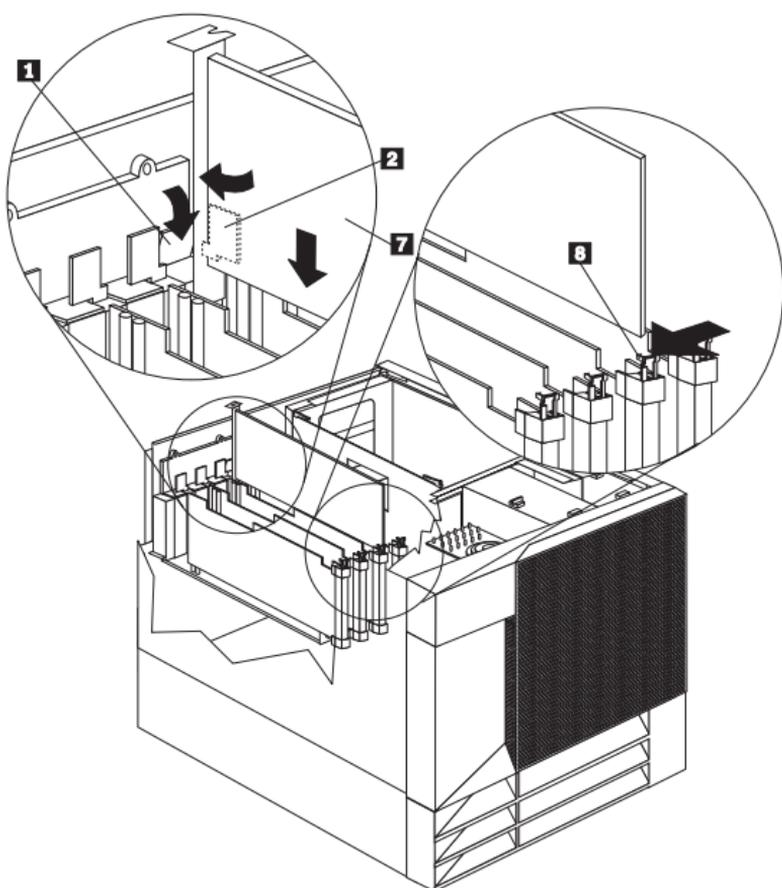
1 Tab
2 Adapter retention latch
7 Adapter
8 Adapter retention latch

To install a hot-plug PCI adapter:

1. Remove the top cover (see "Top Cover Removal" on page 261).
2. Determine which expansion slot you will use for the adapter.

   - **Note**

     Only PCI slots 1–4 can be used for hot-plug PCI adapters.

3. Disable the selected PCI slot from your operating system. (Refer to the documentation that comes with your operating system for information about disabling a hot-plug PCI slot.) Disabling the PCI slot turns off the Power light for that PCI slot.

   - **Attention**

     Make sure the Power light **5** for the hot-plug PCI slot is off before you continue to the next step.

4. Remove the expansion-slot cover **3** :
   a. Rotate the adapter retention latch **2** counterclockwise.

b. Lift the tab **1** covering the top of the expansion-slot cover **3** and remove expansion-slot cover 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. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.
6. Remove the adapter from the static-protective package.

> **Note**
>
> Avoid touching the components and gold-edge connectors on the adapter.

7. Place the adapter, component-side up, on a flat, static-protective surface.
8. Install the adapter **7**:
   a. Carefully grasp the adapter **7** by its top edge or upper corners, and align it with the expansion slot on the system board.
   b. Press the adapter *firmly* into the expansion slot.

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

   c. Lower the tab **1** over the tab on the top corner of adapter. Rotate the adapter retention latch **2** clockwise until it snaps into place.

   > **Note**
   >
   > The expansion slot also has an adapter retention latch **8** at the end of the slot toward the middle of the server. To remove the adapter, you need to push this adapter retention latch **8** away from the adapter until the top edge of the adapter is past the latch.

9. Connect any needed cables to the adapter.
10. Enable the PCI slot from your operating system. (Refer to the documentation that comes with your operating system for information about enabling a

hot-plug PCI slot.) Make sure that the Power light
5 for the hot-plug PCI slot is on.

11. If you have other options to install or remove, do so
now; otherwise, go to "Completing the Installation" on
page 154.

Installing a Non-Hot-Plug Adapter This section
gives the procedure for installing a non-hot-plug adapter.
If you want to remove a non-hot-plug adapter, reverse the
steps.

Before you begin:

- Read "Safety Information" on page 300.
- Read the documentation that comes with your
  option.

Refer to the following illustration while you perform the
steps in this procedure.
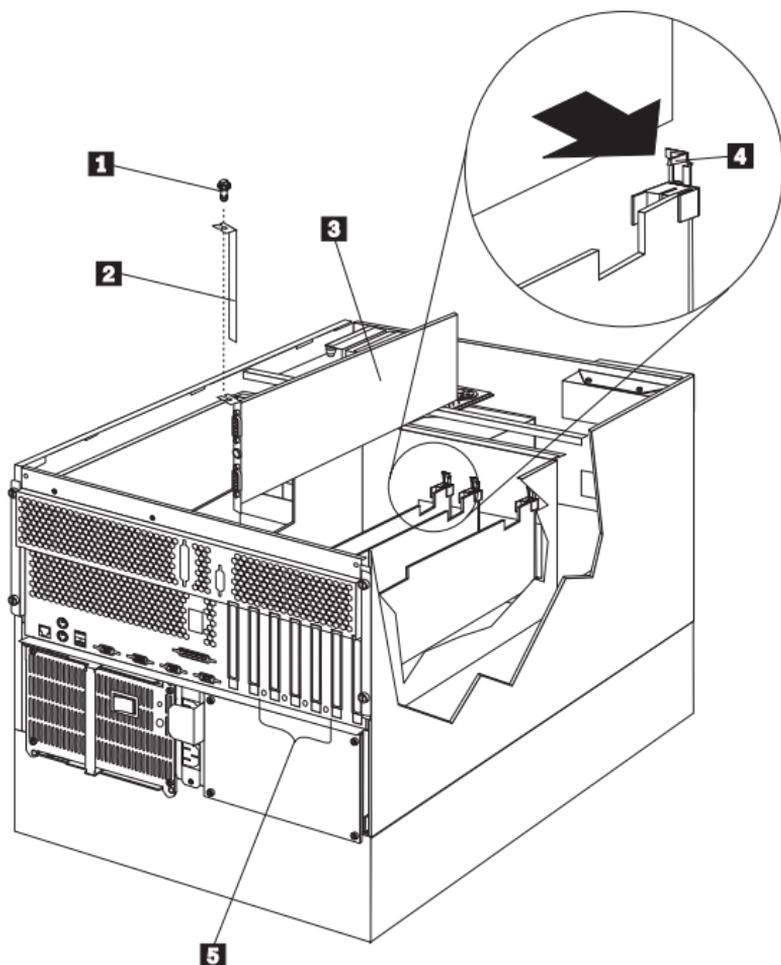
1 Expansion-slot cover screw
2 Expansion-slot cover
3 Adapter
4 Adapter retention latch

To install a non-hot-plug adapter:

.
1. Turn off the server and peripheral devices and
disconnect all external cables and power cords (see

"Preparing to Install Options" on page 220); then remove the top cover (see "Top Cover Removal" on page 261).

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. Remove the expansion-slot cover **2**:
   - If you are installing an adapter in PCI slot 1, 2, 3, or 4:
     a. See the illustration in "Hot-Plug PCI Adapter Installation" on page 173 for operation of the adapter retention latch on the end of the slot near the rear of the server.
     b. Rotate the adapter retention latch counterclockwise.
     c. Lift the tab covering the top of the expansion-slot cover and remove expansion-slot cover from the server. Store it in a safe place for future use.
   - If you are installing an adapter in PCI slot 5 or 6 or in the ISA slot:
     a. Remove the screw **1** on the top of the expansion-slot cover **2**.
     b. Slide the expansion-slot cover out of the server.
     c. Store these items 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.

4. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.

5. Remove the adapter from the static-protective package.

> **Note**
>
> Avoid touching the components and gold-edge connectors on the adapter.

6. Place the adapter, component-side up, on a flat, static-protective surface.

7. Set any jumpers or switches as described by the adapter manufacturer.

8. 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 system board.

b. Press the adapter *firmly* into the expansion slot.

> **Attention**
>
> When you install an adapter in the server, be sure that it is completely and correctly seated in the system-board connector before you apply power. Incomplete insertion might cause damage to the system board or the adapter.

9. If you are installing an adapter in PCI slots 1, 2, 3, or 4:

    a. Refer to the illustration in "Hot-Plug PCI Adapter Installation" on page 173 for operation of the adapter retention latch on the end of the slot near the rear of the server.

    b. Lower the tab on the adapter guide over the tab on the top corner of the adapter. Rotate the adapter retention latch clockwise until it snaps into place.

    If you are installing an adapter in PCI slots 5 or 6 or in the ISA slot:

    a. Align the rounded notch in the retaining bracket with the threaded hole in the expansion-slot frame. The retaining bracket on the adapter fits into the space that was occupied by the expansion-slot cover.

    b. Insert the expansion-slot screw **3** that you removed earlier into the threaded hole, and push the rounded notch up against the screw.

    c. Tighten the expansion-slot screw firmly.

    > **Note**
    >
    > The expansion slot also has an adapter retention latch **4** at the end of the slot toward the middle of the server. To remove the adapter, you need to push this adapter retention latch **4** away from the adapter until the top edge of the adapter is past the latch.

    .

10. Connect any needed cables to the adapter.

11. If you have other options to install or remove, do so now; otherwise, go to "Completing the Installation" on page 154.

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 dual processors. Refer to your network-adapter documentation for additional information about adapter compatibility requirements.

Hot-Swap Power Supply Installation

Your server comes with one power supply. You can add a second power supply to provide redundant power. After you install a power supply, check the power-supply status indicators to verify that the power supply is operating properly. See "Power Supplies" on page 224 for details.

— **Caution** —

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

Hazardous voltage, current, and energy levels are present inside the power supplies, power backplane, and AC box. There are no serviceable parts inside the power supplies, power backplane, or AC box.

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

— **Note** —

You do not need to turn off the power to the server to install hot-swap power supplies.
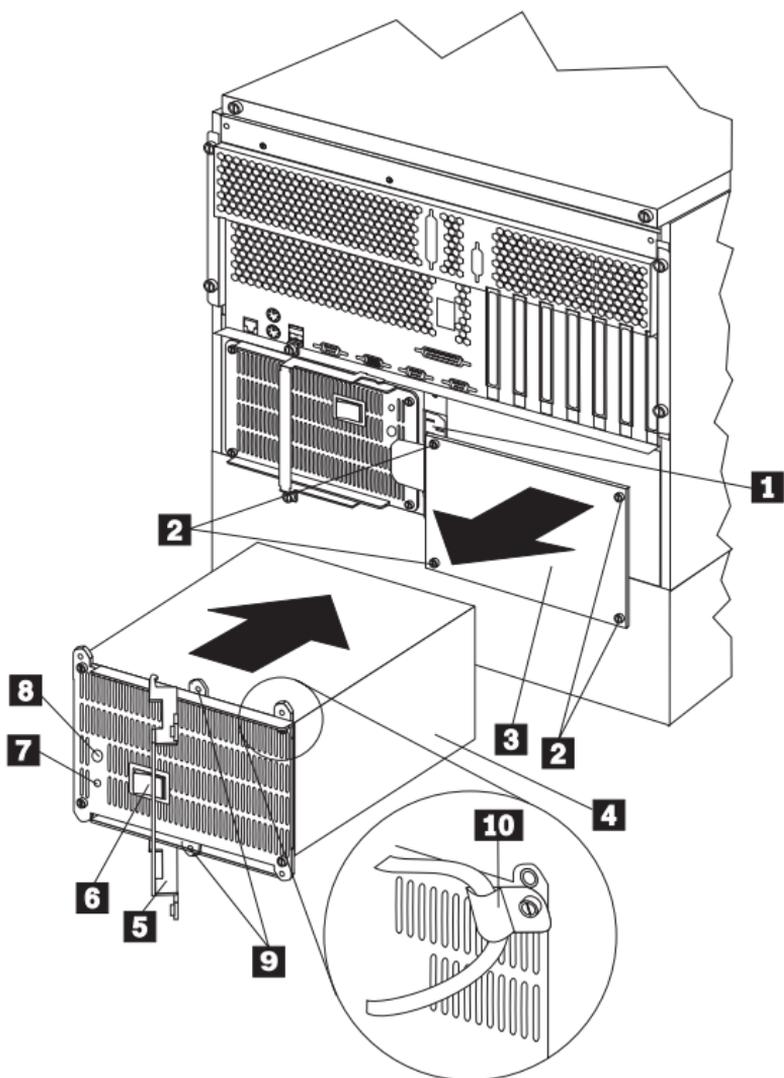
1 Power cord connector for power supply 2
2 Screws
3 Filler panel
4 Power supply
5 Handle
6 Power switch on power supply
7 AC Power light
8 DC Power light
9 Holes for shipping screws
10 Power-cord strain-relief bracket

To add a power supply:

Caution

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

Hazardous voltage, current, and energy levels are present inside the power supplies, power backplane, and AC box. There are no serviceable parts inside the power supplies, power backplane, or AC box.

Note

It is not necessary to turn the Power switch on the power supply off when you are installing a power supply.

---

1. Remove the filler panel **3** :
   a. Remove the four screws **2** from the filler panel.
   b. Remove the filler panel **3** from the power-supply bay and save it and the four screws you removed for future use.

   Note

   During normal operation, each power-supply bay should have either a power supply or filler panel installed for proper cooling.

   ---

2. Place the handle **5** on the power supply in the open position, and slide the power supply into the chassis.
3. Gently close the handle **5** on the power supply to seat the power supply in the bay.
4. Plug the power cord for the added power supply into power cord connector **1** .

Caution

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

---

5. Install a power-cord strain-relief bracket **10** , if desired.
6. Plug the power cord into a properly grounded electrical outlet.

7. Make sure the Power switch **6** on the power supply is in the On position.
8. Verify that the DC Power light **8** and AC Power light **7** on the power supply are lit, indicating that the power supply is operating correctly.

Hot-Swap Power Supply Removal

Your server comes with one power supply. You can add a second power supply to provide redundant power. Each power supply has two status indicators; see "Power Supplies" on page 224 for information about the status indicators.

Attention

You cannot hot swap a power supply if your server has only one power supply installed.

Refer to the illustration in "Hot-Swap Power Supply Installation" on page 181 while you perform the steps in this procedure.

To remove a hot-swap power supply:

Caution

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

Hazardous voltage, current, and energy levels are present inside the power supplies, power backplane, and AC box. There are no serviceable parts inside the power supplies, power backplane, or AC box.

---

1. If your server has only one power supply installed, turn off the server and peripheral devices (see "Preparing to Install Options" on page 220); otherwise, go to the next step.

   Attention

   Before removing a functional power supply, set the Power switch on the power supply to the Off position.

   ---

2. Set the Power switch on the power supply that you are removing to the Off position.
3. Remove the power supply **4**:
   a. Remove the shipping screws **9** from the power supply, if they have not already been removed.

      Note

      You do not need to replace the shipping screws.

      ---

   b. Remove the power-cord strain-relief bracket **10**, if one is installed.

c. Grasp the handle **5** on the power supply and pull the handle toward the center of the server; then, slide the power supply out of the chassis.

> **Note**
>
> During normal operation, each power-supply bay should have either a power supply or filler panel installed for proper cooling.

4. If you are not installing a replacement power supply:
   a. Disconnect the power cord for the power supply that you replaced.
   b. Install a power-supply filler panel; then go to step 5.

   If you are replacing the power supply:
   a. Place the handle **5** on the power supply in the open position, and slide the power supply into the chassis.
   b. Gently close the handle **5** on the power supply to seat the power supply in the bay.
   c. Make sure the Power switch **6** on the power supply is in the On position.
   d. Verify that the AC Power light **7** and DC Power light **8** are lit, indicating that the power supply is operating correctly.

   ⚠️

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

   e. Install a power-cord strain-relief bracket **10**, if desired.

5. If you have other options to install or remove, do so now; otherwise, go to "Completing the Installation" on page 154.

Hot-Swap Fan Assembly

Your server comes with three hot-swap fan assemblies.

Attention:

Replace a fan that has failed within 48 hours to help ensure proper cooling.

> **Note**
>
> You do not need to turn off the power to the server to replace a hot-swap fan assembly.

The following illustration shows the replacement of a hot-swap fan assembly. Refer to this illustration while performing the steps in this procedure.
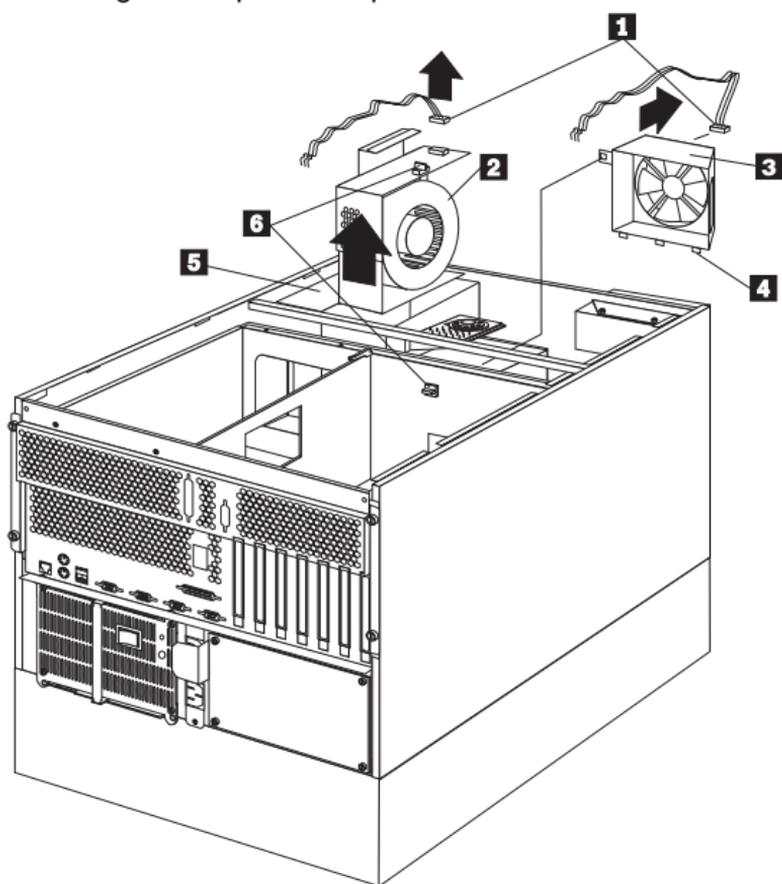
- **1** Fan power cables
- **2** Hot-swap fan assembly 2
- **3** Hot-swap fan assembly 1
- **4** Tabs
- **5** Hot-swap fan assembly 3
- **6** Quarter-turn fasteners

To replace a hot-swap fan assembly:

> **— Caution —**
>
> The power cable to the fan should be disconnected
> whenever the fan assembly is not installed in the
> server; otherwise, the fan might start turning while you
> are holding it and the fan blades could injure your
> fingers.

1. Remove the top cover (see "Top Cover Removal" on
   page 261).

   Attention:

   To ensure proper system cooling, the top cover
   should be removed for no more than 30 minutes
   during this procedure.

2. Determine which fan assembly **2** , **3** , or **5** needs
   to be replaced by checking the fan LEDs on the
   diagnostic panel (see "Diagnostics Panel LEDs" on
   page 164).

3. Disconnect the fan power cable **1** from the fan
   assembly that you are replacing.

4. Turn the quarter-turn fastener **6** for the fan
   assembly one quarter turn and remove the fan
   assembly from the server.

5. Slide the replacement fan assembly into the server.
   (If you are replacing fan assembly 1 **3** , make sure
   the tabs **4** fit into the slots at the bottom of the fan
   opening in the server.)

6. When you have the fan assembly correctly seated,
   turn the quarter-turn fastener **6** one quarter turn to
   secure the fan in the server.

7. Connect the fan power cable **1** to the power
   connector.

8. Replace the top cover (see "Installing the Top Cover"
   on page 155).

Information LED Panel

The information LED panel on the front of the server contains status lights.
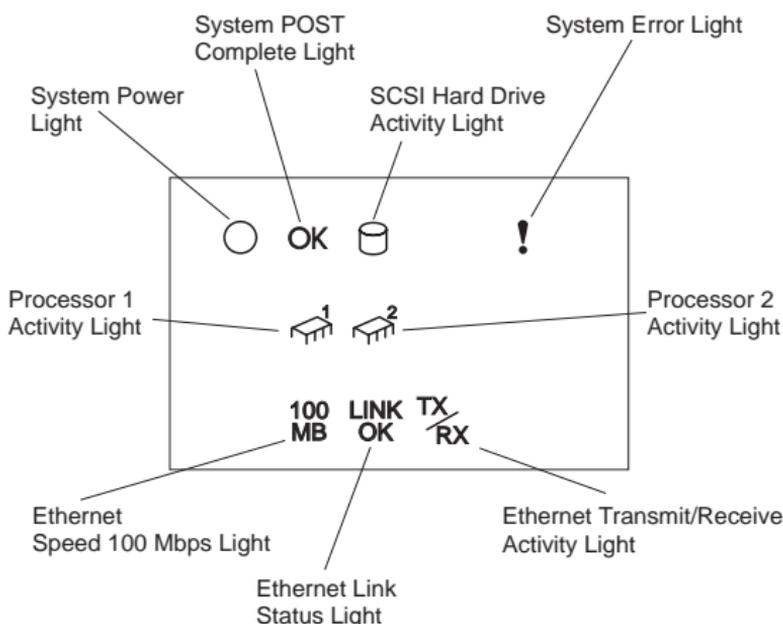
System Power Light: When this green light is lit, system power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and AC current is present). When this light is off, it indicates either power supply failure, an AC power failure, or a light failure.

- **Note**

  If this light is off, it does not mean there is no electrical current present in the server. The light might be burned out. To remove all electrical current from the server, you must unplug the server power cords from the electrical outlets.

System POST Complete Light: This green light is lit when the power-on self-test (POST) completes without any errors.

SCSI Hard Drive Activity Light: This green light is lit when there is activity on a hard drive.

System Error Light: This amber light is lit when a system error occurs. A light on the diagnostics LED panel will also be lit to further isolate the error. (For more information, see "Symptom-to-FRU Index" on page 263)

Processor 1 Activity Light: This green light is lit when there is activity on microprocessor 1 (the primary microprocessor).

Processor 2 Activity Light: This green light is lit when there is activity on microprocessor 2 (the secondary microprocessor).

Ethernet Speed 100 Mbps: When this green light is lit, the Ethernet speed is 100 Mbps.

Ethernet Link Status Light: When this green light is lit, there is an active connection on the Ethernet port.

Ethernet Transmit/Receive Activity Light: When this green light is lit, it indicates transmit or receive activity to or from the server.

Information Panel Cover Removal

Before you begin:

Read "Safety Information" on page 300.

To remove the information-panel cover, do the following:

1. Remove the door, see "Server Door and Trim Bezels Removal" on page 251.
2. Remove the information-panel cover.
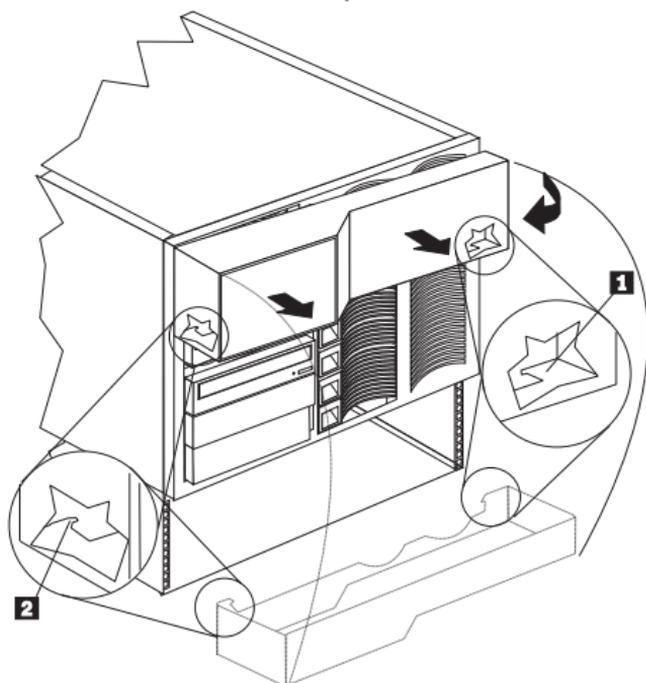
a. Place your fingers inside the right side of the cover
b. Move the end of the cover away from the right side of server until the latch tab **1** on the cover is released from the slot on the side of the server.
c. Lift up on the cover and pivot the right side of the cover away from the front of the server.
d. Move the cover to the left to release the left latch tab **2** and remove the cover from the server.

Information Panel LED Assembly Removal

Before you begin:

Read "Safety Information" on page 300.

To remove the information panel LED assembly, do the following:

1. Remove the server door and trim bezels, see "Server Door and Trim Bezels Removal" on page 251.
2. Remove the top cover, see "Top Cover Removal" on page 261.
3. Remove the side covers, see "Side Cover(s) Removal" on page 253.
4. Remove the door assembly, see "Server Door and Trim Bezels Removal" on page 251.
5. Remove the information panel cover, see "Information Panel Cover Removal" on page 191.
6. Disconnect the information panel LED assembly cables.
7. Remove the information panel LED assembly.
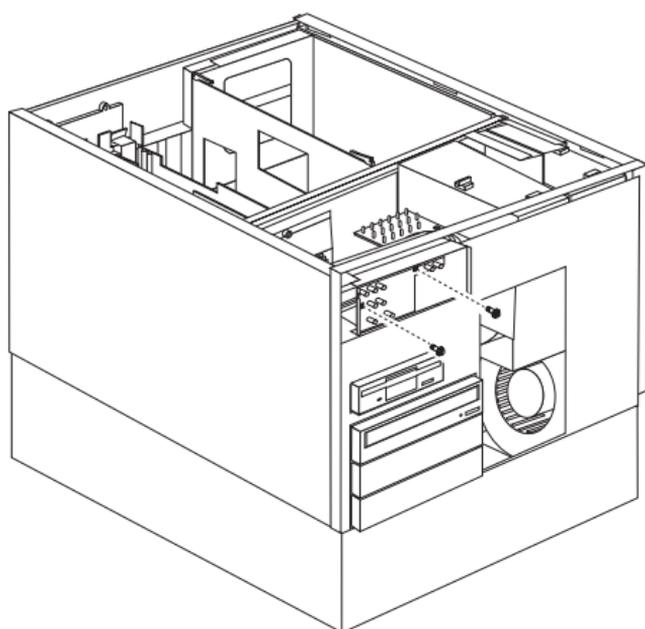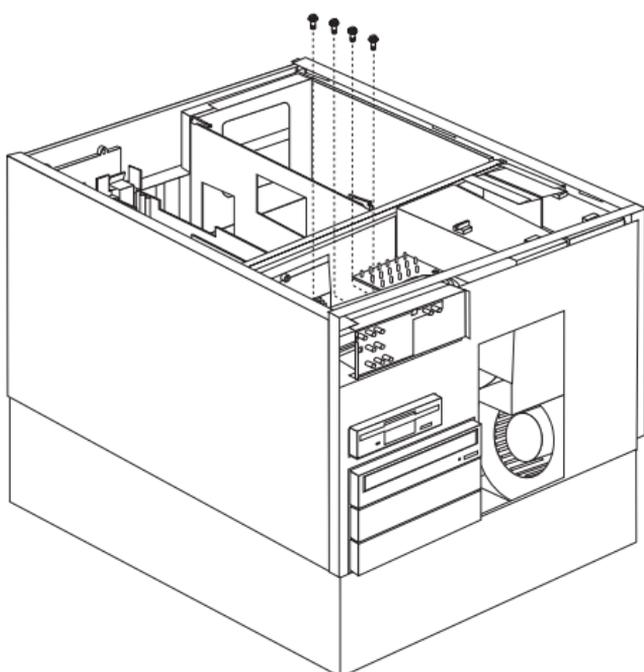
a. Remove the information panel LED assembly screws, then; remove the assembly.

Input/Output Connectors and Expansion Slots

The following illustration shows the expansion slots and the input/output connectors (ports) on the rear of the server.
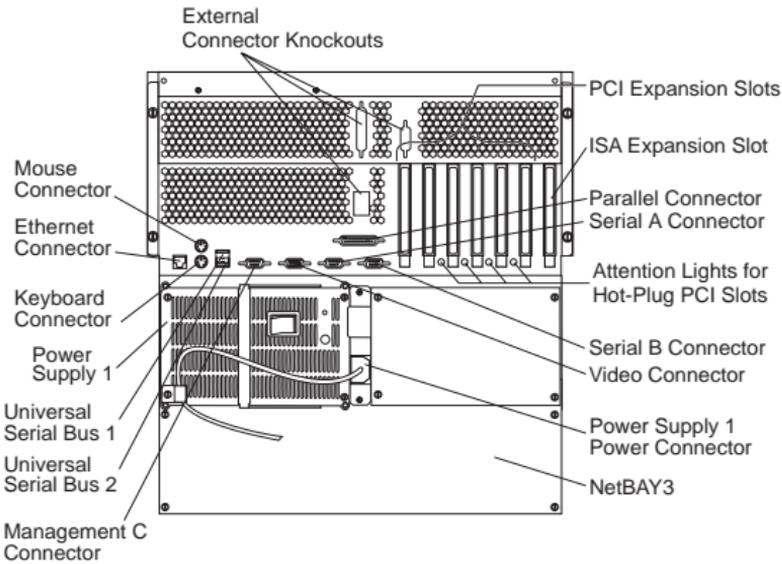
Keyboard Connector: The keyboard cable connects here.

Mouse Connector: The mouse cable connects here. This port sometimes is called an auxiliary-device or pointing-device port.

Serial Connectors: Serial signal cables for modems and other serial devices connect here to the two 9-pin serial connectors, ports A and B. See "Devices and I/O Ports" on page 92 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.

Video Connector: The monitor signal cable connects here.

NetBAY3: The tower model of the Netfinity 5500 comes with a NetBAY3 attached. You can install devices, such as the IBM EXP10 or a power distribution unit, in the NetBAY3. Refer to "Installing Devices in the NetBAY3" for more information.

Management C Connector: This connector is used to attach a modem that is dedicated to communication with the system management processor.

Parallel Connector: A signal cable for a parallel device, such as a printer connects here.

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.

Ethernet Connector: Your server has one RJ-45 Ethernet connector. This connector is for attachment of the network to the integrated 10BASE-T or 100BASE-TX, twisted-pair transceiver.

Expansion Slots: Your server has one industry standard architecture (ISA) expansion slot and six peripheral component interconnect (PCI) expansion slots. Four of the PCI slots support hot-plug PCI adapters.

You can install PCI or ISA adapters. Many adapters provide bus-master capabilities, which enable the adapters to perform operations without interrupting the system microprocessors.

Attention Lights for Hot-Plug PCI Slots: Each hot-plug PCI slot has an Attention light that is visible from the rear of the server. An Attention light flashes approximately once per second when it is on. The meaning of the Attention lights is defined by your operating system. Refer to your operating system documentation to determine if it supports hot-plug PCI adapters and, if so, what the Attention lights indicate.

Power Connector: The power cord for power supply 1 connects here. (The power connector for the additional optional power supply is covered by the filler panel.)

External Connector Knockout: Your server has three external connector knockouts that can be used when you install options, such as the external SCSI cable option.

Note

For pin assignments and other details about these connectors, see "External Options" on page 165.

Interior LED and Speaker Assembly

Before you begin:

Read "Safety Information" on page 300.

To remove the interior LED and speaker assembly (diagnostic LEDs), do the following:

1. Remove the top cover, see "Top Cover Removal" on page 261
2. Disconnect the cables attached to interior LED and speaker assembly.
3. Remove the interior LED and speaker assembly.
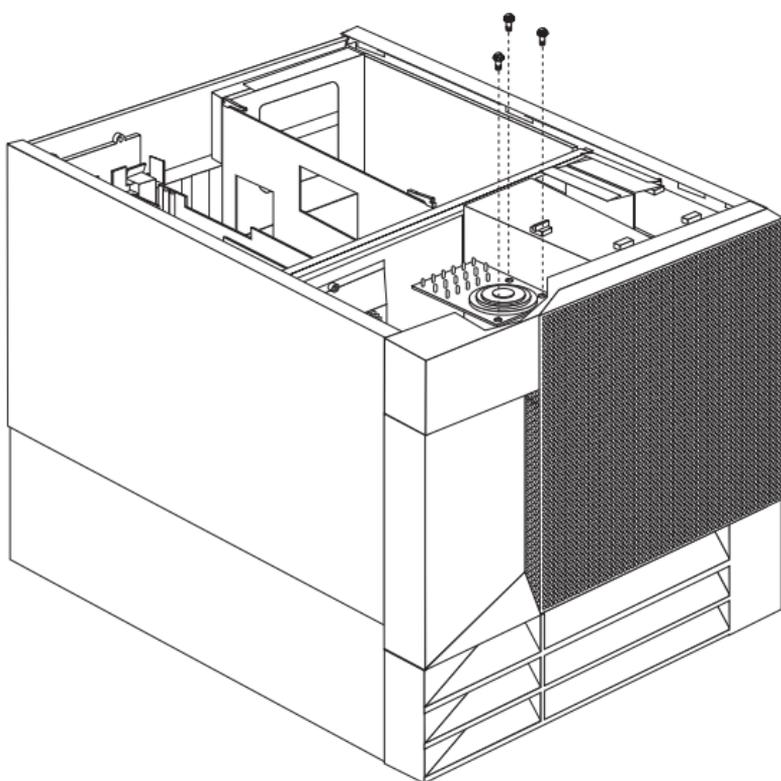
a. Remove the interior LED and speaker assembly mounting screws. then; remove the interior LED and speaker assembly.

Internal Drive Installation

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
- Tape

Internal Drive Bays: Internal drives are installed in *bays*. Your server comes with one 3.5-inch, 1.44 MB diskette drive and one CD-ROM drive.
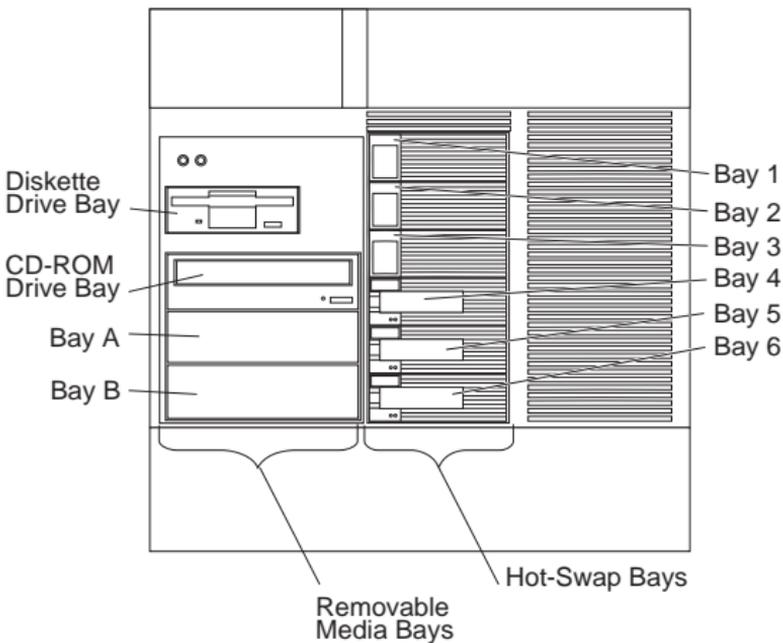
Your server contains hardware that lets you replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swappable* drives. They are also referred to as hot-swap drives.

Each hot-swap drive bay has two indicator lights on the front of the server (see "Information LED Panel" on page 189). If the amber Hard Disk Status light for a drive is lit continuously, that individual drive is faulty and needs to be replaced. When the Hard Disk Status light indicates a drive fault, 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 IDE CD-ROM drive.

- Bays A and B come without a device installed. These bays are for 5.25-inch, half-high, removable-media drives, such as tape backup drives. Bays A and B can be combined into a single full-high bay.
- The Netfinity 5500 supports only one diskette drive.
- Your server does not support hard disk drives in bays A and B because of cooling considerations.

> **Note**
>
> The server's EMI integrity and cooling are both protected by having the left front bays (removable-media bays) covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

- If you are installing a device with a 50-pin connector in one of the removable-media bays (bays A–B), you need a 68-pin to 50-pin converter.
- Your server supports six slim (1-inch) or three half-high (1.6-inch), 3.5-inch hot-swap hard disk drives in the hot-swap bays.
- The hot-swap bays connect to a SCSI *backplane*. This backplane is the printed circuit board behind the bay. The backplane supports up to six hard disk drives.
- The diskette drive uses 1 MB and 2 MB diskettes. For optimum use, format 1 MB diskettes to 720 KB and format 2 MB diskettes to 1.44 MB.

SCSI Drives: Some drives have a special design called *small computer system interface*, or SCSI. This design allows you to attach multiple drives to a single SCSI channel.

> **Notes**
>
> 1. Any information about SCSI drives also applies to other SCSI devices, such as tape drives.
> 2. If you plan to install both internal and external SCSI devices, you must follow the instructions in "External Options" on page 165, 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 RAID SCSI controller on the system board. An additional 16-bit SCSI cable with connectors for optional devices in bays A and B connects to the second channel of the RAID controller. This cable has a terminator at the other end and is folded and restrained with a cable clamp to the bottom of your server between the open bays and the power supply area.

SCSI IDs: Each SCSI device that is connected to an individual channel of the RAID 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 two channels of the integrated RAID controller 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, according to the jumper settings on the SCSI backplanes. The server uses the hard disk drive SCSI IDs to send status information to the indicator lights above each hot-swap bay.

The SCSI backplane in the server supports up to six hot-swap bays. Table 8 shows the default SCSI IDs that the backplane assigns for hot-swap hard disk drives.

Table 8. Automatically Assigned SCSI IDs						
Bay	1	2	3	4	5	6
ID	0	1	2	3	4	5
Note: The default SCSI ID for the SCSI backplane is 15. The default SCSI ID for each channel of the RAID controller is 7.						

You can change the default ID addresses of the drives by changing the jumper settings on the SCSI backplane. See "SCSI Backplane Option Jumpers" on page 249. A simplified layout of the SCSI backplane is shown in "SCSI Backplane Component Locations" on page 248.

The processing sequence for SCSI devices is set through the ServeRAID Configuration Utility program. The sequence proceeds from the lowest SCSI ID to the highest (0 to 6, then 8 to 15 determined by the jumper settings).

Termination (Internal SCSI Devices): SCSI buses must be terminated at each end. The ends of the SCSI buses in your server are already terminated.

All the hot-swap drives in your server have automatic termination and the RAID controller provides termination at the other end of the SCSI bus.

If you install SCSI devices in the removable-media bays (bays A and B), you must disable the termination on the devices; the RAID controller is already terminated and the SCSI cable for devices in the removable-media drive bays has a terminator at the other end. For example, when you install a SCSI device in a removable-media drive bay (bay A or B), set its termination to Disable, because the SCSI cable is already terminated at the end.

Refer to the information that come with the SCSI device for instructions about setting device jumpers or switches that control termination.

Preinstallation Steps (All Bays): 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.

Before you begin:

- Read "Safety Information" on page 300.
- Read the documentation that comes with the internal drive.

---

1. Choose the bay in which you want to install the drive.
2. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive.
3. To install the drive, go to "Installing a 5.25-inch Removable-Media Drive" or "Installing a Drive in a Hot-Swap Bay" on page 203.

Installing a 5.25-inch Removable-Media Drive

Before you begin:

- Read "Safety Information" on page 300.
- Read the documentation that comes with your drive.
- Prepare the drive for installation (see "Preinstallation Steps (All Bays)").

Note

The server's EMI integrity and cooling are both protected by having the left front bays covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

Refer to the following illustrations while you perform the steps in this procedure.
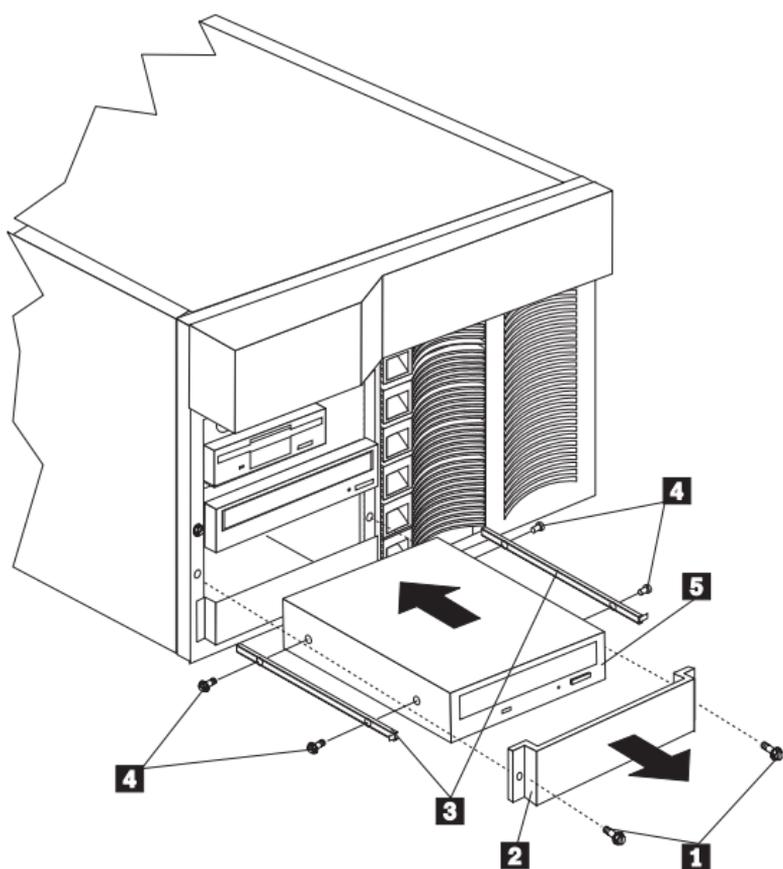
1 Screws for filler panel
2 Filler panel with EMI shield
3 Slide rails
4 Screws for slide rails
5 Drive
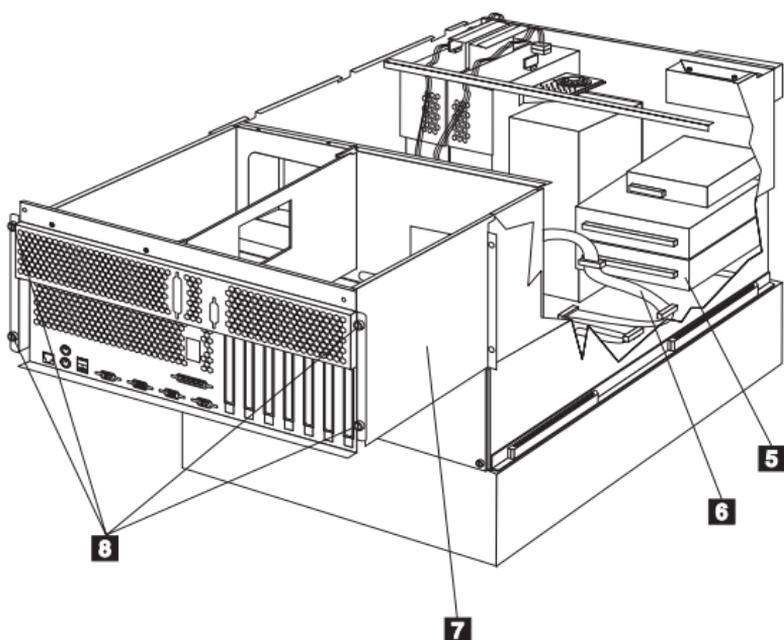
> 5 Drive
> 6 SCSI cable for the removable-media drive bays
> 7 Shuttle
> 8 Thumbscrews

To install a removable-media drive in one of the left front bays:

1. Turn off the server and peripheral devices (see "Preparing to Install Options" on page 220) and remove the top cover (see "Top Cover Removal" on page 261).
2. Remove the NetBAY3 bezel and the media-bay trim bezel. (See "Server Door and Trim Bezels Removal" on page 251.)
3. Remove the screws **1** and filler panel **2** from the bay opening. Save screws for later use in this procedure. You do not need the filler panel when you have a drive installed in the bay.
4. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag and place it on a static-protective surface.
5. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
6. Use screws **4** of the appropriate size and length to attach a slide rail **3** to each side of the drive **5** .

   - **Note** -

   The slide rails and screws are included in the drive accessory kit that comes with your server.

7. Place the drive so that the slide rails engage in the bay guide rails. Push the drive into the bay and attach it with the two screws **1** from the filler panel.
8. Loosen the four thumbscrews **8** on the shuttle at the back of the server.

9. Pull the shuttle **7** toward the back of the server.

10. Connect one of the connectors on the SCSI cable for the removable-media drive bays **6** to the back of the drive **5**.

11. Connect a power cable to the back of the drive. Power cables for removable-media drives come installed in your server. The connectors are keyed and can be inserted only one way.

12. If you are installing another 5.25-inch drive, do so at this time. Otherwise, continue with the next step.

13. Push the shuttle **7** toward the front of the server and tighten the four thumbscrews **8** at the back of the shuttle.

14. Install the media-bay trim bezel and the NetBAY3 bezel that you removed earlier. (See "Installing the Trim Bezels and Server Door" on page 156)

15. If you have other options to install or remove, do so now; otherwise, go to "Completing the Installation" on page 154.

Installing a Drive in a Hot-Swap Bay: The bays on the right front of the server support hot-swap drives only.

- **Note**

  You do not have to turn off the server to install hot-swap drives in these bays. However, you must turn off the server when performing any steps that involve installing or removing cables.

- **Before you begin:**

  - Read "Safety Information" on page 300.
  - Read the documentation that comes with your drive.
  - Reviewed "ServeRAID Configuration Program" on page 74. for information about the RAID controller and disk-array configuration.
  - Prepare the drive for installation (see "Preinstallation Steps (All Bays)" on page 200).

Refer to the following illustration while you perform the steps in this procedure.
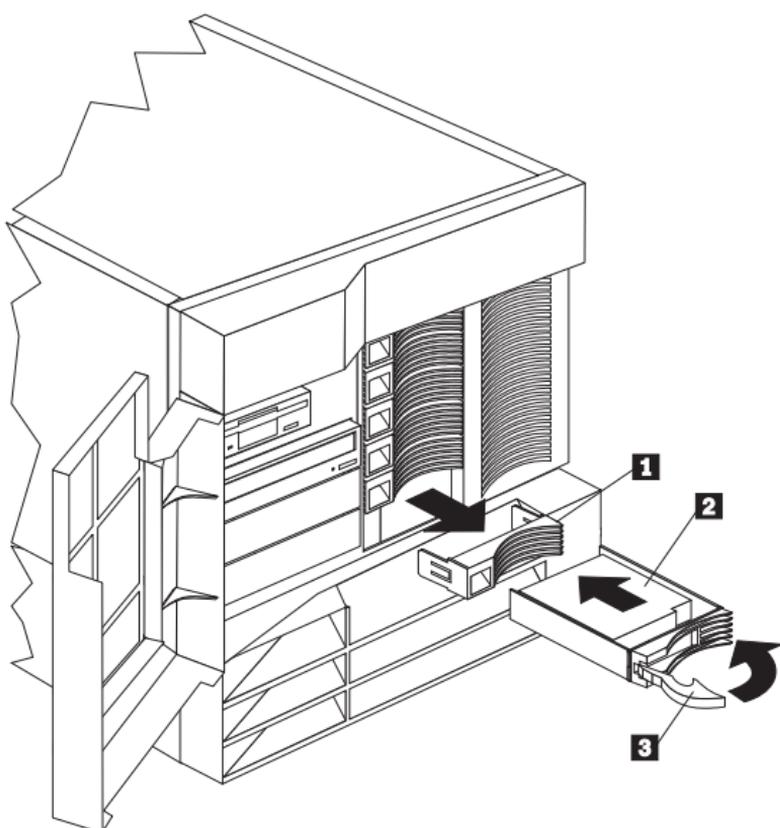
1 Filler panel
2 Hot-swap hard disk drive
3 Drive tray handle (open position)

To install a drive in a hot-swap bay:

1. Unlock and open the server door (see "Preparing to Install Options" on page 220).

   Attention:

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

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

3. Install the hard disk drive **2** in the hot-swap bay:
   a. Ensure the tray handle **3** is open (that is, perpendicular to the drive).
   b. Align the drive/tray assembly so that it engages the guide rails in the bay.
   c. Gently push the drive assembly into the bay until the drive connects to the backplane.
   d. Push the tray handle to the right until it locks.

4. Check the hard disk drive status indicators to verify that the hard disk drives are operating properly.

5. Close and lock the server door.

Replacing a Drive in a Hot-Swap Bay

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

1 Hard disk drive
2 Drive tray handle (open position)
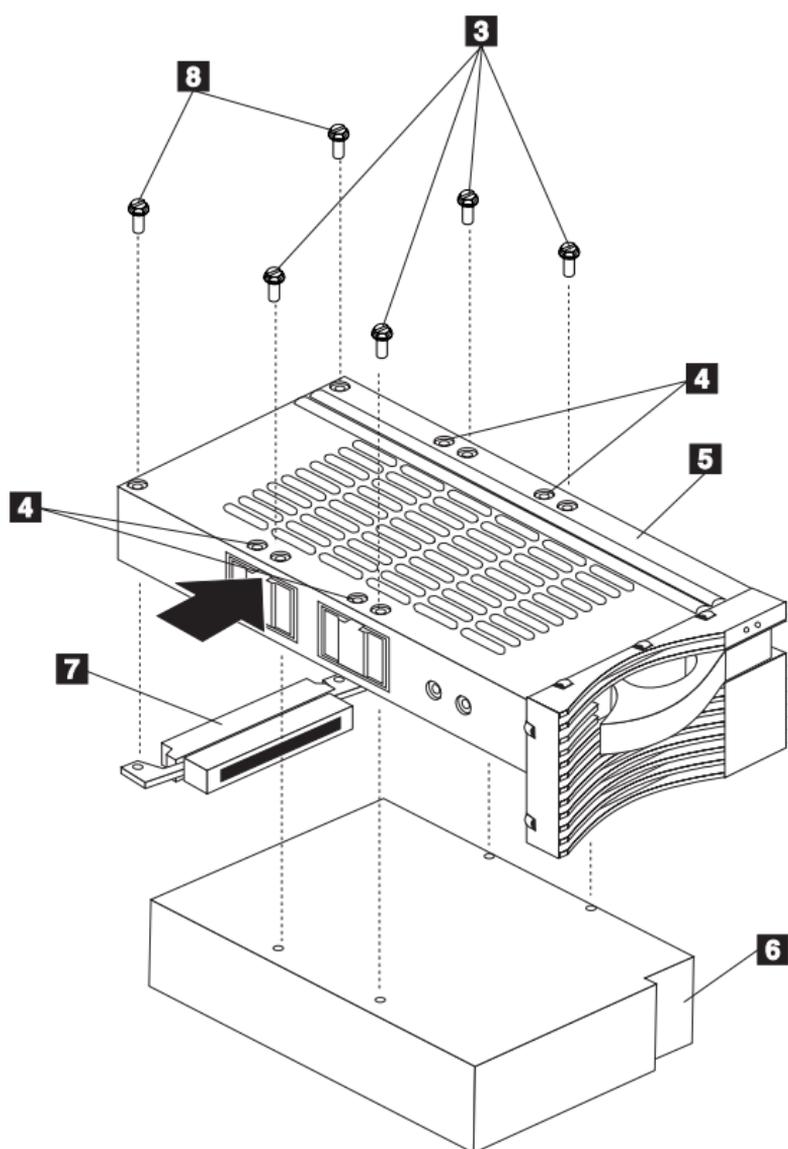
3 Screws for half-high drive
4 Screw holes for slim-high drive
5 Drive tray
6 Drive
7 Connector for half-high drive
8 Screws for half-high drive connector

To replace a drive in a hot-swap bay:

1. Unlock and open the server door (see "Preparing to Install Options" on page 220).

   Attention:

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

2. Remove the defective hard disk drive 1 by placing the handle 2 on the drive to the open position (perpendicular to the drive) and pulling the hot-swap tray from the bay.

3. Remove the hard disk drive from the tray:
   a. If the drive is a half-high drive, remove the two screws 8 that hold the connector 7 to the

hot-swap tray **5** ; then, remove the connector from the back of the drive.

   b. Remove the four screws **3** (for a half-high drive) or **4** (for a slim-high drive) that attach the drive **6** to the hot-swap tray, and remove the drive from the tray.

4. Place the new hard disk drive on the hot-swap tray and attach the drive to the tray using four screws, as follows:

   a. If the drive is a half-high drive, use screws **3** to attach the drive to the tray. If the drive is a slim-high drive, use screws in holes **4** to attach the drive to the tray.

   b. As you tighten each screw, press on the metal spring nearest the screw at the point indicated by the arrow on the illustration.

   c. If the drive is a half-high drive, plug the connector **7** to the back of the drive and secure the connector to the drive with screws **8** . (Slim-high drives do not need the connector.)

5. Install the hard disk drive in the hot-swap bay:

   a. Ensure the tray handle is open (that is, perpendicular to the drive).

   b. Align the drive/tray assembly so that it engages the guide rails in the bay.

   c. Push the drive assembly into the bay until the drive connects to the backplane.

   d. Push the tray handle to the right until it locks.

6. Check the hard disk drive status indicators to verify that the hard disk drive is installed properly.

7. Close and lock the server door.

Installing Devices in the NetBAY3

This appendix contains information about installing devices in the NetBAY3.

> **Note**
>
> The illustrations in this appendix do not show the server on top of the NetBAY3, however, you do not need to remove the NetBAY3 to install devices.

General Considerations: You can install three types of devices in the NetBAY3:

- Devices, such as the IBM EXP10, that sit on side rails
- Cantilevered devices, such as a power distribution unit (PDU), that are screwed to the front or rear of the NetBAY3
- Devices that sit on the NetBAY3 base plate

> **Notes**
>
> 1. To allow the NetBAY3 front bezel to close, devices with handles must not protrude out more than 56 cm (2.2 in.). The following illustration of the front bezel top-view cross section shows the clearances.
> 2. All device cables must exit from the rear of the NetBAY3.

56 mm (2.2 in.)

30 mm (1.2 in.)
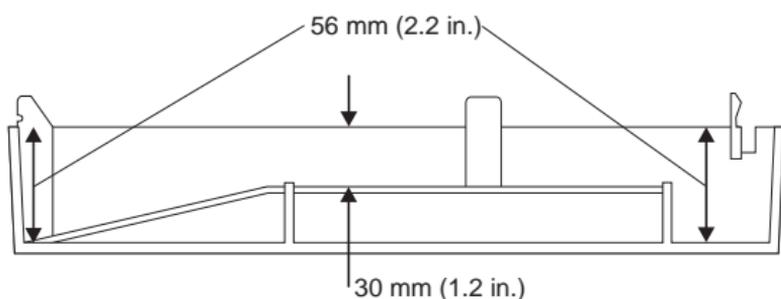
Removing the Rear Panel

> **Note**
>
> Do not remove the rear panel if you are not installing
> a device in the NetBAY3.

1. Remove the NetBAY3 rear panel.
   a. Remove the four screws.
   b. Lift the rear panel off.
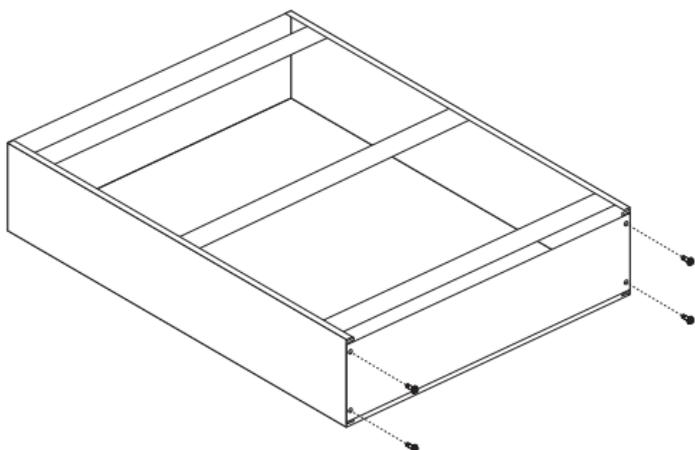
2. After you remove the rear panel, do one of the
   following:
   - Install a device on rails in the NetBAY3. (Go to
     "Installing Devices on Side Rails.")
   - Install a cantilevered device in the NetBAY3.
     (Go to "Installing Cantilevered Devices" on
     page 212.)
   - Install a device on the NetBAY3 base plate. (Go
     to "Installing Devices on the NetBAY3 Base
     Plate" on page 213.)

Installing Devices on Side Rails: Installing
devices that sit on side rails in a NetBAY3 is similar to
installing these devices in a rack enclosure. The device
side rails must be screwed to the NetBAY3 vertical
mounting rails. Follow the instructions in the
documentation that comes with the device and use the
following illustrations as a guide.

If you need to remove or move the cage nuts at the rear of
the NetBAY3 to hold the rails, go to "Removing Cage Nuts"
on page 211.
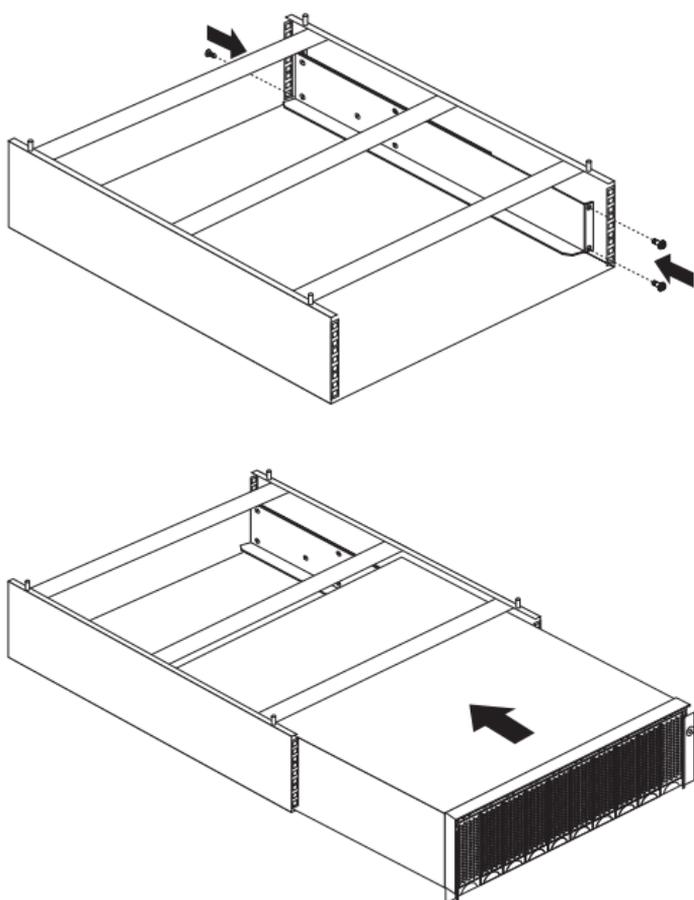
Removing Cage Nuts: Device installation might require the removal or moving of the rear-pane cage nuts. If you need to move the cage nuts, follow this procedure to move them and then go to "Installing Cage Nuts" on page 212 to install them in the correct position.

1. Hold the cage nut in place and compress the cage-nut clip with a flat screwdriver blade.
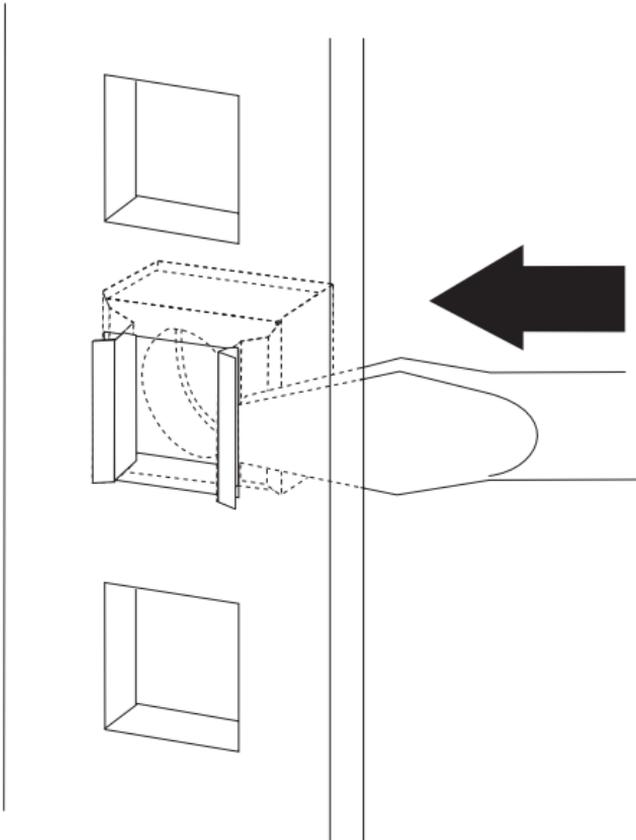
2. With the cage nut-clip compressed, push the cage nut-clip out of the square hole.
3. Release the screwdriver pressure on the clip. The cage nut is now loose and can be removed from the square hole.

Installing Cage Nuts: The nuts go toward the inside of the NetBAY3. Make sure you install all the cage nuts at the same level on the mounting rails.

1. Hook one side of the cage-nut clip into the rack-mounting-rail square hole.
2. Hold the cage nut in place and compress the cage-nut clip with a flat screwdriver blade.
3. With the cage-nut clip compressed, push the cage-nut clip into the square hole.
4. Release the screwdriver pressure on the clip. The cage nut is now locked in the square hole.

5i topmar=1p.

Installing Cantilevered Devices: Installing cantilevered devices in a NetBAY3 is similar to installing these devices in a rack enclosure. Cantilevered devices can be installed in the front or rear of the NetBAY3. The devices must be screwed to the NetBAY3 vertical mounting rails. Follow the instructions in the documentation that comes with the device and use the following figure as a guide.
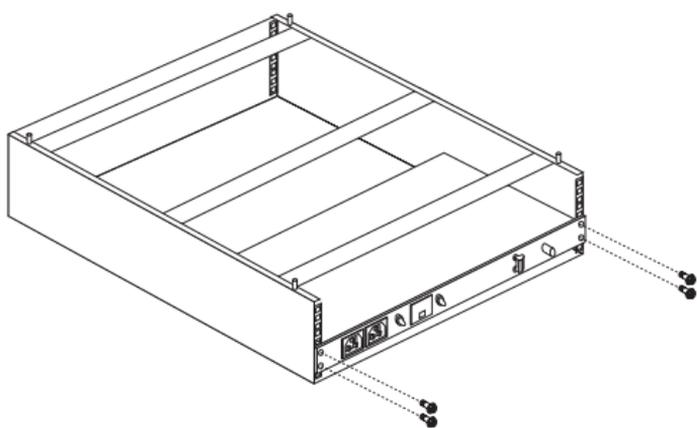
Installing Devices on the NetBAY3 Base Plate:
Some devices rest on the NetBAY3 base plate. These devices must be screwed to the NetBAY3 vertical mounting rails.
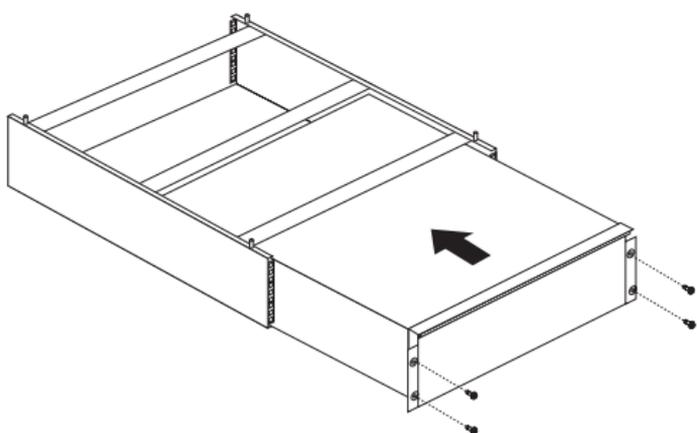
Memory-Module Kits

- **Note**

  If installing a 256MB Registered memory module in your server, ensure the jumper is installed on pins 2 and 3 of Jumper Block J12 on the processor board.

Adding memory to your server is an easy way to make programs run faster. You can increase the amount of memory in your server by installing options called *memory-module kits*. Each kit contains one industry-standard, dual-inline memory module (DIMM). Your server uses a noninterleaved memory configuration.

Your server comes with a memory-module installed in connector J1, the connector nearest the rear of the server. Install additional memory modules in connectors J2, J3, and J4, in that order. If you mix DIMM sizes, install the largest sized DIMM in connector J1, the next largest sized DIMM in connector J2, and so forth.

- **Notes**

  1. The memory-module kit sizes available for your server are 64 MB, 128 MB, and 256 MB. Your server supports a minimum of 128 MB and a maximum of 1 GB of system memory.
  2. Install only 3.3 V, 168-pin, 8-byte DIMMs. Only 100 MHz, 72-bit, unbuffered, synchronous, error correcting code (ECC), x8 configuration DIMM memory is supported for the 64 MB and 128 MB DIMMs. Only 100 MHz, 72-bit, registered, synchronous, ECC, x4 configuration DIMM memory is supported for the 256 MB DIMMs.
  3. Mixing of DIMM types (registered and unbuffered) is not supported. You can install 64 MB unbuffered and 128 MB unbuffered DIMMs in the same system, but neither 64 MB unbuffered nor 128 MB unbuffered DIMMs can be installed in a system with 256 MB registered DIMMs.
  4. Installing or removing memory modules changes the configuration information in the server. Therefore, after installing or removing a DIMM, save the new configuration information in the Configuration/Setup program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup program and select **Save Settings.** See "Using the Configuration/Setup Utility Main Menu" on page 91 for more information.

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

- **Note** -

The illustration shows only the processor board for simplicity; you do not need to remove the processor board to install a memory module.
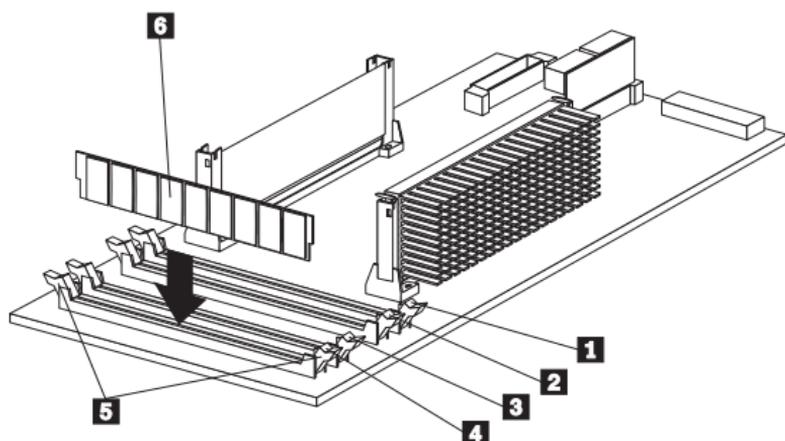
1 Memory socket (Bank) 1 (J4)
2 Memory socket (Bank) 2 (J3)
3 Memory socket (Bank) 3 (J2)
4 Memory socket (Bank) 4 (J1)
5 Retaining clips
6 DIMM

- **Before you begin:** -

- Read "Safety Information" on page 300.
- Read the documentation that comes with your option.

To install a memory module:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see "Preparing to Install Options" on page 220); then remove the top cover (see "Top Cover Removal" on page 261).
2. Locate the memory-module connectors on the memory board.
3. Touch the static-protective package containing the memory-module kit to any unpainted metal surface on the server. Then, remove the memory module from the package.
4. Install the memory module:

- **Note** -

To avoid breaking the retaining clips or damaging the memory-module connectors, handle the clips gently.

a. Locate the lowest-numbered, empty memory-module connector on the processor board.

b. Turn the memory module (DIMM) **6** so that the pins align correctly with the connector **4**.

c. Insert the DIMM into the connector by pressing on one edge of the DIMM and then on the other edge of the DIMM. Be sure to press straight into the connector.

d. Repeat the preceding step to make sure the DIMM is seated correctly.

e. Make sure the retaining clips **5** are in the closed position.

f. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

g. Repeat these steps for each memory module that you install.

5. If you have other options to install or remove, do so now; otherwise, go to "Completing the Installation" on page 154.

Microprocessor Kit

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

Before you begin:

- Read "Safety Information" on page 300.
- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server basic input/output system (BIOS). The latest level of BIOS for your server is available through the World Wide Web and the IBM Bulletin Board System (BBS). See "Online Support" on page iv for the appropriate World Wide Web addresses and bulletin-board telephone numbers.
- Obtain an SMP-capable operating system (optional). For a list of supported operating systems, see http://www.pc.ibm.com/us/compat/ on the World Wide Web.

Notes:

1. The illustrations in this section might differ slightly from your hardware.
2. To avoid damage and ensure proper server operation when you install a new or additional microprocessor, use the same speed and voltage as those of the currently installed microprocessor. Microprocessor internal and external clock frequencies must be identical.
3. The microprocessor that is installed in the primary microprocessor connector is CPU or processor 1. If a microprocessor is installed in the secondary microprocessor connector, it is CPU or processor 2. If the server has only one microprocessor installed, that microprocessor is installed in the primary microprocessor connector and is the boot processor. If the server has two microprocessors installed, the microprocessor in the secondary microprocessor connector is the boot processor and the microprocessor in the primary microprocessor connector is the application processor.

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

Note

The illustration shows only the processor board for simplicity; you do not need to remove the processor board to install a microprocessor kit.

---
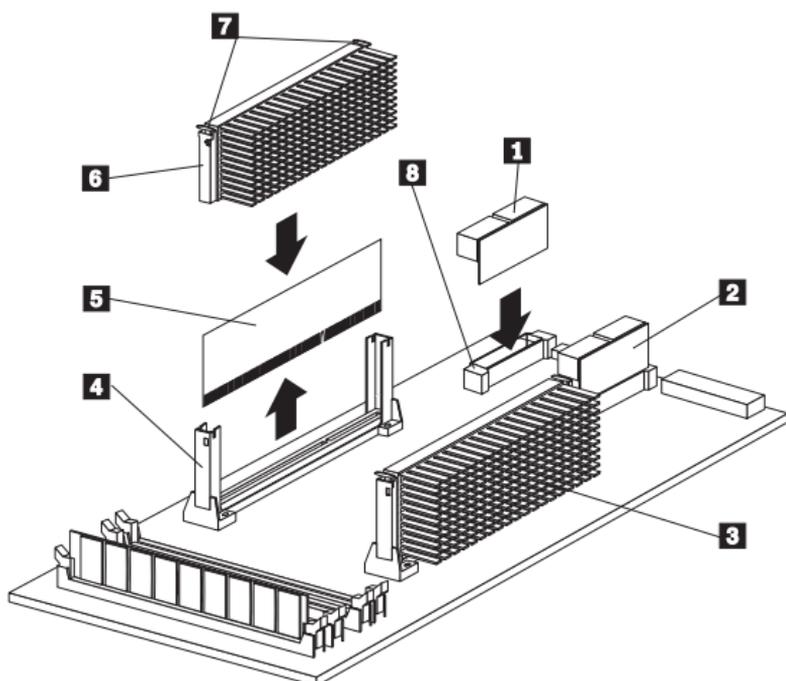
1 Voltage regulator module (VRM) for secondary microprocessor
2 VRM for primary microprocessor
3 Primary microprocessor (CPU or processor 1)
4 Secondary microprocessor connector
5 Terminator card
6 Secondary microprocessor (CPU or processor 2)
7 Latches
8 Connector for VRM for secondary microprocessor

To install an additional microprocessor kit:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see "Preparing to Install Options" on page 220); then remove the top cover (see "Top Cover Removal" on page 261).
2. Remove the terminator card 5 from the secondary microprocessor connector 4 . You do not need the terminator card when you have a second microprocessor installed. You can store it in a safe place in the static-protective package that your new microprocessor is shipped in.
3. Install the microprocessor:
    a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

b. Center the microprocessor **6** over the secondary connector **4** .

> **— Attention —**
>
> Make sure the microprocessor is oriented and aligned correctly before you try to press it into the connector.

c. Press in on the latches **7** and carefully insert the microprocessor into the connector.
d. Press outward on the latches **7** to lock the microprocessor in place.

> **— Note —**
>
> To remove the microprocessor, press in on the latches **7** and lift the microprocessor out of the connector.

4. Install the voltage regulator module (VRM) **1** included in the microprocessor kit in the secondary VRM connector **8** .

> **— Note —**
>
> If you remove the secondary microprocessor at some time in the future, remember to install the terminator card in the secondary microprocessor connector and to remove the VRM for the secondary microprocessor.

5. If you have other options to install or remove, do so now; otherwise, go to "Completing the Installation" on page 154.

Preparing to Install Options

> **Before you begin:**
>
> Read "Safety Information" on page 300.

> **Note**
>
> You do not need to turn the server off to work with hot-plug or hot-swap devices, such as hot-plug PCI adapters, and hot-swap hard disk drives.

If you are:

- Installing or removing a hot-plug PCI adapter, go to "Adapters" on page 142.
- Installing or replacing a hot-swap hard disk drive, go to "Internal Drive Installation" on page 197.
- Installing or replacing a hot-swap power supply, go to "Hot-Swap Power Supply Installation" on page 181.
- Removing a hot-swap power supply, go to "Hot-Swap Power Supply Removal" on page 185.
- Replacing a hot-swap fan, go to "Hot-Swap Fan Assembly" on page 187.
- Installing or removing an option not listed in the preceding list, continue with the following steps.

1. Unlock and open the server door.

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

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

> **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.

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

4. Unplug all power cords (cables) from electrical outlets.
5. Note the location of the remaining cables and cords; then disconnect them from the back of the server.

⚠

Caution

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

Go to "Top Cover Removal" on page 261.

Power Backplane Removal

Before you begin:

Read "Safety Information" on page 300.

To remove the power backplane, to the following
1. Remove the top cover (see "Top Cover Removal" on page 261).
2. To access the power backplane cables, slide the shuttle to the rear of the system, see "Shuttle Removal" on page 252.
3. Disconnect the power backplane cables.
4. Remove the power backplane cover.
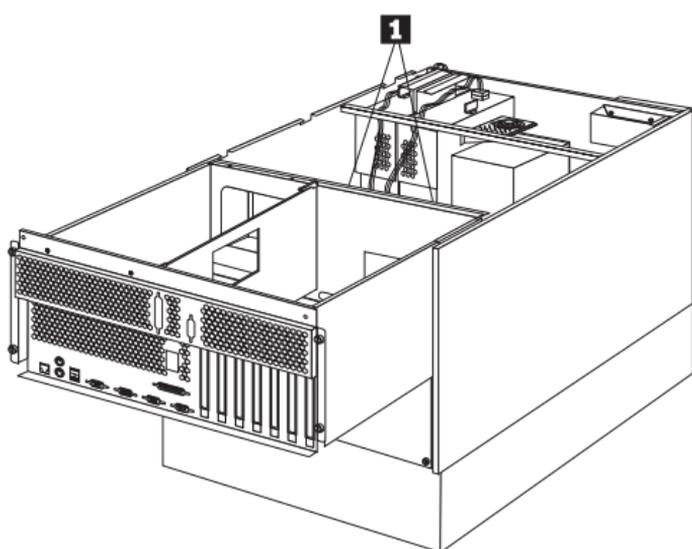
a. Remove the power backplane cover screws **1**.
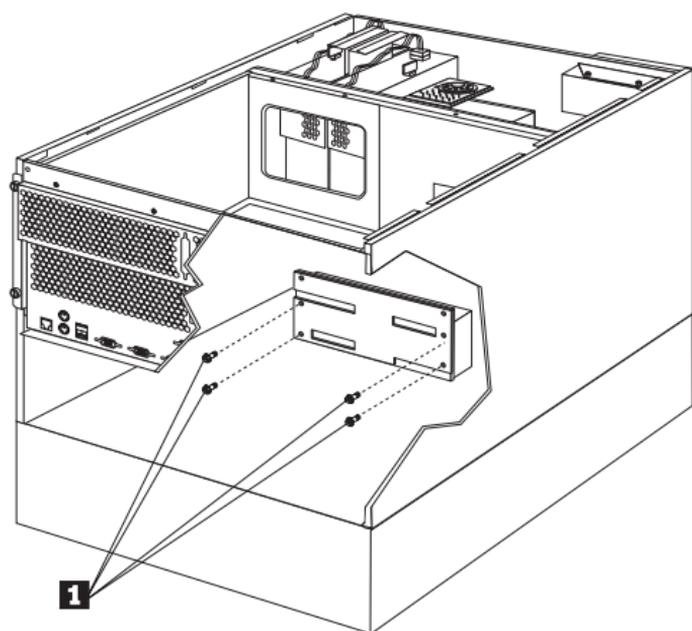
b. Remove the power backplane cover screws **1**, then; remove the power backplane cover.

c.
5. Remove the power backplane.
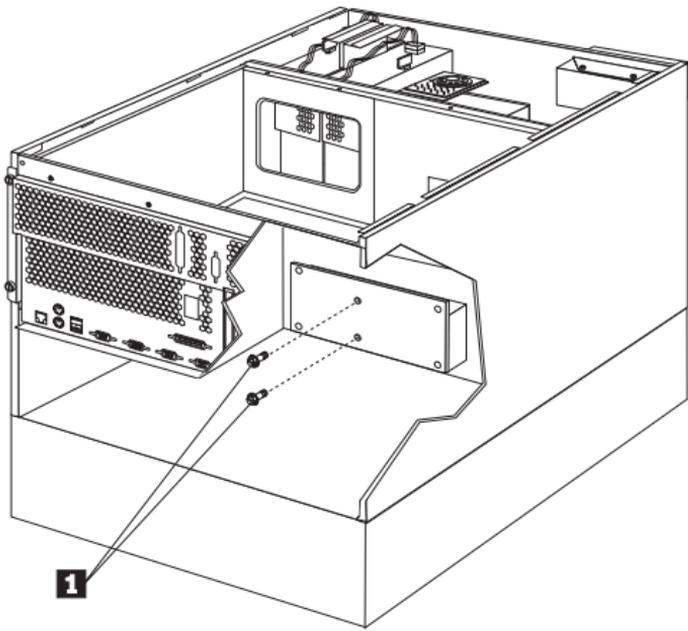
a. Remove the power backplane screws **1** , then; remove the power backplane.

Power Supplies

The following illustration shows the power supplies on your server.

AC Power Light

Power Supply 1

Power Supply
Power Switch

DC Power Light

Power Supply 1
Power Connector

Filler Panel
for Power Supply
Bay 2
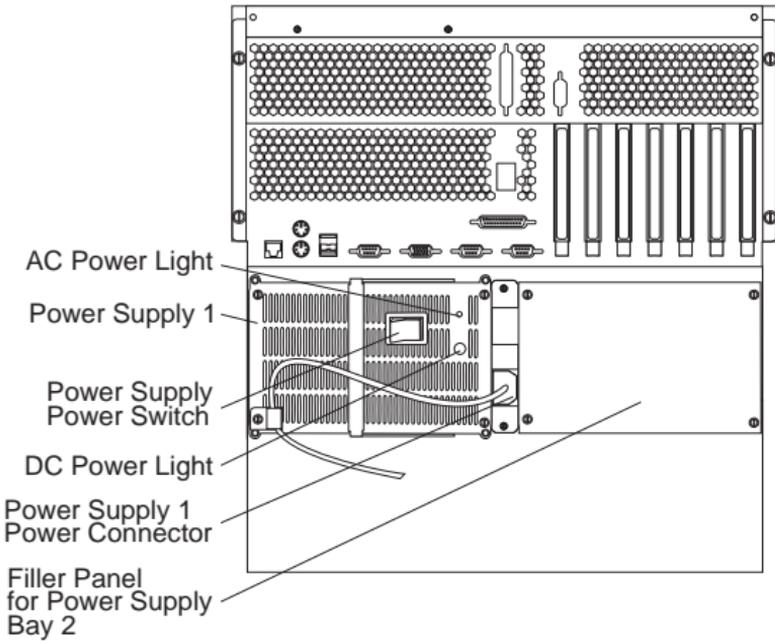
Hot-Swap Power Supplies: Your server comes with one hot-swap power supply installed. You can install a second hot-swap power supply to provide redundant power. You cannot hot swap a power supply if your server has only one power supply installed. (See "Hot-Swap Power Supply Installation" on page 181 for instructions.)

Power Switch: This switch turns the power supply on and off.

AC and DC Power Lights: These lights provide status information about the power supply. For normal operation, both lights should be on. For any other combination of lights, see "Symptom-to-FRU Index" on page 263 for more information.

Power Supply Filler Plate

> **Before you begin:**
>
> Read "Safety Information" on page 300.

To remove the power supply filler plate, do the following:
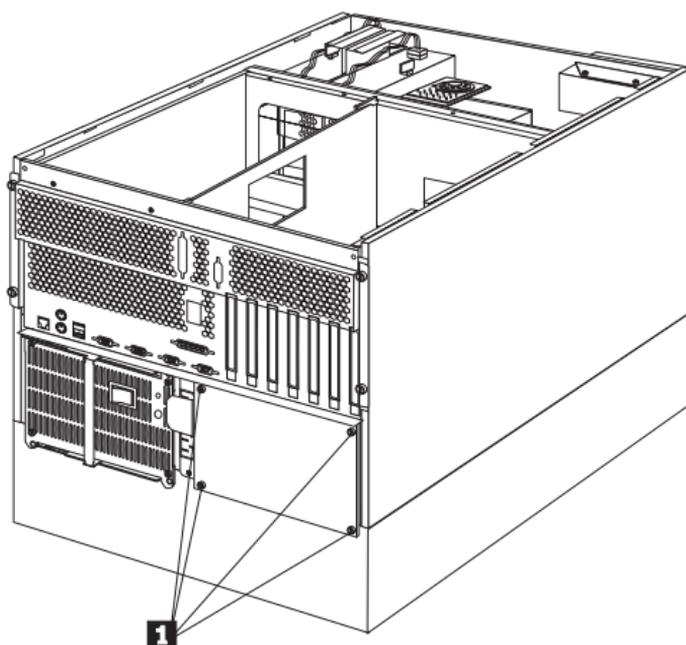
1. Remove the power supply filler plate screws **1**,
   then; remove the power supply filler plate.

NetBAY3 Bezel Installation

The NetBAY3 bezel is shipped, unattached, inside the NetBAY3.
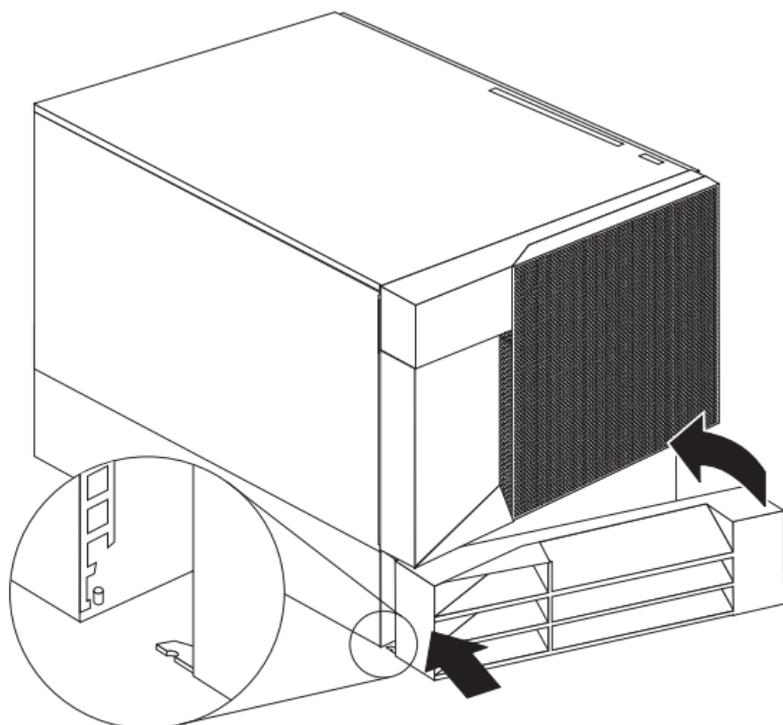
To install the NetBAY3 bezel:

1. Remove the package containing the NetBAY3 bezel and unpack the bezel.
2. Hook the tabs on the left side of the NetBAY3 bezel around the posts on the NetBAY3.
3. Gently push the right side of the bezel toward the server until the bezel snaps into place.
4. Lock the NetBAY3 bezel.

Processor Board Component Locations

A layout of the processor board is shown in the following illustration.
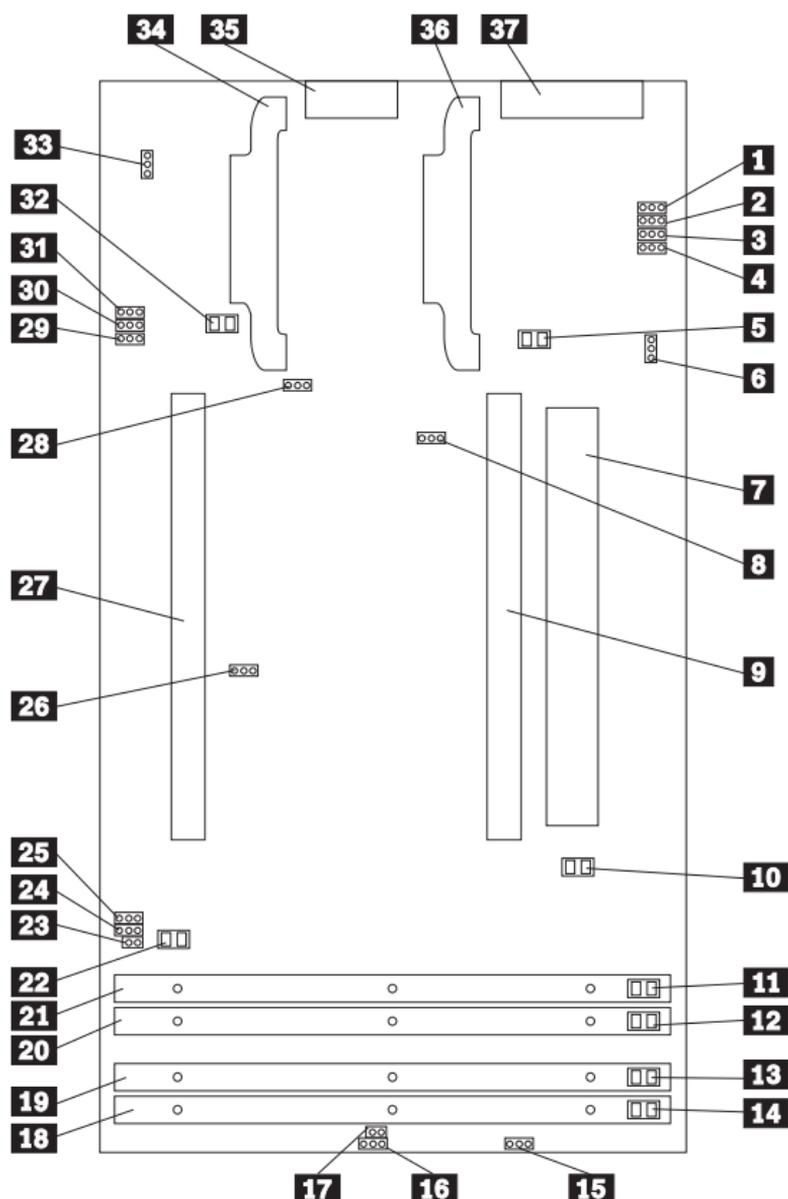
1 – **4** Microprocessor core-frequency-selection jumper block (J27–J30)

5 Primary microprocessor VRM error LED (CR17)

6 Reserved (J20)

7 System-board interface connector (J9) (on reverse side of processor board)

8 Reserved (J5)

9 Primary microprocessor card connector (U5)

10 Primary microprocessor error LED (CR12)

11 DIMM 1 error LED (CR8)

12 DIMM 2 error LED (CR9)

13 DIMM 3 error LED (CR10)

14 DIMM 4 error LED (CR11)

15 Reserved (J12)

16 Reserved (J13)

17 Reserved (J8)

18 DIMM socket 4 (J1)

19 DIMM socket 3 (J2)
 20 DIMM socket 2 (J3)
 21 DIMM socket 1 (J4)
 22 Secondary microprocessor error LED (CR13)
 23 Reserved (J7)
 24 Reserved (J24)
 25 Reserved (J6)
 26 Reserved (J16)
 27 Secondary microprocessor card connector (U6)
 28 Reset-system jumper block (J23)
 29 Reserved (J15)
 30 Reserved (J14)
 31 Reserved (J11)
 32 Secondary microprocessor VRM error LED
(CR19)
 33 Reserved (J18)
 34 Secondary microprocessor VRM connector
(U22)
 35 Power control connector (J17)
 36 Primary microprocessor VRM connector (U15)
 37 Power supply connector (J10)

Processor Board Jumpers

Table 9 contains the names and descriptions of the jumper blocks located on the processor board. The highlighted numbers in the table refer to the highlighted numbers in the illustration in "Processor Board Component Locations" on page 227.

Notes

1. Turn off the server, and disconnect the power cords before moving any jumpers.
2. Be sure the microprocessor bus-to-core ratio is set correctly. For example, if you have a 350 MHz microprocessor installed and the system bus speed is 100 MHz (the default), be sure that the jumpers are set to a bus-to-core ratio of 3.5 (350/100). Refer to jumpers J27–J30 in Table 9 and Table 10 on page 230.

   MHz denotes internal clock speed of the microprocessor only; other factors also affect application performance.

Attention

If installing or changing to a different speed processor than the original processor, be sure to change the processor core-frequency selection jumpers on the processor board. If the microprocessor bus-to-core ratio is incorrect, system-board components will overheat and component damage might occur.

Table 9 (Page 1 of 2). Processor Board Jumpers

Jumper Name	Description
1 – **4** Microprocessor core frequency selection (J27–J30)	The default core/bus fraction is 3.5 (350/100 MHz). Jumpers are installed on pins 1 and 2 of J27 and J30; either jumpers are installed on pins 2 and 3 of J28 and J29 or no jumper is installed on J28 or J29.
	For the core/bus fraction 4 (400/100 MHz), the jumpers are installed on pins 1 and 2 of J28, J29, and J30; either a jumper is installed on pins 2 and 3 of J27 or no jumper is installed on J27.
	For the core/bus fraction 4.5 (450/100 MHz), jumpers are installed on pins 1 and 2 of J28 and J30; and either jumpers are installed on pins 2 and 3 of J27 and J29 or no jumpers are installed on J28 or J30.
8 J5 Reserved	The default position is a jumper on pins 1 and 2.
15 J12 SDRAM selection	If your server has unbuffered SDRAM, a jumper should be on pins 1 and 2. If your server has registered SDRAM, a jumper should be on pins 2 and 3.
16 J13 Reserved	The default position is a jumper on pins 1 and 2.
17 J8 Reserved	The default position is no jumper on J8.

Table 9 (Page 2 of 2). Processor Board Jumpers

Jumper Name	Description
23 J7 Reserved	The default position is a jumper on pins 1 and 2.
24 J24 Reserved	The default position is a jumper on pins 2 and 3.
25 J6 Reserved	The default position is a jumper on pins 1 and 2.
26 J16 Reserved	The default position is a jumper on pins 1 and 2.
28 J23 System reset	In normal operation, there is either a jumper on pins 2 and 3 of J23 or no jumper on J23. Installing a jumper on pins 1 and 2 of J23 forces the system into the reset state.
29 J15 Reserved	The default position is a jumper on pins 1 and 2.
30 J14 Reserved	The default position is a jumper on pins 2 and 3.
31 J11 Reserved	The default position is a jumper on pins 1 and 2.

Table 10. Microprocessor Core Frequency Selection

Core/Bus Ratio	J27 Jumper	J28 Jumper	J29 Jumper	J30 Jumper
350/100	Pins 1 and 2	Pins 2 and 3	Pins 2 and 3	Pins 1 and 2
400/100	Pins 2 and 3	Pins 1 and 2	Pins 1 and 2	Pins 1 and 2
450/100	Pins 2 and 3	Pins 1 and 2	Pins 2 and 3	Pins 1 and 2

Processor Board Removal

Before you begin:

Read "Safety Information" on page 300.

To remove the processor board, do the following.

1. Remove the top cover (see "Top Cover Removal" on page 261).
2. Disconnect all processor board cables.
3. Remove the processor board.
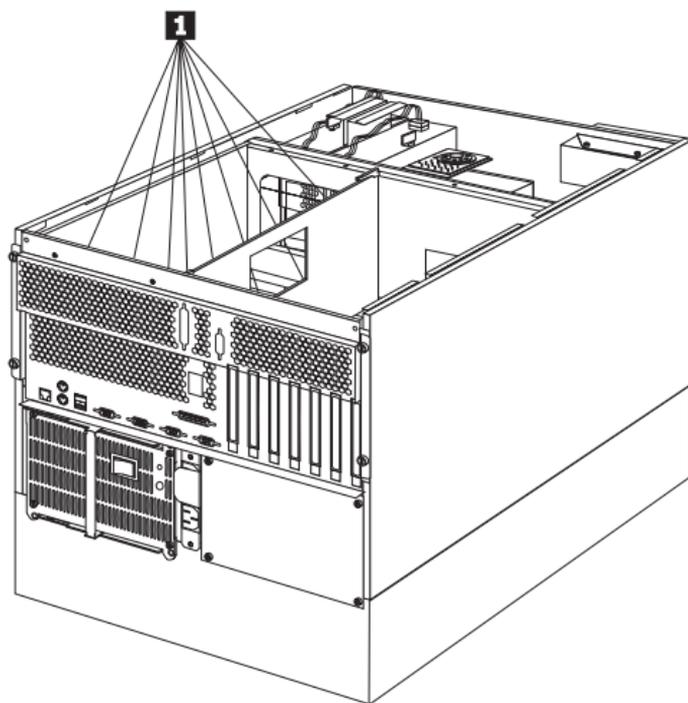
4. Remove the processor board screws **1**, then; lift the processor board out of the tray.

Rack Installation

Use the following information for installing a server in a rack and for removing a server from a rack.

Your server comes with all the rack installation hardware (rack model only). Review the preinstallation information in "Before You Begin"; then, continue with "Installing and Removing the Server."

12
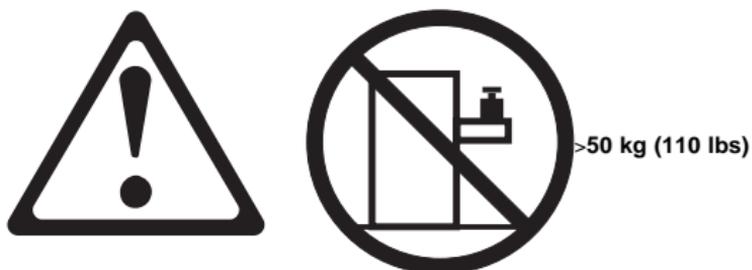
>50 kg (110 lbs)

> **Caution**
>
> Do not place any object weighing more than 50 kg (110 lbs) on top of the rack model of the server.

Before You Begin

- You will need the following items:
  - An assortment of small screwdrivers
  - 8-inch adjustable wrench or pliers

  Some of the installation procedures require three people.
- To ensure rack stability, plan the installation of servers in the rack starting from the bottom. For more information, refer to the IBM Netfinity Rack Configurator program provided with ServerGuide.
- Review the documentation that comes with your rack enclosure for safety or cabling considerations. Ensure that your planned installation is within the rack's guidelines for heat generation, electrical requirements, air flow, and mechanical loading.
- Verify that the rack can meet the operating parameters, as detailed in "Specifications" on page 75.

Installing and Removing the Server: During the installation procedure, you must install parts on the rack and the server. This process can be divided into two parts:

- Preparing the rack
- Installing the server in the rack

Preparing the Rack

≥32 kg (70.5 lbs)   **≥55 kg (121.2 lbs)**

- Caution -

Use safe lifting practices when lifting your machine.

In this section, you will use the following parts:

- IBM Installation Template
- Two slide-bracket assemblies
- One cable-management arm
- Two bezel brackets
- Six screws (for attaching the bezel brackets)
- Sixteen long screws (M6 by 16 mm)
- Eight short screws (M4 by 8 mm)
- Six cage nuts
- Two hex nuts (M6)
- Four lift handles (shipped with some servers)
- Cable ties
- One server bracket (for attaching the cable management arm to the server)

- Attention -

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

To attach the mounting hardware to the rack:

1. Remove the rack front door. Refer to the rack documentation for instructions.
2. Mark the positions of the slide-bracket assemblies, bezel brackets, and the cable-management arm on the rack:
    a. Position the installation template on the front mounting rails on the rack, aligning the holes.
    b. Mark the holes for the slide-bracket assemblies and bezel brackets.
    c. Move the template to the same U level at the rear of the server and mark the locations for the slide-bracket assemblies and cable-management arm.
    d. Install the six cage nuts at the locations marked on the mounting rails.
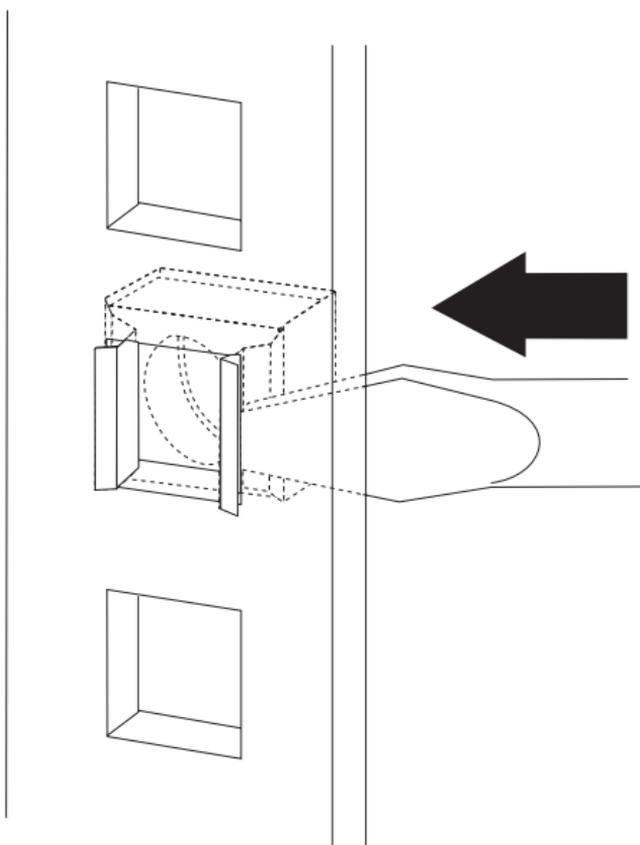
3. Attach a slide-bracket assembly to the front of the rack:

   Notes:
   - Get another person to help you attach the slide-bracket assemblies to the rack.
   - The slide-bracket assemblies can be installed on either the left or right side of the rack.
   - Refer to the illustrations for examples of the proper alignment of the slide-bracket assemblies.
   a. Position the slide-bracket assembly behind the mounting rail so that the slides will extend out from the front of the rack.
   b. If necessary, loosen the screws at the rear of the slide bracket assembly and adjust the length of the slide-bracket to fit the mounting rail. Tighten the screws.
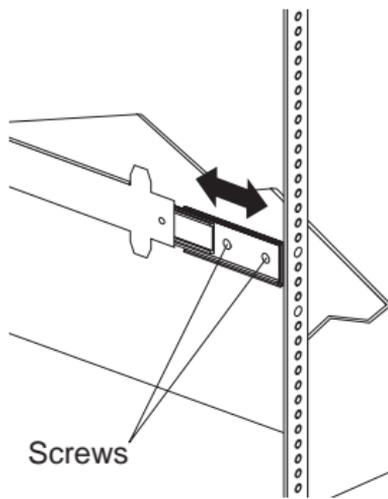
Screws

c. Insert screws (6M by 16 mm) through the mounting rail to the slide-bracket assembly. Do not tighten the screws.
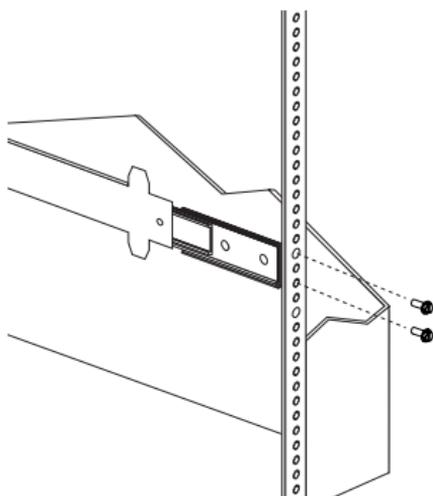
4. Attach the slide bracket assembly to the rear of the rack:
   a. Position the slide-bracket assembly inside the mounting rail.
   b. Insert screws (6M by 16 mm) through the mounting rail to the slide-bracket assembly. Do not tighten the screws.
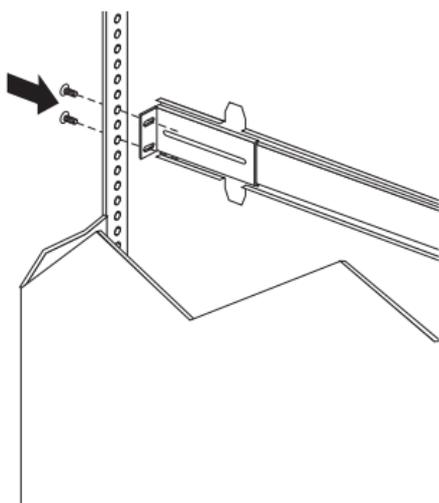
5. Attach the other slide-bracket assembly to the front and rear of the rack.
6. Push the slide-bracket assemblies to the outermost positions on the rack.
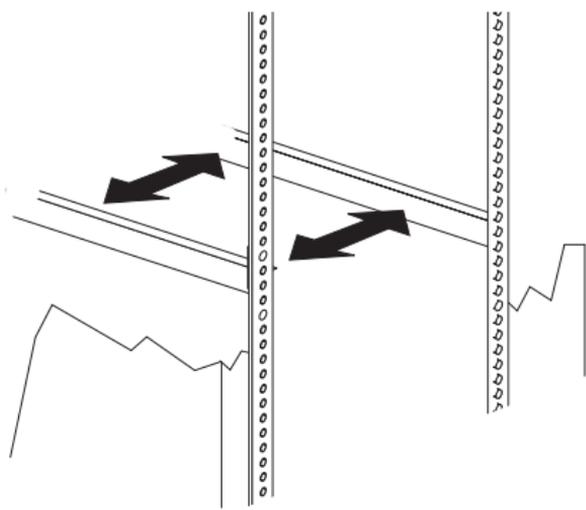
7. Tighten all screws to secure both slide-bracket assemblies. If you are using a torque screwdriver, use the following torque setting: 8–11 Nm (70.8–97.0 in/lbs).
8. Attach the cable-management arm to the rear of the rack:
   a. Position the cable-management arm bracket on the outside of the mounting rail.
   b. Insert screws (M6 by 16 mm) through the cable-management arm bracket, mounting rail, and cage nuts. Tighten the screws.
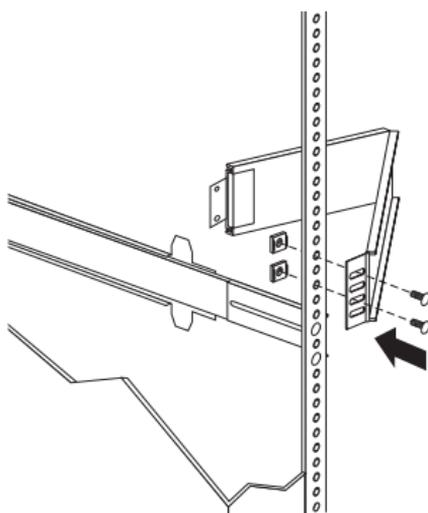
   c. Position the server bracket on the cable-management arm.
   d. Insert screws through the cable-management arm and the server bracket. Attach M6 hex nuts to the screws and tighten the hex nuts.
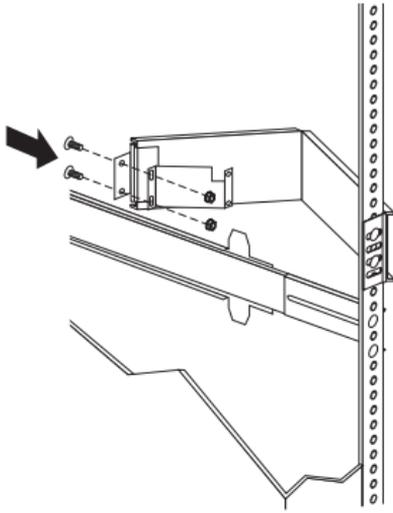
Installing the Server in the Rack: In this section, you will use eight screws (M4 by 8).

To install the server in the rack:

1. Fully extend the slide-bracket assemblies until they lock.
2. Install the four lift handles on the sides of the server:
   a. Press in on the sides of the lift handle near the tabs and insert the handle tabs into the slots on the side of the server.
   b. Move the handle up in the slots so that the hooked part of each tab is inside the server. Release the pressure on the sides of the handle.
   c. Install the remaining three lift handles.
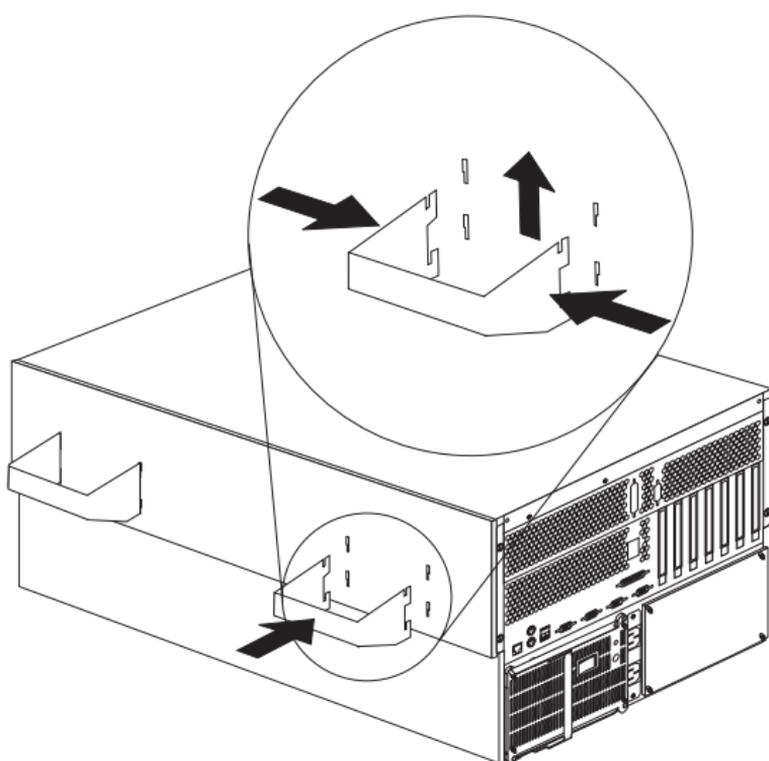
≥32 kg (70.5 lbs)   **≥55 kg (121.2 lbs)**

―――― **Caution** ――――

Use safe lifting practices when lifting your machine.

3. Lift and position the server so that the bayonet slots on the server are above the bayonets on the slide-bracket assemblies.

4. Lower the server and slip the bayonets into the bayonet slots.

5. Insert screws through one slide-bracket assembly and server side. Tighten the screws. Repeat this step for the other slide-bracket assembly on the opposite side of the server. This secures the server.
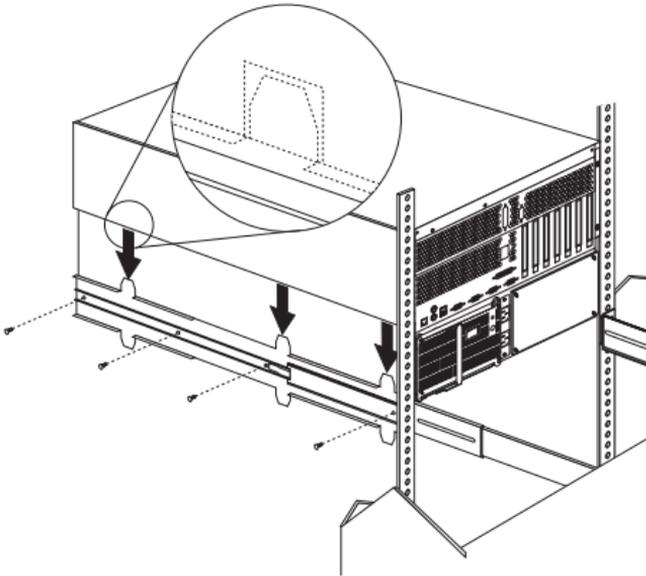
6. Remove the four lift handles from the sides of the server:

   a. Grasp the lift handle and press in on the sides of the lift handle near the tabs until the tabs touch the inside edges of the slots.
   b. Move the handle down in the slots so that the hooked parts of the tabs clear the top edges of the slots; then, pull the handle away from the server.
   c. Remove the remaining three handles. Store the handles in a safe place.

   --- **Note** ---

   When the drawer is fully extended, safety latches on the slide-brackets lock into place. To release the safety latch, press the latch on each side of the rack.

7. Press the safety latches and slide the drawer about halfway into the rack.
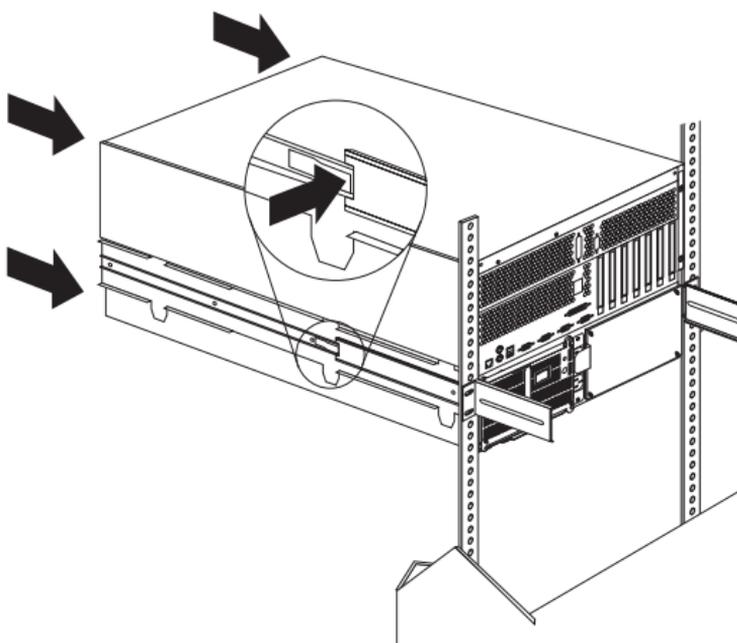
8. Attach the cable-management arm to the server using the captive screws.
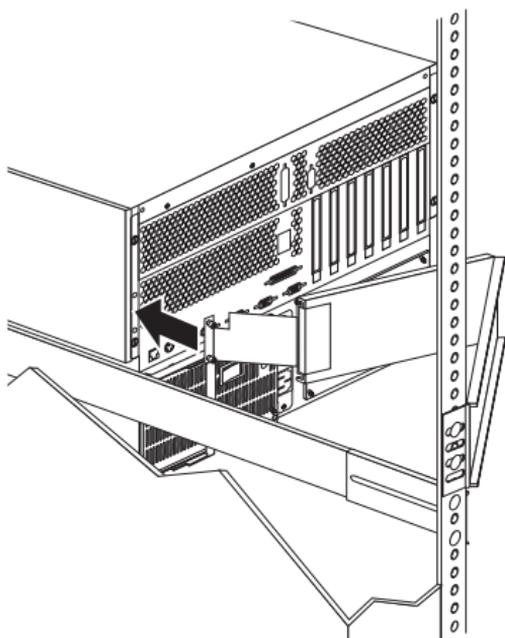
9. Attach the monitor, keyboard, and power cables to the corresponding connectors on the server. Refer to the rack documentation for instructions.
10. Attach the cables to the cable-management arm using cable ties.

11. Attach the two bezel brackets (one for each side) to the front sides of the server with the six screws provided.
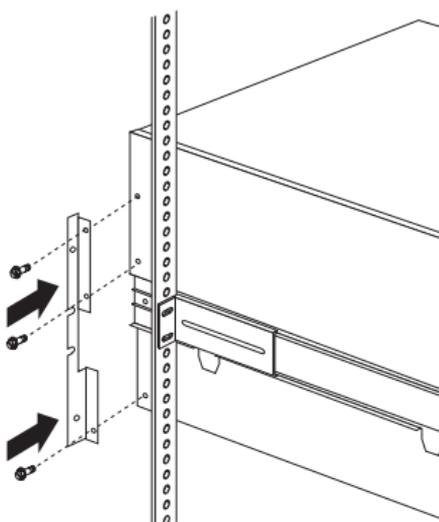
12. Secure the server in the rack:
    a. Slide the server into the rack.
    b. Secure the server to both sides of the rack by inserting screws (M6 by 16 mm) through the bezel brackets, mounting rails, and cage nuts.
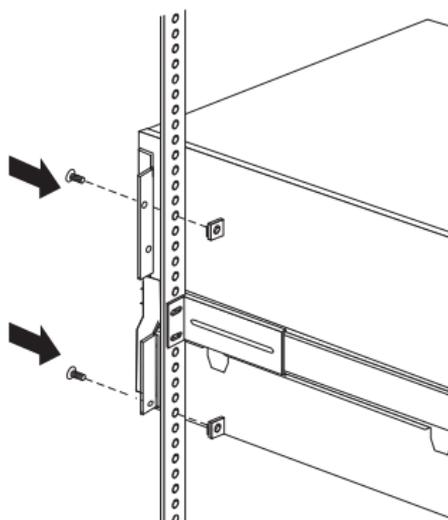
13. Install the rack front door.
14. To complete the installation, refer to the documentation that came with the rack.

Removing the Server from a Rack

Before you begin

- Read "Safety Information" on page 300.
- Turn off the server.
- Follow any additional installation and safety instructions that come with the rack.

To remove the server from a rack:

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

   Note

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

2. Disconnect all cables and power cords from the rear of the server.
3. Disconnect all power cords from the rack.
4. Remove the screws from the bezel brackets on each side of the front bezel. Set them aside for later use.
5. Slide the server about halfway out of the rack.
6. Loosen the captive screws that secure the cable-management arm.
7. Fully extend the slide-bracket assemblies until they lock.
8. Remove the screws that attach the server to each slide-bracket assembly.

Caution

Use safe lifting practices when lifting your machine.

9. Install the four lift handles on the sides of the server:
   a. Press in on the sides of the lift handle near the tabs and insert the handle tabs into the slots on the side of the server.
   b. Move the handle up in the slots so that the hooked part of each tab is inside the server. Release the pressure on the sides of the handle.
   c. Install the remaining three lift handles.
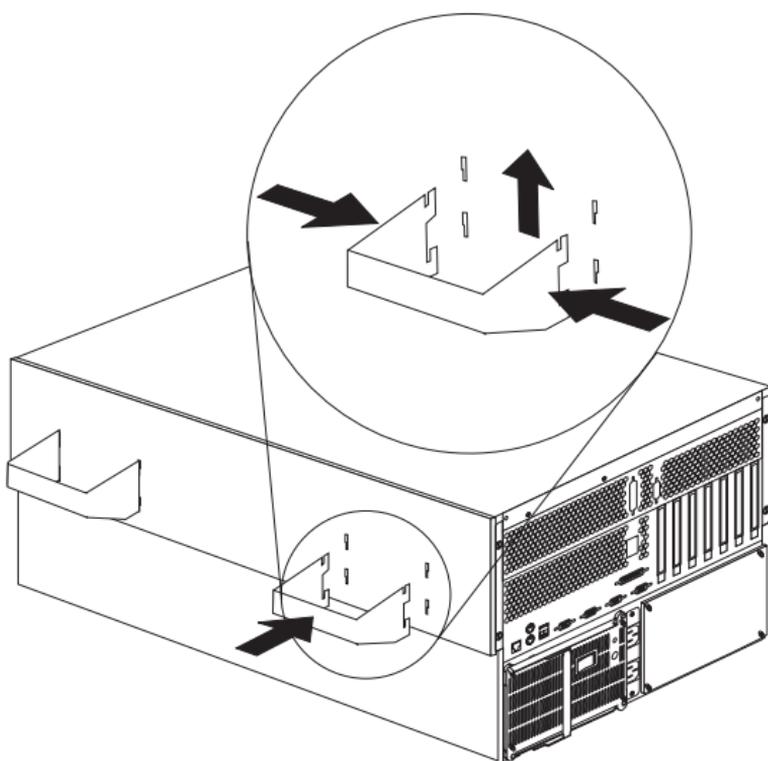
10. Lift the server from the slide bracket assemblies and place the server on a flat, nonconductive surface.

SCSI Backplane Component Locations

The following simplified layout of the SCSI backplane identifies the components. Refer to this figure when you set the jumpers on the backplane.
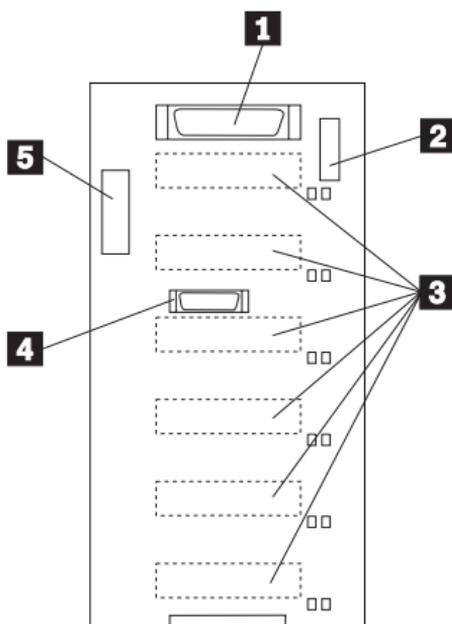
1. Wide (16-bit) SCSI connector
2. Option jumper block (J10)
3. SCSI hot-swap drive connectors (on reverse side of backplane)
4. Repeater card connector
5. Power connector

SCSI Backplane Option Jumpers

The option jumper block on the SCSI backplane defines the SCSI IDs for hot-swap drives. See the illustration in "SCSI Backplane Component Locations" on page 248 for the location of the option jumper block.

Table 11 summarizes the settings for the SCSI backplane option jumper block (J10).

Pins	Description
Table 11. Backplane Option Jumper Block	
1-2	Reserved.
3-4	Reserved
5-6	Placing a jumper on these two pins enables SCSI IDs 8-13
7-8	Reserved.
9-10	Reserved.
11-12	Placing a jumper on these two pins reverses the SCSI IDs on the backplane.

Note: The default is no jumpers installed on the J10 jumper block.

Table 12 shows the SCSI IDs that you can use for hot-swap drives.

J10 Pins 5-6	J10 Pins 11-12	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6
Table 12. SCSI IDs for Hot-Swap Drives							
No jumper	No jumper	0	1	2	3	4	5
No jumper	Jumper	5	4	3	2	1	0
Jumper	No jumper	13	12	11	10	9	8

Notes:

1. No jumper on pins 5-6 and 11-12 is the default.
2. Jumpers on pins 5-6 and 11-12 is not supported.

Server Cabling

Make sure you have an adequate number of properly
grounded electrical outlets for your server, monitor, and
any other options that you installed. Place your server in a
location that is dry. Rain or spilled liquids might damage
your server. Leave about 50 mm (2 inches) of space at
the right and left sides of your server to allow the server's
cooling system to work properly. Leave about 100 mm (4
inches) clearance at the rear for cables.

1. Use the illustration in "Input/Output Connectors and
   Expansion Slots" on page 194 to cable your server.
2. Remove any shipping screws **2** from the power
   supply.
3. Connect the power cord **1** to the server.

   ![caution symbol]

   Caution.

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

4. Install the power-cord strain-relief bracket **3** (if
   desired).
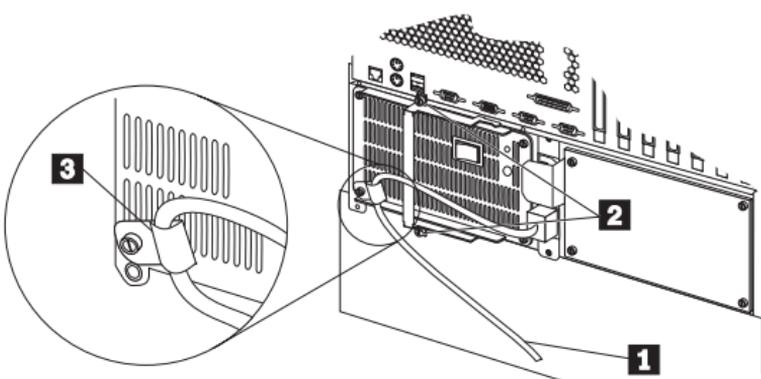
5. Plug the power cord into a properly grounded
   electrical outlet.

Server Door and Trim Bezels Removal

Refer to the following illustration while you perform the steps in this procedure.
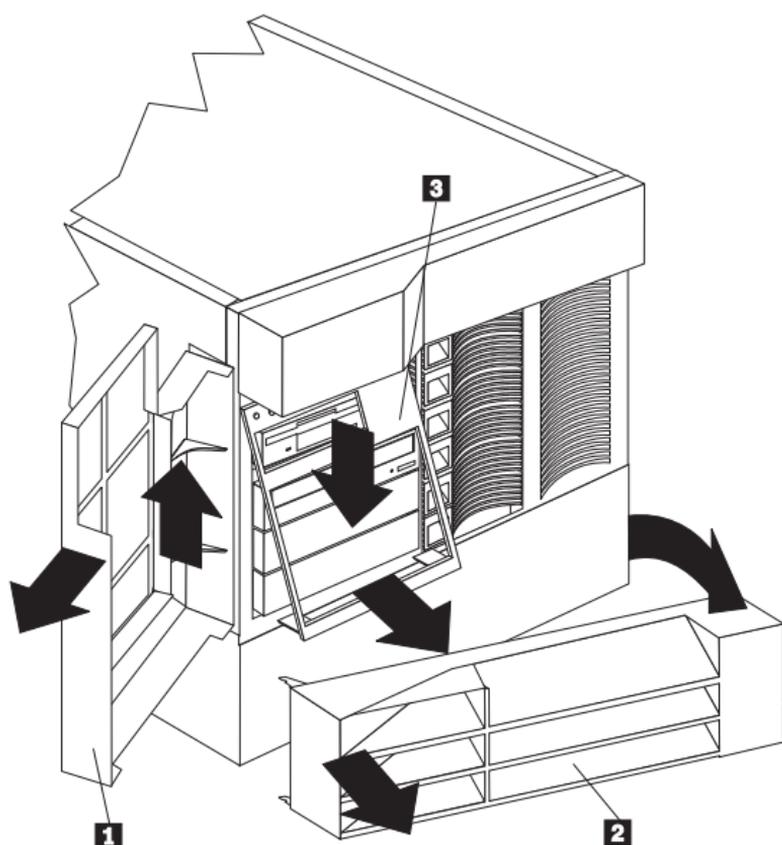
To remove the server door:

1. Unlock and open the server door **1**.
2. Lift the server door up and off its hinges. Store the door in a safe place.

To remove the NetBAY3 bezel (tower model only):

1. Unlock the NetBAY3 bezel **2**.
2. With your fingers on the ribbed area on the right side of the NetBAY3 bezel **2**, grasp the right side of the NetBAY3 bezel and pull it away from the pedestal.
3. Unhook the left side of the bezel from the server. Store the bezel in a safe place.

To remove the media-bay trim bezel:

1. Release the two tabs at the bottom edge of the bezel **3** and pull the bottom of the bezel slightly away from the server.
2. Pull the bezel down to release the two tabs at the top edge of the bezel. Store the bezel in a safe place.

Shuttle Removal

Before you begin:

Read "Safety Information" on page 300.

To remove the shuttle, do the following:

1. Remove the top cover (see "Top Cover Removal" on page 261).
2. Remove the shuttle.
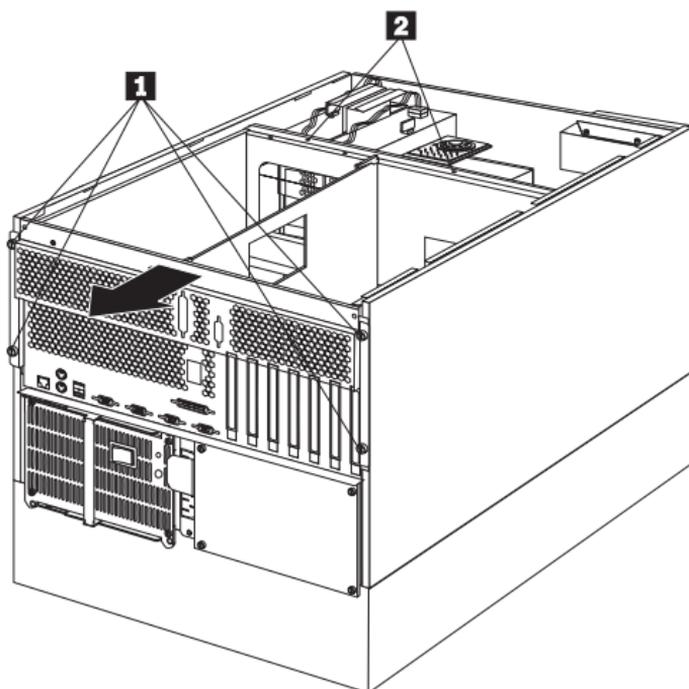
a. Remove the screws **2**.
b. Loosen the screws **1**, then: slide the shuttle to the rear of the system.

Side Cover(s) Removal

To remove the side cover(s), do the following:

1. Remove the top cover (see "Top Cover Removal" on page 261).
2. Remove the side cover.
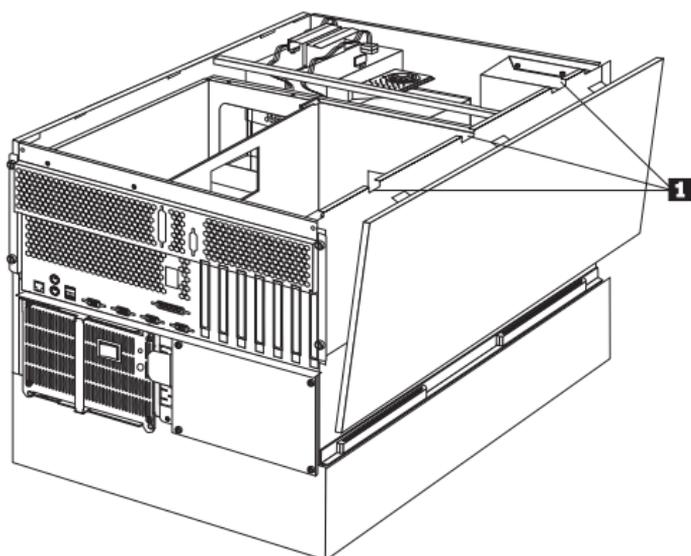
a. Release the three tabs **1** on the top edge of one side cover and tilt the cover away from the server.
b. Lift the cover off the server and set it aside.
c. Repeat the previous steps to remove the other side cover.

System Board Component Locations

The following illustration shows the system board and identifies system-board components. You might need to refer to this figure before you install hardware in your server. You might also need to refer to this figure when you set configuration jumpers on the system board.
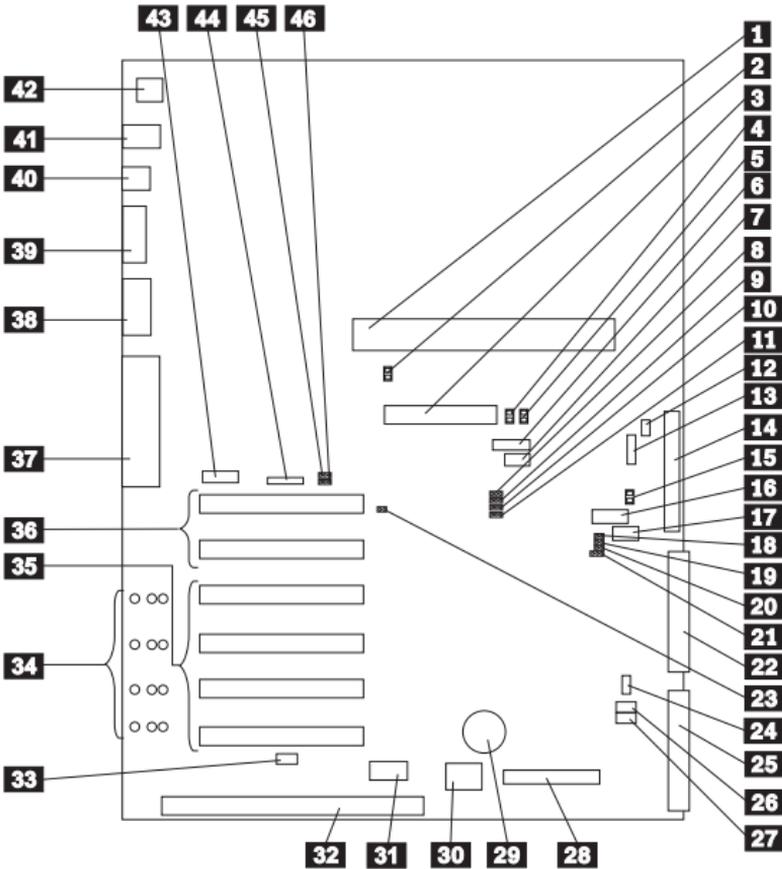
1 Processor board connector (J19)
2 System management processor error LED (CR24)
3 RAID channel 1 connector (J7)
4 RAID channel 1 error LED (CR30)
5 RAID channel 2 error LED (CR31)
6 Reserved (J54)
7 Reserved (J64)
8 Disable RAID controller jumper block (J11)
9 Reserved (J45)
10 Power on control jumper block (J32)
11 Reserved (J25)
12 Reserved (J9)
13 Power backplane cable connector (J8)
14 RAID channel 2 connector (to backplane) (J3)
15 RAID system error LED (CR32)
16 Reserved (J27)
17 Reserved (J35)
18 SCSI activity LED connector (J52)
19 Reserved (J34)
20 Reserved (J29)
21 Reserved (J26)
22 IDE connector (J33)

23 System reset jumper block (J51)

24 Fan connector (J36)

25 Diskette drive connector (J22)

26 Power on password override jumper block (J24)

27 Flash ROM page swap jumper block (J30)

28 Control panel connector (J20)

29 Battery

30 Reserved (J46)

31 Hot-plug PCI controller programmer interface connector (J53)

32 ISA expansion slot

33 Hot-plug switch connector (J16)

34 PCI slot LEDs (four are on the side of the board)

35 PCI slots 1–4 (hot-plug)

36 PCI slots 5 and 6

37 Parallel port connector (J56) (Serial port A and B connectors are below the parallel port connector.)

38 Video port connector (J2)

39 Management port C connector (J42)

40 USB 1 and USB 2 port connectors (USB 2 is below USB 1.) (J31)

41 Mouse and keyboard connectors (J1) (The mouse connector is above the keyboard connector.)

42 Ethernet port connector (J4)

43 Reserved (J17)

44 Reserved (J18)

45 Disable Ethernet controller jumper block (J5)

46 Disable video controller jumper block (J14)

System Board Jumpers

Table 13 describes the jumpers on the system board. The numbers in the table correspond to the highlighted numbers on the illustration in "System Board Component Locations" on page 254.

Note

Turn off the server, and disconnect the power cords before moving any jumpers.

Table 13. System Board Jumpers

Jumper Name	Description
8 J11 Disable RAID controller	The default position is Enabled (jumper on pins 1 and 2). Move the the jumper to pins 2 and 3 to disable the RAID controller.
9 J45 Reserved	The default position is a jumper on pins 2 and 3.
10 J32 Power on control	The default position is normal operation (jumper on pins 1 and 2). Moving the jumper to pins 2 and 3 allows the power supply to be turned on without a control panel or system management processor.
11 J25 Reserved	The default position is a jumper on pins 1 and 2.
12 J9 Reserved	The default position is a jumper on pins 1 and 2.
19 J34 Reserved	The default is no jumper installed on J34.
20 J29 Reserved	The default is no jumper installed on J29.
21 J26 Reserved	The default is a jumper on pins 2 and 3.
23 J51 System reset	In normal operation, there is no jumper on J51. Installing a jumper on J51 resets the system logic.
26 J24 Power on password override	Changing the position of this jumper bypasses the power-on password check if the jumper has been moved since the server was last powered on. You do not need to move the jumper back to the default position after the password is overridden. Changing the position of this jumper does not affect the administrator password check if an administrator password is set.
27 J30 Flash ROM page swap	The default position is a jumper installed on pins 2 and 3. Changing the position of this jumper will change which of the two pages of Flash ROM is used when the system is started.
45 J5 Disable Ethernet controller	The default position is Enabled (jumper on pins 1 and 2). Move the the jumper to pins 2 and 3 to disable the Ethernet controller.
46 J14 Disable video controller	The default position is Enabled (jumper on pins 1 and 2). Move the the jumper to pins 2 and 3 to disable the video controller.

**Bypassing an Unknown Power-on
Password:** When a power-on password is set, POST
does not complete until you enter the password. If you
forget the power-on password, you can regain access to
the server through either of the following methods:

- Enter the administrator password at the power-on
  prompt, if an administrator password has been set.
  (If necessary, see "Using the Administrator Password
  Menu" on page 96 for details.) Start the
  Configuration/Setup utility programs and change the
  power-on password. See "Using the Power-On
  Password Menu" on page 95.
- Change the position of the jumper on J24 as
  described in Table 13 on page 256 to bypass the
  power-on password check. You can then start the
  Configuration/Setup utility programs and change the
  power-on password. See "Using the Power-On
  Password Menu" on page 95.

System Board Removal

Notes

1. Read "Safety Information" on page 300.
2. If possible, record the configuration settings before removing the system board. (see "Configuration/Setup Utility Program" on page 60.)

To remove the system board, do the following:

1. Remove the top cover (see "Top Cover Removal" on page 261).
2. Disconnect all adapter cables and remove the adapters (see "Adapters" on page 142).
3. Remove the adapter dividers.
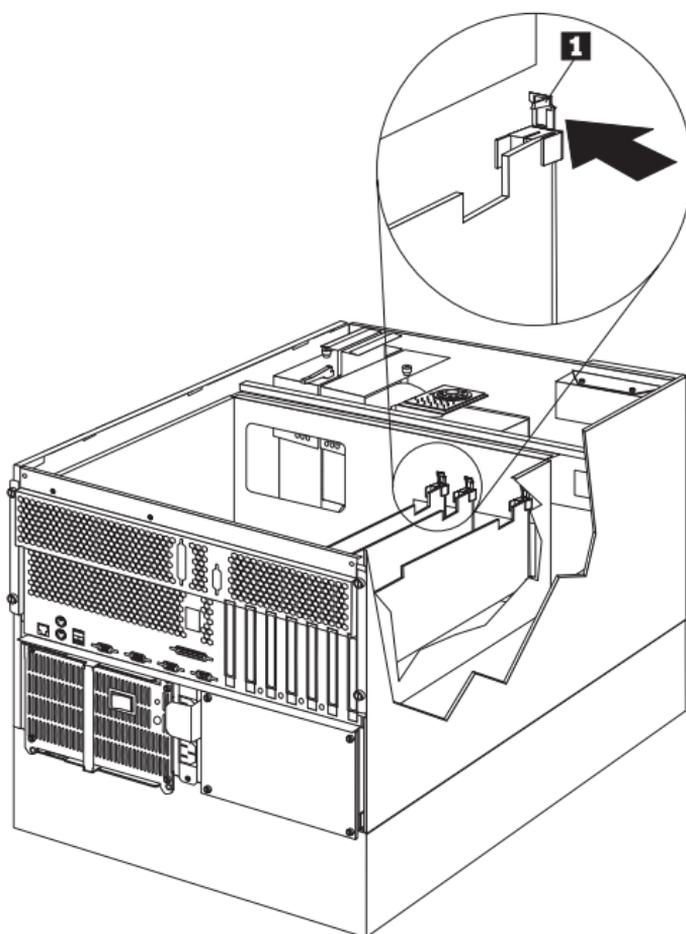
   a. Press on the adapter divider release tab **1** and lift the divider out of the system.
   b. Repeat the procedure for each adapter divider.
4. Remove the processor board (see "Processor Board Removal" on page 231).
5. Disconnect all system board cables.
6. Remove the processor card support tray housing.
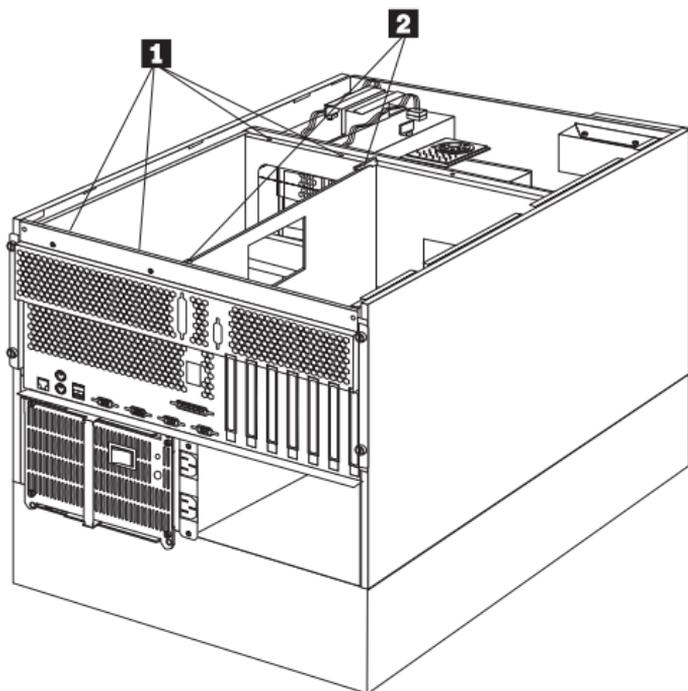
a. Remove the processor card support tray housing screws 1.

b. Lift the support tray housing latches 2 to release the housing from the shuttle, then; lift the housing out of the system.

7. Remove the system board dust cover 1.
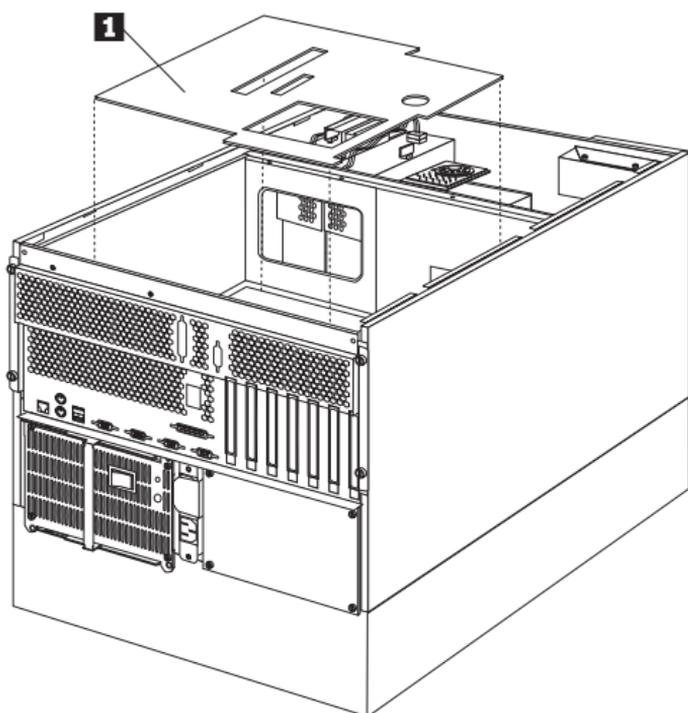
8. Remove the system board.
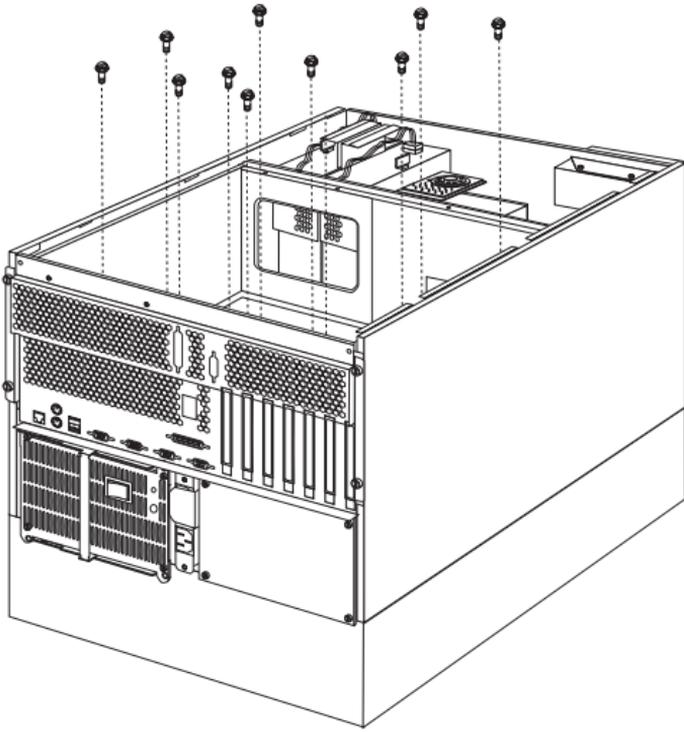
a. Remove the system board mounting screws, then; remove the system board.

Top Cover Removal

Before you begin:

Read "Safety Information" on page 300.

Note

You do not have to power-off the system to replace a hot swap fan.
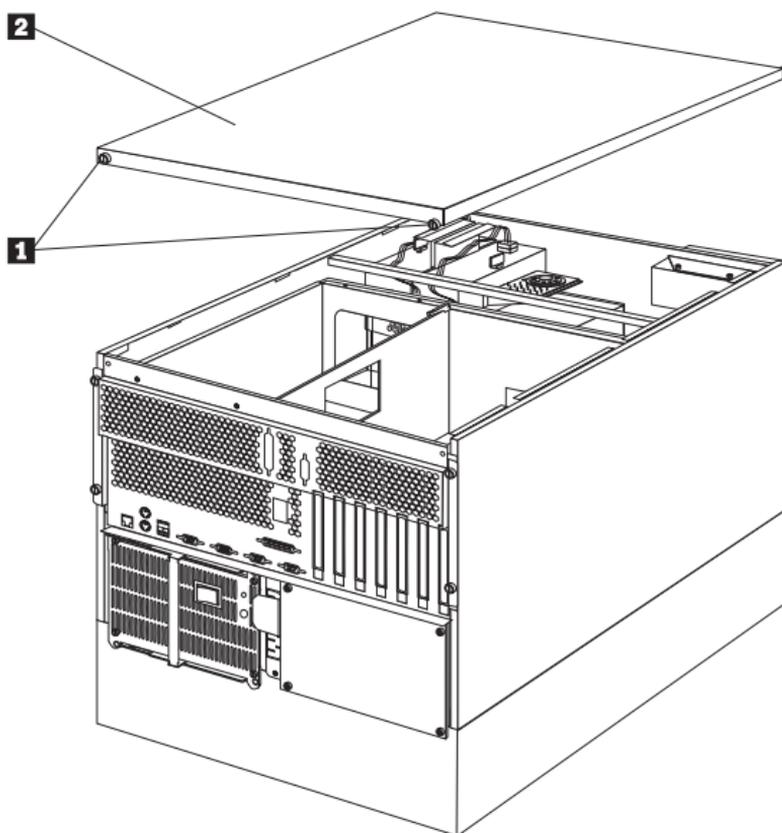
To remove the server top cover:

1. Turn off the server and all attached devices and disconnect all external cables and power cords (see "Preparing to Install Options" on page 220).
2. Loosen the two thumbscrews **1** on the back edge of the top cover.
3. Slide the top cover **2** slightly toward the rear of the server; the cover will stop after about 25 mm (1 inch). Lift the cover off the server and set the cover aside.

Attention

For proper cooling and airflow, replace the top cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the top cover removed might damage server components.

Go to "Server Door and Trim Bezels Removal" on page 251.

Voltage Regulator Card Removal

Note

Read "Safety Information" on page 300.

To remove the voltage regulator card, do the following:

1. Turn off the server and all eternal devices.
2. Disconnect the server and all external devices from the power source.
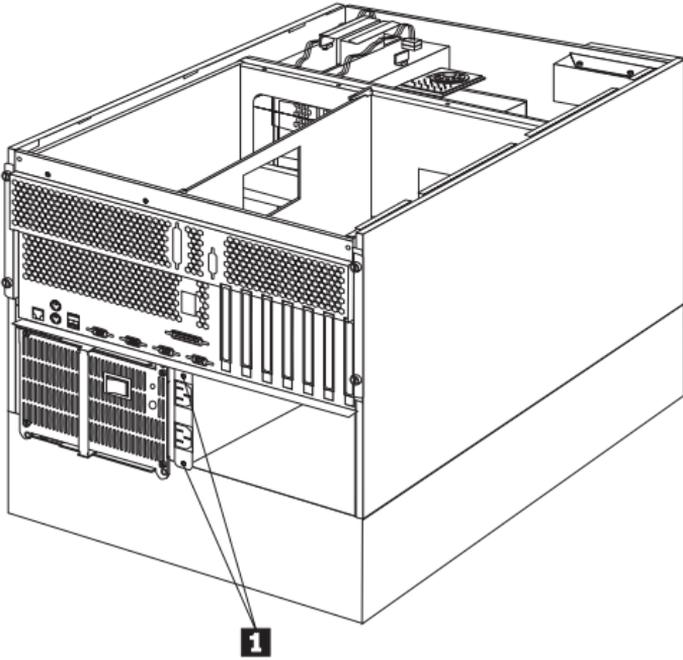
3. Remove the voltage regulator card mounting screws **1**, then; slid the voltage regulator card out of the server.

Symptom-to-FRU Index

This index supports Netfinity 5500 - Type 8660 servers.

Notes

1. Check the configuration before you replace a FRU. Configuration problems can cause false errors and symptoms.
2. For IBM devices not supported by index, refer to the manual for that device.
3. Always start with "General Checkout" on page 7.

The Symptom-to-FRU lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this Symptom-to-FRU Index to help you decide which FRUs to have available when servicing the computer. The POST BIOS displaying POST error codes and messages on the screen.

Beep Symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). See the following examples.

Note

One beeps after successfully completing POST indicated the system is functioning properly.

Beeps	Description
1-2-3	• One beep • A pause (or break) • Two beeps • A pause (or break) • Three beeps
4	Four continuous beeps

Beep/Symptom	FRU/Action
1-1-2 (Processor register test failed)	1. **Optional Processor** (if installed) 2. Processor
1-1-3 (CMOS write/read test failed)	1. **Battery/CMOS chip** 2. System Board
1-1-4 (BIOS ROM checksum failed)	1. **System Board**
1-2-1 (Programmable Interval Timer failed)	1. **System Board** 2. Processor Board
1-2-2 (DMA initialization failed)	1. **System Board** 2. Processor Board

Beep/Symptom	FRU/Action
1-2-3 (DMA page register write/read failed)	1. **System Board** 2. Processor Board
1-2-4 RAM refresh verification failed	1. **System Board** 2. Processor Board
1-3-1 (1st 64K RAM test failed)	1. **DIMM** 2. Processor Board
1-3-2 (1st 64K RAM parity test failed)	1. **DIMM** 2. Processor Board 3. System Board
2-1-1 (Secondary DMA register failed)	1. **System Board** 2. Processor Board
2-1-2 (Primary DMA register failed)	1. **System Board** 2. Processor Board
2-1-3 (Primary interrupt mask register failed)	1. **System Board** 2. Processor Board
2-1-4 (Secondary interrupt mask register failed)	1. **System Board** 2. Processor Board
2-2-1 (Interrupt vector loading failed)	1. **System Board** 2. Processor Board
2-2-2 (Keyboard controller failed)	1. **System Board**
2-2-3 (CMOS power failure and checksum checks failed)	1. **Battery/CMOS chip** 2. System Board
2-2-4 (CMOS configuration info validation failed)	1. **Battery/CMOS chip** 2. System Board
2-3-1 (Screen initialization failed)	1. **Jumper on J14** 2. System Board
2-3-2 (Screen memory failed)	1. **System Board**
2-3-3 (Screen retrace failed)	1. **System Board**
2-3-4 (Search for video ROM failed)	1. **System Board**
2-4-1 (Video failed, screen believed operable)	1. **System Board**
3-1-1 (Timer tick interrupt failed)	1. **System Board**
3-1-2 (Interval timer channel 2 failed)	1. **System Board**

Beep/Symptom	FRU/Action
3-1-3 (RAM test failed above address 0FFFFH)	1. **DIMM** 2. Processor Board 3. System Board
3-1-4 (Time-Of-Day clock failed)	1. **Battery/CMOS chip** 2. System Board
3-2-1 (Serial port failed)	1. **System Board**
3-2-2 (Parallel port failed)	1. **System Board**
3-2-3 (Math coprocessor failed)	1. **Optional Processor** (if installed) 2. Processor 3. Processor Board
3-2-4 (Failure comparing CMOS memory size against actual)	1. **DIMM** 2. Processor Board 3. Battery/CMOS chip
3-3-1 (Memory size mismatch occurred, see"Memory Settings" on page 98)	1. **DIMM** 2. Processor Board 3. Battery/CMOS chip
3-3-2 (Critical SMBUS error occurred)	1. **Disconnect the server power cord from outlet, wait 30 seconds and retry.** 2. Processor Board 3. Memory DIMMs
Three Short Beeps	1. **DIMM** 2. Processor Board 3. System Board
One Continuous Beep	1. **Processor** 2. Optional Processor (if installed) 3. Processor Board 4. System Board
Repeating Short Beeps	1. **Keyboard** 2. System Board
One Long and One Short Beep	1. **Video adapter** (if present) 2. System Board 3.
One Long and Two Short Beeps	1. **Video adapter** (if present) 2. System Board
Two Long and Two Short Beeps	1. **Video adapter**

No Beep Symptoms

No Beep Symptom	FRU/Action
No beep and the system operates correctly. 1. **Check speaker cables** 2. Speaker 3. System Board	
No Beeps occur after successfully completing POST (The Power-On Status is disabled.)	1. **Run Configuration/Setup, set the Start Options Power-On Status to enable.** 2. Check speaker connection. 3. Speaker 4. System Board
No AC power (Power supply AC LED is off)	1. **Check the power cord** 2. Power Supply (If two are installed, swap them to determine if one is defective.) 3. Power Backplane 4. Hot Swap Power AC Inlet Box
No beep and no video	1. **See "Undetermined Problems" on page 286.**
System will not power-up (Power supply AC LED is on)	1. **See "Power Supply LED Errors" on page 273.**

Control Panel System Error LED

The system error LED is turned on on when an error is detected. If the system error LED is on, remove the cover and check the diagnostic panel LEDs. The following is a complete list of diagnostic panel LEDs followed by the FRU/Action for replacing the problem.

> ── **Notes** ──
>
> 1. To locate the LEDs on the processor board see "Processor Board Component Locations" on page 227.
> 2. To locate the LEDs on the system board see "System Board Component Locations" on page 254.
> 3. Check the system error log for additional information before replacing a FRU.

Diagnostic Panel LED	FRU/Action
CPU LED on (The LED next to the failing CPU is on.)	1. **Processor 1 or 2** on (Processor 1 or 2). 2. Processor Board

Diagnostic Panel LED	FRU/Action
DASD 1 LED on (The LED located next to the drive bay that the failing drive is installed in will be turned on.)	1. **Failing drive.** 2. Be sure the fans are operating correctly and the air flow is good. 3. SCSI Backplane
FAN 1 LED on	1. **Fan 1** 2. Fan Cable 3. System Board
FAN 2 LED on	1. **Fan 2** 2. Fan Cable 3. System Board
FAN 3 LED on	1. **Fan 3** 2. Fan Cable 3. System Board
MEM LED on (The LED next to the failing DIMM is on.)	1. **Failing DIMM in slot J1, J2, J3, or J4).** 2. System Board 3. Processor Board
NMI LED on (Machine check error)	1. **Reboot the system.** 2. Check the system Board LED(s); if on, see "System Board LEDs" on page 285. 3. Check the system error log.
PCI 1 LED on	1. **PCI Card for the PCI slot LED that is turned on** 2. System Board 3. Processor Board
PCI 2 LED on	1. **Card in slot 1 or 4** 2. System Board 3. Processor Board
PS1 LED on	1. **Check the DC Good LED on power supply 1. If off, replace power supply 1.** 2. Power Backplane
PS2 LED on	1. **Check the DC Good LED on power supply 2. If off, replace power supply 2.** 2. Power Backplane
SMI LED on	1. **Reboot the system.** 2. Check the system Board LED(s); if on, see "System Board LEDs" on page 285.

Diagnostic Panel LED	FRU/Action
TEMP LED on	1. **Be sure the fans are operating correctly and the air flow is good.** 2. Check processor 1 and 2 LEDs 3. Be sure the power supply fans are operating correctly and the air flow is good. 4. Processor Board 5. System Board
VRM LED on (Check the VRM (voltage regulator module) LEDs on the processor board.)	1. **Voltage regulator module for the VRM LED on the processor board that is turned on** 2. Processor 1, if the VRM 1 LED on the processor board is on. Processor 2, if the VRM 2 LED on the processor board is on. 3. Processor Board

Diagnostic Error Codes

In the following error codes, *X* can be any number or letter.

Error Code/Symptom	FRU/Action
001-XXX-001 (Failed core tests)	1. **System Board**
005-XXX-001 (Failed Video test)	1. **System Board** 2. Processor Board
011-XXX-001 (Failed Serial Port test)	1. **System Board**
014-XXX-001 (Failed Parallel Port test)	1. **System Board**
015-XXX-001 Failed USB test)	1. **System Board**
020-XXX-001 (Failed PCI Interface test)	1. **Processor Board** 2. System Board
020-XXX-001 (Failed Hot Swap PCI Latch test)	1. **Hot Swap PCI Latch Assembly** 2. System Board
020-XXX-002 (Failed Hot Swap PCI Latch test)	1. **Hot Swap PCI Latch Assembly** 2. System Board
020-XXX-003 (Failed Hot Swap PCI Latch test)	1. **Hot Swap PCI Latch Assembly** 2. System Board
020-XXX-004 (Failed Hot Swap PCI Latch test)	1. **Hot Swap PCI Latch Assembly** 2. System Board
030-XXX-001 **(Failed Internal SCSI interface test)**	1. **System Board**
035-XXX-001 (Failed RAID test for Fixed Disk in bay 1, SCSI ID 0)	1. **Fixed Disk 1**
035-XXX-002 (Failed RAID test for Fixed Disk in bay 2 SCSI ID 1	1. **Fixed Disk 2**
035-XXX-003 (Failed RAID test for Fixed Disk in bay 3, SCSI ID 2)	1. **Fixed Disk 3**
035-XXX-004 (Failed RAID test for Fixed Disk in bay 4, SCSI ID 3)	1. **Fixed Disk 4**
035-XXX-005 (Failed RAID test for Fixed Disk in bay 5, SCSI ID 4)	1. **Fixed Disk 5**
035-XXX-006 (Failed RAID test for Fixed Disk in bay 6, SCSI ID 5)	1. **Fixed Disk 6**
035-XXX-007 (Failed System Board RAID test)	1. **System Board**

Error Code/Symptom	FRU/Action
035-XXX-006 (System Board RAID indicates POST error)	1. **System Board**
075-XXX-001 (Failed Power Supply test)	1. **Power Supply**
089-XXX-001 (Failed Microprocessor test)	1. **Microprocessor**
089-XXX-002 (Failed Optional Microprocessor test)	1. **Optional Microprocessor**
165-XXX-001 (Failed System Board test)	1. **System Board** 2. Processor Board 3. Power Backplane 4. Hot-Swap Drive Backplane
175-XXX-001 (Failed Fan 1 test)	1. **Fan 1**
175-XXX-002 (Failed Fan 2 test)	1. **Fan 2**
175-XXX-003 (Failed Fan 2 test)	1. **Fan 3**
175-XXX-004 (Processor Board Temperature sensor out of range)	1. **Check system cooling**
180-XXX-001 (Failed Information Panel LED test)	1. **Information LED Panel**
180-XXX-002 (Failed Diagnostics LED Panel test)	1. **Diagnostics LED Panel**
180-XXX-003 (Failed System Board LED test)	1. **System Board**
180-XXX-004 (Failed Processor Board LED test)	1. **Processor Board**
180-XXX-005 (Failed Hot Swap SCSI Backplane LED test)	1. **Hot Swap SCSI Backplane**
201-XXX-001 (Failed Memory test, see "Memory Settings" on page 98)	1. **DIMM Location J1** 2. System Board
201-XXX-002 (Failed Memory test, see "Memory Settings" on page 98)	1. **DIMM Location J2** 2. System Board

Error Code/Symptom	FRU/Action
201-XXX-003 (Failed Memory test, see "Memory Settings" on page 98)	1. **DIMM Location J3** 2. System Board
201-XXX-004 (Failed Memory test, see "Memory Settings" on page 98)	1. **DIMM Location J4** 2. System Board
201-XXX-999 (Multiple DIMM failure, review error code text on screen to identify failing FRUs)	1. **See System Error Log for DIMM locations**
202-XXX-001 (Failed System Cache test)	1. **Microprocessor**
202-XXX-002 (Failed System Cache test on Optional Microprocessor)	1. **Optional Microprocessor**
206-XXX-001 (Failed Diskette Drive test)	1. **Diskette Drive cable** 2. Diskette Drive
215-XXX-001 (Failed IDE test)	1. **System Board**
217-XXX-001 (Failed BIOS Fixed Disk test)	1. **Fixed Disk 1**
217-XXX-002 (Failed BIOS Fixed Disk test)	1. **Fixed Disk 2**
217-XXX-003 (Failed BIOS Fixed Disk test)	1. **Fixed Disk 3**
217-XXX-004 (Failed BIOS Fixed Disk test)	1. **Fixed Disk 4**
217-XXX-005 (Failed BIOS Fixed Disk test)	1. **Fixed Disk 5**
217-XXX-006 (Failed BIOS Fixed Disk test)	1. **Fixed Disk 6**
301-XXX-001 (Failed Keyboard test)	1. **Keyboard**
405-XXX-001 (Failed Ethernet test)	1. **System Board**

Error Symptoms

Error Symptom	FRU/Action
CD is not working properly.	1. **Clean the CD** 2. Clean the optical-head lens. 3. CD-ROM Drive
CD-ROM drive tray is not working. (The server must be powered-on.) If the server is on and the tray does not eject,	1. **Insert the end of a paper clip into the manual tray-release opening.** 2. CD-ROM Drive
CD-ROM drive is not recognized.	1. **Run Configuration/Setup, enabled primary IDE channel.** 2. Check cables and jumpers. 3. Check for correct device driver.
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	If there is a diskette in the drive, verify that: 1. The diskette drive is enabled in the configuration programs. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette is inserted correctly in the drive. 4. The diskette contains the necessary files to start the server. 5. The software program is OK. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, replace the diskette drive.
Monitor problems (general) Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, refer to the information that comes with the monitor for adjusting and testing instructions.	1. **Monitor** 2. Display Adapter/System Board

Power Supply LED Errors

Use the power supply LED information on the following page to trouble shoot power supply problems.

Note

The minimum configuration required for the DC Good light to come on is.

> Power Supply
> Power Backplane
> Power AC Inlet Box
> System Board (With pins 2 and 3 of J32 connected together to bypass the power switch (button). The default is pins 1 and 2.)
> Processor Board (Verify that the J10 and J17 connectors are are installed correctly.)
> Memory-Module Kits (Minimum requirement = 1 bank of 64 MB DIMMs)

Table 14. Power Supply LED Errors

AC Good LED	DC Good LED	Description	FRU/Action
Off	Off	No power to system or AC problem.	1. **Check AC power to system** 2. Power Supply 3. Power Backplane 4. Power AC Inlet Box
On	Off	Standby mode or DC problem.	1. **Verify power supply switch is on.** 2. Check processor connectors J10 and J17. 3. Move jumper J32 to pins 2-3 to bypass power control. If the DC Good LED comes on, reseat the system power switch (button) assembly cable connector to the system board. 4. Remove the adapters and disconnect the cables and power connectors to all internal and external devices. Power-on the system. If the DC Good LED comes on, replace the adapters and devices one at a time until you isolate the problem. 5. Power Supply 6. Power Backplane 7. System Board 8. Processor Board
On	On	Power is OK	N/A

POST Error Codes

In the following error codes, *X* can be any number or letter.

Error Code/Symptom	FRU/Action
062 (Three consecutive boot failures using the default configuration.)	1. **Run Configuration/Setup** 2. Battery/CMOS Chip 3. System Board
101, 102 (System and processor error)	1. **System Board** 2. Processor Board
106 (System and processor error)	1. **System Board** 2. Processor Board
111 (Channel check error)	1. Failing ISA Adapter 2. Memory DIMM 3. System Board
114 (Adapter read-only memory error)	1. **Failing Adapter** 2. Run Diagnostics
129 (Internal Cache error)	1. **Processor** 2. Optional Processor (if installed) 3. Processor Board
151 (Real time clock error)	1. **Run Diagnostics** 2. Battery/CMOS chip 3. System Board
161 (Real time clock battery error)	1. **Run Configuration/Setup** 2. Battery/CMOS chip 3. System Board
162 (Device Configuration Error) **Important** Be sure to load the default settings and any additional desired settings; then, **save the configuration**.	1. **Run Configuration/Setup** 2. Battery/CMOS Chip 3. Failing Device 4. System Board
163 (Real-Time Clock error)	1. **Run Configuration/Setup** 2. Battery/CMOS Chip 3. System Board
164 (Memory configuration changed, see "Memory Settings" on page 98)	1. **Run Configuration/Setup** 2. DIMM 3. Processor Board
173 (System CMOS checksum bad)	1. **Run Configuration/Setup** 2. Battery/CMOS Chip 3. System Board
175 (Hardware error)	1. **System Board** 2. Processor Board

Error Code/Symptom	FRU/Action
176 (Computer cover or cable cover was removed without a key being used)	1. **Run Configuration/Setup** 2. System Board
177, 178 (Security hardware error)	1. **Run Configuration/Setup** 2. Service Processor Adapter 3. System Board
184 (Power-on password corrupted)	1. **Run Configuration/Setup** 2. System Board
185 (Drive startup sequence information corrupted)	1. **Run Configuration/Setup** 2. System Board
186	1. **Run Configuration/Setup** 2. System Board
187 (VPD serial number not set.)	1. **Set serial number in Setup** 2. System Board
188 (Bad EEPROM CRC #2)	1. **Run Configuration/Setup** 2. System Board
189 (An attempt was made to access the server with invalid passwords)	1. **Run Configuration/Setup, enter the administrator password**
195 (Processor 1 is not functioning)	1. **VRM 1** 2. Processor 1 3. Processor Board 4. System Board
196 (Processor 2 is not functioning)	1. **VRM 2** 2. Processor 2 3. Processor Board 4. System Board
197 (Processor 1 failed BIST)	1. **Processor 1** 2. Processor Board 3. System Board
198 (Processor 2 failed BIST)	1. **Processor 2** 2. Processor Board 3. System Board
201 (Memory test error, see "Memory Settings" on page 98)	1. **DIMM** 2. Processor Board 3. System Board
229 (Cache error)	1. **Processor** 2. Optional Processor (if installed) 3. Processor Board

Error Code/Symptom	FRU/Action
262 (DRAM parity configuration error)	1. **Run Configuration/Setup** 2. Battery/CMOS Chip 3. System Board
289 (DIMM has been disabled the user or system, see "Memory Settings" on page 98)	1. **Run Configuration/Setup, if disabled by user** 2. Disabled DIMM, if not disabled by user. 3. Processor Board
301 (Keyboard or keyboard controller error)	1. **Keyboard** 2. System Board
303 (Keyboard controller error)	1. **Keyboard** 2. System Board
602 (Invalid diskette boot record)	1. **Diskette** 2. Cable 3. Diskette Drive
604 (Diskette drive error)	1. **Run Configuration/Setup and Diagnostics** 2. Check cables 3. Diskette Drive 4. Drive Cable 5. System Board
605 (Unlock failure)	1. **Diskette Drive** 2. Drive Cable 3. System Board
662 (Diskette drive configuration error)	1. **Run Configuration/Setup and Diagnostics** 2. Diskette Drive 3. Drive Cable 4. System Board
762 (Coprocessor configuration error)	1. **Run Configuration/Setup** 2. Battery/CMOS Chip 3. Processor
962 (Parallel port error)	1. **Disconnect external cable on parallel port.** 2. Run Configuration/Setup 3. System Board
11XX (System-board serial port 1 or 2 error)	1. **Disconnect external cable on serial port.** 2. Run Configuration/Setup 3. System Board
1762 (Fixed Disk Configuration error)	1. **Fixed Disk Cables** 2. Run Configuration/Setup 3. Fixed Disk Adapter 4. Fixed Disk Drive 5. System Board

Error Code/Symptom	FRU/Action
178X (Fixed Disk error)	1. **Fixed Disk Cables** 2. Run Diagnostics 3. Fixed Disk Adapter 4. Fixed Disk Drive 5. System Board
1800 (No more hardware interrupt available for PCI adapter)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
1801 (No room for PCI option ROM)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
1802 (No more I/O space available for PCI adapter)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
1803 (No more memory (above 1MB for PCI adapter)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
1804 (No more memory (below 1MB for PCI adapter)	1. **Run Configuration/Setup** 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
1805 (PCI option ROM checksum error)	1. **Remove Failing PCI Card** 2. System Board
1806 (PCI to PCI Bridge error)	1. **Run Configuration/Setup** 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
1807, 1808, 1810 (General PCI error)	1. **Remove Failing PCI Card** 2. System Board
1962 (Drive does not contain a valid boot sector)	1. **Verify a bootable operating system is installed** 2. Run Diagnostics 3. Hard Disk Drive Cable 4. System Board 5. Hard Disk Drive
2400 (Video controller test failure)	1. **Video Adapter** (if installed) 2. System Board
2462 (Video memory configuration error)	1. **Video Adapter** (if installed) 2. System Board

Error Code/Symptom	FRU/Action
5962 (IDE CD-ROM configuration error)	1. **Run Configuration/Setup** 2. Check cables 3. CD-ROM Drive 4. Battery/CMOS Chip
8603 (Pointing Device Error)	1. **Pointing Device** 2. System Board
8603 (Pointing Device Error)	1. **Pointing Device** 2. System Board
19501 (Processor 1 is not functioning)	1. **VRM 1** 2. Processor 1 3. Processor Board 4. System Board
19502 (Processor 2 is not functioning)	1. **VRM 2** 2. Processor 2 3. Processor Board 4. System Board
19701 (Processor 1 failed BIST)	1. **Processor 1** 2. Processor Board 3. System Board
19702 (Processor 2 failed BIST)	1. **Processor 2** 2. Processor Board 3. System Board
0001200 (Machine check architecture error)	1. **Processor** 2. Optional Processor 3. Processor Board
000120P0, 000120P1,000120P2,000120PF (Processor cache error)	1. **Failing Processor** 2. Processor Board
01295085 (ECC checking hardware test error)	1. **Processor Board** 2. Processor
I9990301 (Fixed boot sector error, no operating system installed)	1. **Run Configuration/Setup for correct startup** 2. Verify operating system installed
I9990305 (Fixed boot sector error, no operating system installed)	1. **Install operating system to hard disk drive.**

SCSI Error Codes

Error Code	FRU/Action
All SCSI Errors One or more of the following might be causing the problem: • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable	1. **External SCSI devices must be powered-on before you power-on the server.** 2. The cables for all external SCSI devices are connected correctly. 3. If you have attached an external SCSI device to the server, make sure the external SCSI termination is set to automatic. 4. The last device in each SCSI chain is terminated correctly. 5. The SCSI devices are configured correctly.

ServeRAID II Controller Error Codes/Messages

Use the following ServeRAID II controller error code/message information when diagnosing ServeRAID problems. The error codes/messages are displayed on the screen in a line of text immediately after the the adapter BIOS version screen similar to the following appears.

```
IBM PC ServeRAID Adapter BIOS
Copyright IBM Corp. 1995,1997

BIOS Ver. x.xx.x    xx/xx/xx
```

Press **Ctrl+I** to start the MiniConfig Utility. The following message is displayed on the screen.

```
Initializing Adapter Number 1.
Please Wait. Starting Drives.
Firmware Version: x.xx.xx

* Adapter POST & configuration Error Codes:
  IPSR=xxxx BCS=xx ECS=xx
```

The interrupt status port register (IPSR) codes, basic configuration status (BCS) messages, and extended configurations status (ECS) messages identify the Controller State. The BCS and ECS codes indicate a configuration change. Configuration change information is displayed on the screen in text following the IPSR code.

--- **Note** ---

Do Not replace a planar (system board) for RAID problems that has an integrated on-board ServeRAID Controller if the system board is not listed as the FRU/Action in the following index. Refer to RAID adapter HMM S10L-9147-00 for recovery procedures for DDD drives.

IPSR Error	FRU/Action
EF10 (Default ISPR)	1. **Controller is functioning properly. DO NOT replace Controller.**
1xxx (Microcode Checksum Error)	1. **RAID Controller. System Board, if integrated controller.**
2xxx thru 8xxx (Code DRAM Error)	1. **Install the download jumpers (two jumpers on J15, installed parallel to PCI slots) and Flash the Controller with the latest IBM ServeRAID BIOS/Firmware from the IBM Web site, then; remove the jumpers.** 2. RAID Controller System Board, if integrated controller.

IPSR Error	FRU/Action

9xxx thru Bxxx(hex)
(SCSI bus error caused by either defective drives, termination, etc.)
	1.
	
	      ┌── **Note** ───
	      │ The Controller will detect a configuration change. Do not select Save Changes. Press **F10** to bypass any save options.
	      └──
	
	      Isolate between the SCSI subsystem and the controller by disconnecting all SCSI cables and reboot. If the IPSR code still occurs, replace the planar.
	2. If the IPSR code does not occur after disconnecting the cables, follow the steps below until the error is eliminated:
	  a. Identify which channel is causing the error by the second digit of the original IPSR code:
	
	      = Channel 1
	      ISPR = B2xx = Channel 2
	      ISPR = B3xx = Channel 1 and 2
	
	  b. Confirm that the channel(s) identified by the error code(s) is/are the cause of the error by verifying that the error presents itself when the offending channel is reconnected.
	  c. Ensure that channel is properly terminated.
	  d. Ensure that the backplane configuration jumpers settings are correct.
	  e. Replace the failing cable.
	  f. Replace the failing backplane.
	  g. Disconnect one drive at a time that is attached to the failing channel, then; reboot to the system to determine which drive is causing the error.

IPSR Error	FRU/Action
EF10 (Default ISPR)	1. **N/A, controller is functioning properly.**
EFFE (Firmware code corrupt or download jumpers are in place)	1. **Verify that the download jumpers (J15) are not in place.** 2. Flash the controller firmware with the download jumpers in place (two jumpers on J15, installed parallel to PCI slots), then remove the download jumpers. 3. RAID Controller. System Board, if integrated controller.

FFFF	1. **Isolate between SCSI Subsystem and Controller by disconnecting all attached SCSI cables and reboot. IF IPSR code is NOT PRESENT after disconnecting cables, follow the steps below until the error is eliminated:**
	    a. Identify which channel is causing the error by reconnecting cables one at a time and rebooting until the error returns.
	    b. Verify correct termination of the failing channel.
	    c. SCSI cable attached to the failing channel.
	    d. Backplane attached to the failing channel.
	    e. Disconnect one drive at a time attached to failing channel and reboot to determine which drive is causing the problem.
	2. **If the IPSR code remains after disconnecting all SCSI cables then rebooting, replace system planar.**

System Board LEDs

The system board contains three SCSI LEDs and a processor LED that are turned on when the system detects an error.

Notes

1. To locate the LEDs on the system board see "System Board Component Locations" on page 254.
2. Check the system error log for additional information before replacing a FRU.

System Board LED	FRU/Action
Service Processor LED	1. **System Board**
SCSI LED(s) on (Blinking or solid)	1. **See "System Board SCSI LEDs."**

System Board SCSI LEDs

A solid on or blinking system board SCSI LED indicated an error was detected. (The blinks are followed by a pause.)

Notes

1. To locate the LEDs on the system board see "System Board Component Locations" on page 254.
2. If you are instructed to flash the ServeRAID controller on the system board, refer to the ServerGuide that was shipped with the system for instructions on creating a bootable ServeRAID Flash diskette. Or refer to the WEB, see "Online Support" on page iv.
3. Check the system error log for additional information before replacing a FRU.

System Board SCSI LEDs	FRU/Action
1 blink followed by a pause (Boot block checksum error)	1. **Check cables** 2. System Board 3. DASD Backplane
2 blinks followed by a pause (DRAM parity error)	1. **Check cables** 2. System Board 3. DASD Backplane
3 blinks followed by a pause (Code block checksum error, flash the ServeRAID controller.)	1. **Run the ServeRAID Flash program.** 2. **Check cables** 3. System Board 4. DASD Backplane
4 blinks followed by a pause (DRAM DATA)	1. **Check cables** 2. System Board 3. DASD Backplane

System Board SCSI LEDs	FRU/Action
5 blinks followed by a pause (DRAM address error)	a. **Check cables** b. System Board c. DASD Backplane
6 blinks followed by a pause (Code block checksum error, flash the ServeRAID controller.)	1. **Run the ServeRAID Flash program.** 2. **Check cables** 3. System Board 4. DASD Backplane
On (solid)	1. **Check jumper J11, see "System Board Jumpers" on page 256.** 2. Check cables 3. System Board 4. DASD Backplane

Undetermined Problems

You are here because the diagnostic tests did not identify the failure, the Devices List is incorrect, or the system is inoperative.

Notes

1. If you suspect a software mismatch is causing failures (solid or intermittent), be sure to see "Resolving Configuration Conflicts" on page 73.
2. A corrupt CMOS can cause undetermined problems.

Check the LEDs on all the power supplies, see "Power Supply LED Errors" on page 273. If the LEDs indicate the power supplies are working correctly, return here and do the following:

1. Power-off the computer.
2. Be sure the system is cabled correctly.
3. Remove or disconnect the following (one at a time) until you find the failure (power-on the computer and reconfigure each time).
   - Any external devices
   - Surge suppressor device (on the computer)
   - Modem, printer, mouse, or non-IBM devices
   - Each adapter
   - Drives
   - Memory-Module Kits (Minimum requirement = 1 bank of 64 MB DIMMs)

> **Note**
>
> Minimum operating requirements are:
>
> > Power Supply
> > Power Backplane
> > Power AC Inlet Box
> > System Board (With pins 2 and 3 of J32
> > connected together to bypass the power
> > switch (button). The default is pins 1 and
> > 2.)
> > Processor Board (Verify that the J10 and
> > J17 connectors are are installed correctly.)
> > Memory-Module Kits (Minimum requirement
> > = 1 bank of 64 MB DIMMs)

4. Power-on the computer. If the problem remains,
   suspect the following FRUs in the order listed:
   • Power Supply
   • Power Backplane
   • System Board
   • Processor Board

> **Note**
>
> If the problem goes away when you remove an
> adapter from the system, and replacing that adapter
> does not correct the problem, suspect the system
> board then the processor board(s)

Parts Listing (Type 8660)
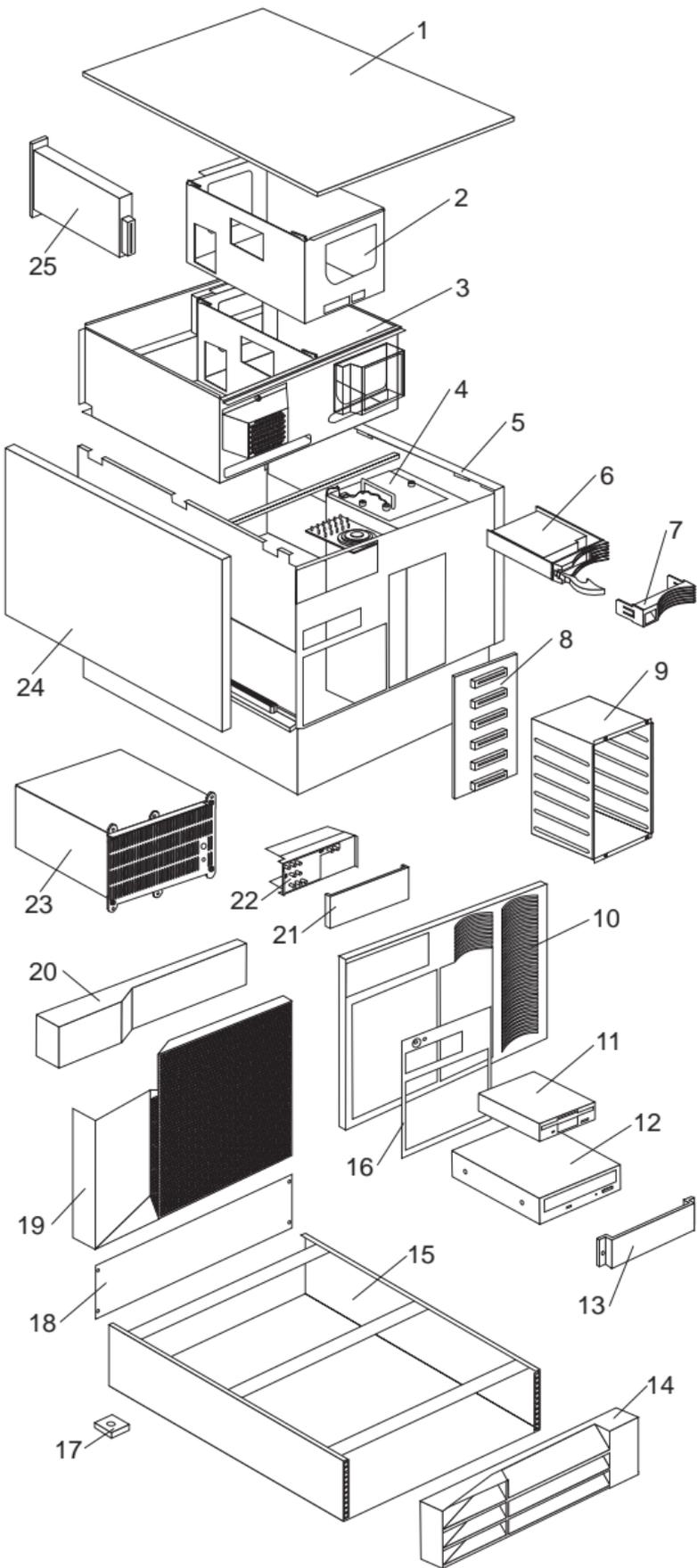
System

Index	System (Netfinity 5500 - Type 8660) Models 11U, 11X, 1RU, 1RX, 41U, 41X 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX	FRU No.
1	Top Cover (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J3063
2	Processor Card Support Tray (Housing) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6983
3	Shuttle with Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6998
4	Fan Assembly 92 mm with Connector and Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6999
4	Short Blower Fan Assembly with Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6988
4	Long Blower Fan Assembly with Bracket and Vane (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6990
	Fan/Blower 3x Power Cable (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K9168
5	Base Frame Assembly (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6991
6	Hard Disk Drive See"Hard Disk Drives and Cables" on page 295 .	N/A
7	Hard Disk Drive Bezel (Black) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J3072
8	DASD Backplane Board (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	76H6880
9	DASD 6-Drive Cage Assembly (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6987

Index	System (Netfinity 5500 - Type 8660) Models 11U, 11X, 1RU, 1RX, 41U, 41X 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX	FRU No.
10	Front Bezel without Door Assembly (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6997
11	1.44MB Diskette Drive, Black (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	76H4091
	Diskette Holder Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J3065
	Diskette Drive Signal Cable (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K9340
12	MKE CR-504 32x CD-ROM Drive, Black (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	02K1119
	CD-ROM Signal Cable (IDE) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K9338
13	5.25-Inch Blank Bezel (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J3073
14	3-U Front Bezel Assembly with Lock and Keys (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8798
15	3-U Enclosure Frame (Models 11U, 11X, 41U 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8797
16	Media and Switch Trim Panel (Models 11U, 11X, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K8773
17	Foot Pads Qty. 4 (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8800
18	3-U Blank Panel (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8799
19	DASD Door (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8778
20	Front Bezel Cap (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	12J7041
	Door Hinge (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	01K6637

Index	System (Netfinity 5500 - Type 8660) Models 11U, 11X, 1RU, 1RX, 41U, 41X 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX	FRU No.
21	Status Cover Lens (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J7031
22	Front LED (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7001
23	400 Watt Hot Swap PFC Power Supply Assembly with Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K8774
	Power Supply Filler Plate (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6996
	Hot Swap Power Backplane Card with 5 Power Cables (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6992
24	Side Access Cover (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8776
	Side Cover Retention Bracket (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	12J7040
25	Power AC Inlet Box (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K6995
	64MB ECC 3.3v REG DIMM (Option)	01K7392
	128 MB ECC 3.3v REG DIMM (Models 11U, 11X, 41U, 41X, 51U, 51X, 5RU, 5RX)	01K7393
	256MB ECC 3.3v REG DIMM (Models 52U, 52X, 5SU, 5SX; options for other models)	01K7391
	512 KB Processor Card without Processor (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7077
	350 MHz Processor with 512 KB Cache and Heat Sink (Models 11U, 11X, 1RU, 1RX)	10L5881
	400 MHz Processor with 512 KB Cache and Heat Sink (Models 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	10L5882
	450 MHz Processor with 512 KB Cache and Heat Sink (Models 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K1578

Index	System (Netfinity 5500 - Type 8660) Models 11U, 11X, 1RU, 1RX, 41U, 41X 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX	FRU No.
	Air Diffuser (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7000
	Interior LED and Speaker (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7002
	Keyboard with Cable (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX) See"Keyboards" on page 296 .	N/A
	Keylock with Keys and Pawl (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	01K6641
	Lock Linkage (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8777
	Media Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J5681
	Miscellaneous Parts Kit 1 (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	12J3079
	• 32X5/16 Screws (4 each)	
	• M3.5X8 Plastite Screws (2 each)	
	• (8 each)-M3X5 (CD/BRKT SCREWS),15- M3.5X7 (PROC CD SCREWS),	
	• 6-32X3/16 Screws (8 each)	
	• 3.9ID Nylon Washers (2 each)	
	• EMC Springs (24 each)	
	• Lock Hole Plug (1 each)	
	• (1 each)CABLE TIE,	
	• (4 each)FAN GROMMETS,	
	Miscellaneous Parts Kit 2 (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	03K8782
	• EMI I/O Gasket	
	• EMI PCI/ISA I/O Gasket (1 each)	

Index	System (Netfinity 5500 - Type 8660) Models 11U, 11X, 1RU, 1RX, 41U, 41X 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX	FRU No.
	Miscellaneous Parts Kit 3 (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX) • M3X5 Handle Screws (5 each) • PCI Card/Housing to Shuttle Screws (2 each) • Insulator with Light Pipes (5 each) • Hot Swap PCI Card Clamps (4 each) • Hot Swap PCI Card Guides (5 each) • Hot Swap PCI I/O Card Guides (6 each) • ISA I/O Card Guide (1 each) • PCI Filler Plate Bracket (4 each) • Hot Swap Retention Handles (4 each) • Switch Card Mounting to Chassis (1 each)	01K6982
	Miscellaneous Parts Kit 4 (Models 1RU, 1RX, 4RU, 4RX, 5RU, 5RX,) • M6X16 Slide/Bracket to Rack Screws (16 each) • M3.5X7 EIA Flanges to Chassis Screws (6 each) • M4X8 Slides to Chassis Screws (8 each) • M6 Slide/Bracket to Rack Nut Clips (6 each) • M6 Flange Arm to Bracket Nuts (2 each)	12J3090
	Mouse (Models 11U, 11X, 41U, 41X, 42U, 42X, 4SU, 4SX, 51U, 51X, 52U, 52X, 5SU, 5SX)	76H0889
	Power Switch (Button) Assembly with Bracket (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7003
	Processor Terminator Card (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J2701
	System Battery (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	33F8354
	System Board without Memory and Processor Card (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7068
	System Board Shield (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K9054

Index	System (Netfinity 5500 - Type 8660) Models 11U, 11X, 1RU, 1RX, 41U, 41X 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX	FRU No.
	Voltage Regulator Card (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	01K7113

Hard Disk Drives and Cables

Index	Hard Disk Drive Option	FRU No.
6	4 GB Hard Disk Drive (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	76H5817
6	4 GB Hard Disk Drive (2nd Source) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	76H7243
6	9 GB Hard Disk Drive (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	76H5818
6	9 GB Hard Disk Drive (2nd Source) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	76H7244
	Hard Disk Drive Tray (Slim) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	12J3276
	Hard Disk Drive Tray (Half High) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	12J3758
	Half High Drive Extender (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX)	12J3286
	PCI Switch Card (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K8982
	SCSI Hard Disk Drive Cable (3X) (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	12J3711
	External SCSI Cable (Models 11U, 11X, 1RU, 1RX, 41U, 41X, 42U, 42X, 4RU, 4RX, 4SU, 4SX, 51U, 51X, 52U, 52X, 5RU, 5RX, 5SU, 5SX)	03K9342

Keyboards

Keyboards	FRU No.
Arabic	02K0870
Belgian-French	02K0871
Belgian-UK/Dutch	02K0872
Brazil/Portugal	02K0869
Bulgarian	02K0873
Chinese/US	02K0900
Czech	02K0874
Danish	02K0875
Dutch	02K0876
French	02K0877
French/Canadian-ID 058	02K0863
French/Canadian-ID 445	02K0865
German	02K0878
Greek	02K0879
Hebrew	02K0880
Hungarian	02K0881
Icelandic	02K0882
Italian	02K0883
Japan	02K0899
Latin/Spanish	02K0867
Norwegian	02K0884
Polish	02K0885
Portuguese	02K0886
Romania	02K0887
Russian	02K0888
Serbian/Cyrillic	02K0889
Slovak	02K0890
Spanish	02K0891
Swed/Finn	02K0892
Swiss French/German	02K0893
Thailand	02K0902
Turkish (ID 179)	02K0894
Turkish (ID 440)	02K0895
UK English	02K0896
US English	02K0861
UK English (ISO Compliant)	02K0898
Yugoslavia/Lithuania	02K0897

Power Cords

Power Cords	FRU No.
Arabic	14F0033
Belgium	1339520
Bulgaria	1339520
Czech Republic	1339520
Denmark	13F9997
Finland	1339520
France	1339520
Germany	1339520
Hungary	1339520
Israel	14F0087
Italy	14F0069
Latvia	1339520
Netherlands	1339520
Norway	1339520
Poland	1339520
Portugal	1339520
Serbia	1339520
Slovakia	1339520
South Africa	14F0015
Spain	1339520
Switzerland	1339520
Switzerland (French/German)	14F0051
U.S. English	62X1045
U.K./Ireland	14F0033
Yugoslavia	1339520

Related Service Information

> **Important**
>
> The service procedures are designed to help you
> isolate problems. They are written with the
> assumption that you have model-specific training on
> all computers, or that are familiar with the computers,
> functions, terminology, and service information
> provided in this manual.

Safety Information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile computer.

General Safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

  Remember: Metal objects are good electrical conductors.

- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical Safety

Caution

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

Observe the following rules when working on electrical equipment.

Important

Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
    – Performing a mechanical inspection
    – Working near power supplies
    – Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
    – Ensure that another person, familiar with the power-off controls, is near you.

       Remember: Another person must be there to switch off the power, if necessary.
    – Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
    - Power supply units
    - Pumps
    - Blowers and fans
    - Motor generators

    and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
    - **Use caution; do not become a victim yourself.**
    - **Switch off power.**
    - **Send another person to get medical aid.**

Safety Inspection Guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The power cord should be the appropriate type as specified in the parts listings.
   c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling Electrostatic Discharge-Sensitive Devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.

2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

  Note: The use of a grounding system is desirable but not required to protect against ESD damage.

  – Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  – Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
  – Use the round ground-prong of the AC plug on AC-operated computers.

Grounding Requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

DANGER

> **Para evitar choques elétricos, não conecte ou desconecte nenhum cabo, nem efetue instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.**
>
> **Para evitar choques elétricos:**
>
> - **O cabo de alimentação deve ser conectado a um receptáculo corretamente instalado e aterrado.**
> - **Todos os equipamentos aos quais este produto será conectado devem também ser conectados a receptáculos corretamente instalados.**
>
> **Quando possível, utilize uma das mãos para conectar ou desconectar cabos de sinal, para evitar um possível choque ao tocar duas superfícies com potenciais elétricos diferentes.**
>
> **A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicação é perigosa. Para evitar choques elétricos, conecte e desconecte os cabos conforme descrito a seguir, ao instalar, movimentar ou abrir tampas deste produto ou de dispositivos conectados.**

Para Conectar	**Para Desconectar**
1. DESLIGUE tudo.	1. DESLIGUE tudo.
2. Conecte primeiro todos os cabos nos dispositivos.	2. Remova primeiro o(s) cabo(s) de alimentação das tomadas.
3. Conecte os cabos de sinal nos receptáculos.	3. Remova os cabos de sinal dos receptáculos.
4. Conecte o(s) cabo(s) de alimentação nas tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE o dispositivo.	

CAUTION:
Ao substituir a bateria, utilize apenas o Número de Peça IBM 33F8354 ou um tipo de bateria equivalente recomendado pelo fabricante. Se seu sistema possuir um módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, produzido pelo mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de forma adequada.

Não:

- **Jogue ou coloque na água**
- **Aqueça a mais de 100°C (212°F)**
- **Conserte nem desmonte.**

Descarte a bateria conforme requerido pelas disposições e regulamentações locais.

CAUTION:
Quando uma unidade de CD-ROM estiver instalada, observe o seguinte.

A utilização de controles ou ajustes ou a execução de procedimentos diferentes daqueles especificados nesta publicação pode resultar em exposição perigosa à radiação.

A remoção das tampas da unidade de CD-ROM pode resultar em exposição a radiação perigosa de laser. Não existem peças que possam ser consertadas no interior da unidade de CD-ROM. Não remova as tampas da unidade de CD-ROM.

DANGER

> **Algumas unidades de CD-ROM contém um diodo de laser da Classe 3A ou da Classe 3B. Observe o seguinte.**
>
> **Radiação de laser quando aberto. Não olhe diretamente para o feixe de laser, não olhe diretamente com instrumentos óticos, e evite exposição direta ao raio.**

≥32 kg (70,5 lbs)   **≥55 kg (121,2 lbs)**

CAUTION:
Utilize práticas seguras para levantamento de peso ao levantar sua máquina.

CAUTION:
O botão de Controle de Energia na parte frontal do servidor não desliga a corrente elétrica fornecida ao servidor. O servidor pode também possuir mais que um cabo de alimentação. Para remover toda a corrente elétrica do servidor, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia.

CAUTION:
Quando o suporte do cabo de alimentação estiver instalado no cabo de alimentação, o servidor deve estar conectado a uma fonte de energia de fácil acesso.

50 kg (110 lbs)

CAUTION:
Não coloque qualquer objeto com peso superior a 50 kg (110 lbs) sobre o modelo de gaveta do servidor.

Related Service Information   **307**

声明 1

危险！

为避免电击危险，请不要在暴风雨期间连接或断开任何电缆，
或是进行此产品的安装、维护或重新配置操作。

为避免电击危险：

- 电源线必须连接到适当的电线及接地插座。

- 此产品将要连接的所有设备也必须连接到正确接线的插座上。

如果可能，请使用一只手连接或断开连接信号电缆，以避免在
接触两个具有不同电势的表面时遭到电击。

电源线、电话线以及通信电缆中的电流非常危险。为避免电击，
请在安装、移动或打开本产品或连接设备的外盖时，按照下述
步骤连接或断开电缆。

要连接电缆	要断开电缆
1.关闭所有设备。	1.关闭所有设备。
2.首先将所有电缆与设备连接。	2.首先从电源插座拔下电源线。
3.将信号线连接到插座。	3.从插座拔下信号电缆。
4.将电源线连接到电源插座。	4.从设备上拔下所有电缆。
5.打开设备。	

声明 2

注意！

当更换电池时，仅可使用 IBM 部件号为 33F8354 的产品或由制造商
推荐的同等电池。如果系统中有包含锂电池的模块，则只能使用由相
同制造商制造的相同类型模块更换。该电池含有锂，如果使用、操作
或处理不当会发生爆炸。

不要：

- 将其投入或浸于水中

- 加热超过100°C （212°F）

- 修理或拆卸

应按照当地法规和条例对此电池进行处理。

声明 3

注意 ！

在已安装 CD-ROM 驱动器的情况下，请注意下面的内容。

不遵循此处指定的控制、调整、或操作过程的操作将可能导致危险
的辐射泄漏。

取下 CD-ROM 驱动器的外盖会导致危险的激光辐射泄漏。CD-ROM 驱
动器内没有可以使用的部件。请不要取下 CD-ROM 驱动器的外盖。

声明 4

危险 ！

> 一些 CD-ROM 驱动器中包含内置的 3A 类或 3B 类激光二极管。
> 请注意下述内容。
>
> 打开驱动器会产生激光辐射。请不要凝视激光束，请不要使用光学仪器
> 直接观看激光束，同时也要避免人体直接暴露在激光束下。

声明 5

32 kg (70.5 磅)   **55 kg (121.2 磅)**

注意！

搬运机器时，请进行安全搬运操作。

声明 6

注意！

关闭服务器前端的电源控制按钮并不能完全切断供给服务器的电流。
服务器可能有多条电源线。为从服务器断开所有电流，应确保断开
所有电源线与电源的连接。

声明 7

注意！

当电源线上安装有电源线固定夹选件时，服务器必须插在容易接近
的电源上。

声明 12

>50 kg (110 磅)

注意！

请不要将任何重量超过 50 kg(1101 磅)的物体放在抽屉型服务器的
顶部。

• 聲明 1

⚠

危險

> 為了避免雷擊，在閃電期間，請勿連接或拔掉本裝置上的任
> 何電纜線，或請勿安裝、維修或重新架構本產品。
>
> 為了避免雷擊：
>
> - 電源線必須連接到接線及接地正確的插座。
> - 本產品所連接的設備也必須連接到接線正確的插座。
>
> 儘可能使用單手來連接或拔掉信號電纜，以避免因接觸兩不
> 同電位的平面，而受到電擊。
>
> 電源、電話及通信電纜上均有電流流通。為了避免電擊，在
> 安裝、移動本產品，或開啓本產品的蓋子或與本產品連接之
> 裝置的蓋子時，請依照下列「連接」及「拔掉」電纜線的步
> 驟操作。

> 連接   拔掉
>
> 1. 關閉所有開關。   1. 關掉所有開關。
> 2. 首先，將所有電纜線連接到裝置。 2. 首先，自電源插座拔掉電源線。
> 3. 將信號電纜連接到信號插座。   3. 拔掉信號插座上的所有信號電纜。
> 4. 將電源線連接到電源插座。   4. 拔掉裝置上的所有電纜線。
> 5. 開啓裝置電源。

• 聲明 2

⚠

注意：
更換電池時，只可使用 IBM 零件編號 33F8354 的電池，或廠商建議
的相當類型的電池。如您系統中的模組含有鋰電池，更換時，請使
用相同廠商製造的相同模組類型。如未正常使用、處理或捨棄含有
鋰的電池時，可能會造成爆炸。

嚴禁：.

- 丟入或浸入水中
- 加熱超過攝氏100 度（華氏 212 度）
- 修補或拆解

處理廢棄電池時，請遵照當地法令規章處理。

• 聲明 3

⚠

注意：
安裝光碟機時，請注意下列事項：

不依此處所指示的控制、調整或處理步驟，恐有遭致輻射之虞。

移開光碟機蓋子，恐有遭致雷射輻射之虞。光碟機中沒有需要維修
的部分。請勿移開光碟機的蓋子。

• 聲明 4

⚠

危險

> 光碟機含有內嵌式 Class 3A 或 Class 3B 雷射二極體時，請
> 注意下列事項：
>
> 開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器
> 直接觀察，且應避免直接暴露在光束下。

・聲明 5

>= 32 公斤（70.5 磅）　　>= 55 公斤（121.2 磅）

注意：
提昇機器時，請使用安全提昇措施。

・聲明 6

注意：
伺服器前面的電源控制按鈕無法關閉供應伺服器的電流。本伺服器
可能有一條以上的電源線。如要移除伺服器上的所有電流，請確認
所有電源線已與電源分離。

・聲明 7

注意：
如電源線上安裝了電源線托架裝置，則所使用的電源必須是伺服器
容易使用為原則。

・聲明 12

>50 公斤（110 磅）

注意：
請勿將任何重量超過 50 公斤（110 磅）的東西置於伺服器的抽屜上
方。

DANGER

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

To avoid shock hazard:

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

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

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

To Connect	**To Disconnect**
1. Turn Everything OFF.	1. Turn Everything OFF.
2. First, attach all cables to devices.	2. First, remove power cord(s) from outlet.
3. Attach signal cables to receptacles.	3. Remove signal cables from receptacles.
4. Attach power cord(s) to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

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

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

Do not:

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

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

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

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

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

DANGER

> **Some CD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following.**
>
> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**
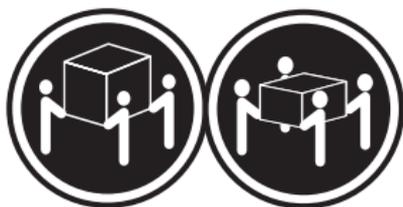
≥32 kg (70.5 lbs) **≥55 kg (121.2 lbs)**

CAUTION:
Use safe lifting practices when lifting your machine.

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.

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

CAUTION:
Do not place any object weighing more than 50 kg (110 lbs) on top of the rack model of the server.

DANGER

> **Pour éviter tout risque de choc électrique, ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.**
>
> **Pour éviter tout risque de choc électrique :**
>
> - **Les cordons d'alimentation du présent produit et de tous les appareils qui lui sont connectés doivent être branchés sur des socles de prise de courant correctement câblés et mis à la terre.**
>
> **Afin d'éviter tout risque de choc électrique provenant d'une différence de potentiel de terre, n'utilisez qu'une main, lorsque cela est possible, pour connecter ou déconnecter les cordons d'interface.**
>
> **Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux. Pour éviter tout risque de choc électrique, lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.**

Connexion	**Déconnexion**
1. Mettez les unités hors tension.	1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.	2. Commencez pas débrancher les cordons alimentation des socles de prise de courant.
3. Branchez les câbles d'interface sur les prises.	3. Débranchez les câbles d'interface des prises.
4. Branchez les cordons d'alimentation sur un socle de prise de courant.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	

Related Service Information **315**

CAUTION:
Remplacez la pile usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

- **Ne la jetez pas à l'eau.**
- **Ne l'exposez pas à une température supérieure à 100 °C.**
- **Ne cherchez pas à la réparer ou à la démonter.**

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.

CAUTION:
Si une unité de CD-ROM est installée, prenez connaissance des informations suivantes :

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.

Pour éviter une exposition directe au rayon laser, n'ouvrez pas l'unité de CD-ROM. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.

DANGER

> **Certaines unités de CD-ROM contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes :**
>
> **Rayonnement laser lorsque le carter est ouvert. Évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. Évitez une exposition directe au rayon.**
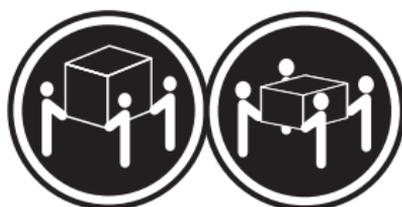
≥32 kg   **≥55 kg**

CAUTION:
Ce produit pèse un poids considérable. Faites-vous aider pour le soulever.

CAUTION:
Le bouton de mise sous tension/hors tension situé sur la face avant du serveur ne coupe pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre serveur dispose de plusieurs cordons d'alimentation. Pour isoler totalement le serveur du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.

CAUTION:
Lorsqu'une patte de fixation du cordon d'alimentation est installée, branchez le serveur sur une prise de courant électrique facile d'accès.

50 kg

CAUTION:
Ne posez pas d'objet dont le poids dépasse 50 kg sur les modèles tiroir de serveur.

Related Service Information   **317**

DANGER

Aus Sicherheitsgründen bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.

Aus Sicherheitsgründen:

- **Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**

- **Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**

Signalkabel möglichst einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potential zu vermeiden.

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich. Um einen Stromschlag zu vermeiden, nur nach den Anweisungen arbeiten, die für Installation, Transport oder Öffnen von Gehäusen dieses Produkts oder angeschlossenen Einheiten gelten.

Kabel anschließen	**Kabel lösen**
1. Alle Geräte ausschalten und Netzstecker ziehen.	1. Alle Geräte ausschalten.
2. Zuerst alle Kabel an Einheiten anschließen.	2. Zuerst Netzstecker von Steckdose lösen.
3. Signalkabel an Anschlußbuchsen anschließen.	3. Signalkabel von Anschlußbuchsen lösen.
4. Netzstecker an Steckdose anschließen.	4. Alle Kabel von Einheiten lösen.
5. Gerät einschalten.	

CAUTION:
Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht

- **mit Wasser in Berührung bringen.**
- **über 100 C erhitzen.**
- **reparieren oder zerlegen.**

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.


CAUTION:
Wenn ein CD-ROM-Laufwerk installiert ist, beachten Sie folgendes. Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.

DANGER

> **Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.**
>
> **Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.**
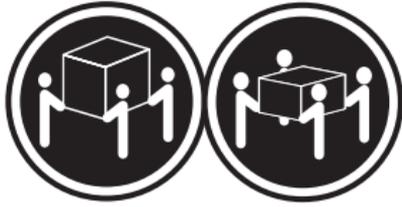
≥32 kg **≥55 kg**

CAUTION:
**Beim Anheben der Maschine die vorgeschriebenen
Sicherheitsbestimmungen beachten.**

CAUTION:
**Mit dem Betriebsspannungsschalter an der Vorderseite
des Servers wird die Stromversorgung für den Server
nicht unterbrochen. Der Server könnte auch mehr als
ein Netzkabel aufweisen. Um die gesamte
Stromversorgung des Servers auszuschalten, muß
sichergestellt werden, daß alle Netzkabel aus den
Netzsteckdosen herausgezogen wurden.**

CAUTION:
**Wenn am Netzkabel eine Kabelhalterung angebracht
ist, muß der Server an eine leicht zugängliche
Netzsteckdose angeschlossen werden.**

CAUTION:
**Legen Sie keine Gegenstände, die mehr als 50 kg
wiegen, auf das Einschubmodell des Servers.**

PERICOLO

Per evitare il pericolo di scosse elettriche durante i temporali, non collegare o scollegare cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto.

Per evitare il pericolo di scosse elettriche:

- **collegare il cavo di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza;**
- **collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.**

Quando possibile, collegare o scollegare i cavi di segnale con una sola mano per evitare il rischio di scosse derivanti dal contatto con due superfici a diverso potenziale elettrico.

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa. Per evitare scosse elettriche, collegare e scollegare i cavi come descritto quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o durante il collegamento delle unità.

Per collegare	Per scollegare
1. SPEGNERE tutti i dispositivi.	1. SPEGNERE tutti i dispositivi.
2. Collegare prima tutti i cavi alle unità.	2. Rimuovere prima il(i) cavo(i) di alimentazione dalla presa elettrica.
3. Collegare i cavi di segnale alle prese.	3. Rimuovere i cavi di segnale dalle prese.
4. Collegare il(i) cavo(i) di alimentazione alla presa elettrica.	4. Rimuovere tutti i cavi dalle unità.
5. ACCENDERE le unità.	

Related Service Information **321**

ATTENZIONE:
**Quando si sostituisce la batteria, utilizzare solo una
batteria IBM o batterie dello stesso tipo o di tipo
equivalente consigliate dal produttore. Se il sistema di
cui si dispone è provvisto di un modulo contenente
una batteria al litio, sostituire tale batteria solo con un
tipo di modulo uguale a quello fornito dal produttore.
La batteria contiene litio e può esplodere se utilizzata,
maneggiata o smaltita impropriamente.**

Evitare di:

- **Gettarla o immergerla in acqua**
- **Riscaldarla ad una temperatura superiore ai 100°
  C**
- **Cercare di ripararla o smaltirla**

**Smaltire secondo la normativa in vigore (D.Lgs 22 del
5/2/97) e successive disposizioni nazionali e locali.**

ATTENZIONE:
**Quando è installata un'unità CD-ROM, notare quanto
segue:**

**L'utilizzo di controlli, regolazioni o l'esecuzione di
procedure non descritti nel presente manuale possono
provocare l'esposizione a radiazioni pericolose.**

**L'apertura di un'unità CD-ROM può determinare
l'esposizione a radiazioni laser pericolose. All'interno
dell'unità CD-ROM non vi sono parti su cui effettuare
l'assistenza tecnica. Non rimuovere i coperchi
dell'unità CD-ROM.**

PERICOLO

> **Alcune unità CD-ROM contengono all'interno
> un diodo laser di Classe 3A o Classe 3B.
> Prestare attenzione a quanto segue:**
>
> **Aprendo l'unità vengono emesse radiazioni
> laser. Non fissare il fascio, non guardarlo
> direttamente con strumenti ottici ed evitare
> l'esposizione diretta al fascio.**
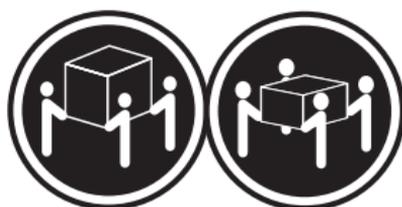
≥32 kg   **≥55 kg**

ATTENZIONE:
Durante il sollevamento della macchina seguire delle norme di di sicurezza.

ATTENZIONE:
Il pulsante del controllo dell'alimentazione situato nella parte anteriore del servente non disattiva la corrente elettrica fornita al servente. Il servente potrebbe anche avere più di un cavo di alimentazione. Per disattivare la corrente elettrica del servente, assicurarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.

ATTENZIONE:
Quando sul cavo di alimentazione è installata l'opzione di sostegno del cavo, il servente deve essere collocato in prossimità di una presa elettrica facilmente accessibile.

~50 kg

ATTENZIONE:
Non poggiare oggetti che pesano più di 50 kg sulla parte superiore del servente.

Related Service Information   **323**

경고문 1

⚠️
위험

전기 충격을 피하려면 날씨가 나쁠 때(예: 눈 또는 비가 오거나 천둥 번개가 칠 때)는 케이블을 연결하거나 끊지 않도록 하고 이 제품의 설치, 유지보수 또는 재구성 등의 작업을 수행하지 않도록 하십시오.

전기 충격을 피하려면 다음과 같아야 합니다.

– 고압선은 적절한 배선 및 접지 상태의 콘센트로 연결되어야 합니다.

– 이 제품이 접속될 모든 장비도 적절한 배서 상태의 콘센트로 연결되어야 합니다.

다른 전위를 가진 두 표면을 만졌을 때 발생할 수 있는 전기 충격을 피하려면 한 손으로 신호선을 연결하거나 끊으십시오.

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다. 전기 충격을 피하려면 이 제품이나 접속 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하고 끊도록 하십시오.

연결하려면	연결해제하려면
1. 모든 스위치를 켠다.	1. 모든 스위치를 끈다.
2. 먼저 모든 케이블을 장치에 연결한다.	2. 먼저 모든 케이블을 장치에 제거한다.
3. 신호선을 콘센트에 연결한다.	3. 신호선을 콘센트에서 제거한다.
4. 전원을 콘센트에 연결한다.	4. 장치에서 모든 케이블을 제거한다.
5. 장치 스위치를 켠다.	

경고문 2

⚠️
주의:

배터리를 교체할 때는 IBM 부품 번호 &PN. 또는 제조업체에서 추천하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 포함하는 모듈이 있으면 이것은 동일한 제조업체에서 생산된 동일한 모듈 유형으로만 교체하십시오. 배터리에는 리튬이 포함되어 있으므로 제대로 사용, 처리 또는 처분하지 않으면 폭발할 수 있습니다.

다음을 주의하십시오.

– 던지거나 물에 담그지 않도록 하십시오.
– 100℃(212℉) 이상으로 가열하지 않도록 하십시오.
– 수리하거나 분해하지 않도록 하십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3

⚠️
주의:

CD-ROM 드라이브가 설치되어 있으면 다음 사항을 명심하십시오.

여기에서 지정하지 않은 방식으로 CD-ROM 드라이브를 제어 또는 조절하거나 다른 절차로 사용하면 위험한 방사능 노출이 발생할 수 있습니다.

CD-ROM 드라이브의 덮개를 제거하면 위험한 레이저 방사능이 노출될 수 있습니다. CD-ROM 드라이브 내에는 정비할 수 있는 부품이 없습니다. CD-ROM 드라이브 덮개를 제거하지 않도록 하십시오.

경고문 4

위험

> 일부 CD-ROM 드라이브에는 클래스 3A 또는 3B 레이저 2극
> 진공관(다이오드)이 들어 있습니다. 다음 사항을 명심하십시오.
>
> 열면 레이저 방사능이 노출됩니다. 광선을 주시하거나 광학 기계를
> 직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 5

32kg(70.5 파운드)   55kg(121.2 파운드)

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 6

주의:
서버 앞쪽의 전원 제어 버튼을 꺼도 서버로 공급되는 전류가 차단되지 않습니다.
또한 서버에 둘 이상의 전선이 연결되어 있는 경우가 있습니다. 서버에서 모든
전류를 차단하려면 모든 전선이 전원으로부터 차단되어 있는지 확인하십시오.

경고문 7

주의:
전선 브래킷 옵션이 전선에 설치되어 있으면 서버는 쉽게 액세스할 수 있는 전원으로
연결되어야 합니다.

경고문 12

50kg(110 파운드) 이상

주의:
서랍형 모델의 서버 상단에는 50kg(110 파운드)이 넘는 물체를 올려 놓지 않도록
하십시오.

DANGER

Para evitar una posible descarga eléctrica, no conecte ni desconecte los cables ni lleve a cabo ninguna operación de instalación, de mantenimiento o de reconfiguración de este producto durante una tormenta eléctrica.

Para evitar una posible descarga:

- **El cable de alimentación debe conectarse a un receptáculo con una instalación eléctrica correcta y con toma de tierra.**
- **Los aparatos a los que se conecte este producto también deben estar conectados a receptáculos con la debida instalación eléctrica.**

Cuando sea posible, utilice una sola mano para conectar o desconectar los cables de señal a fin de evitar una posible descarga al tocar dos superficies con distinto potencial eléctrico.

La corriente eléctrica de los cables de comunicaciones, teléfono y alimentación puede resultar peligrosa. Para evitar una posible descarga, siga las indicaciones de conexión y desconexión de los cables siempre que tenga que instalar, mover o abrir las cubiertas de este producto o de los dispositivos acoplados.

Instrucciones de conexión	**Instrucciones de desconexión**
1. Apague todos los componentes (OFF).	1. Encienda todos los componentes (ON).
2. En primer lugar, conecte todos los cables a los dispositivos.	2. En primer lugar, retire los cables de alimentación de las tomas.
3. Conecte los cables de señal a los receptáculos.	3. Retire los cables de señal de los receptáculos.
4. Conecte los cables de alimentación a las tomas.	4. Retire todos los cables de los dispositivos.
5. Encienda el dispositivo (ON).	

CAUTION:
Al cambiar la batería, utilice únicamente la batería IBM Número de pieza 33F8354 o un tipo de batería equivalente recomendado por el fabricante. Si el sistema tiene un módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo del mismo fabricante. La batería contiene litio y puede explotar si no se utiliza, manipula o desecha correctamente.

Lo que no debe hacer

- **Tirar o sumergir el producto en agua.**
- **Exponer el producto a una temperatura superior a 100°C.**
- **Reparar o desmontar el producto.**

Cuando quiera desechar la batería, siga las disposiciones y reglamentaciones locales.

CAUTION:
**Cuando instale una unidad de CD-ROM, tenga en cuenta la siguiente información.**

Si se llevan a cabo controles o ajustes o se utilizan métodos que no se atengan a lo aquí especificado, se puede producir una exposición peligrosa a las radiaciones.

Si se retiran las cubiertas de la unidad de CD-ROM, se puede producir una peligrosa exposición a radiaciones de láser. Dentro de la unidad de CD-ROM no existen piezas reparables. No retire las cubiertas de la unidad de CD-ROM.

DANGER

> **Algunas unidades de CD-ROM tienen incorporado un diodo de láser de Clase 3A o de Clase 3B Tenga en cuenta la siguiente información.**
>
> **Cuando la unidad está abierta se generan emisiones de rayos láser. No dirija la mirada al haz, no lo observe directamente con instrumentos ópticos y evite la exposición directa.**
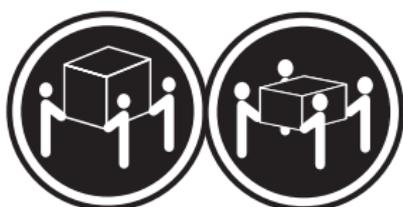
≥**32 kg**   ≥**55 kg**

CAUTION:
**Alce la máquina con cuidado; el sobrepeso podría causar alguna lesión.**

CAUTION:
El botón de control de alimentación del panel frontal del servidor no apaga la corriente eléctrica suministrada al servidor. Puede suceder que el servidor tenga más de un cable de alimentación. Para eliminar por completo la corriente eléctrica del servidor, asegúrese de desconectar todos los cables de alimentación del suministro de alimentación.

CAUTION:
Cuando la opción de soporte del cable de alimentación está instalada en el cable de alimentación, el servidor debe estar conectado a un suministro de alimentación de fácil acceso.
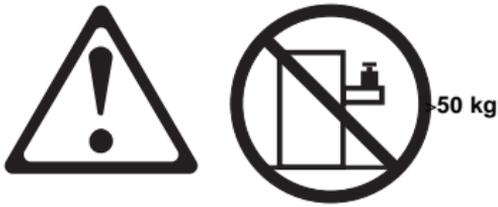
CAUTION:
No coloque ningún objeto cuyo peso sea superior a los 50 kilos sobre la bandeja modelo del servidor.

Send Us Your Comments!

We want to know your opinion about this manual (part number 01K4881). Your input will help us to improve our publications.

Please photocopy this survey, complete it, and then fax it to **IBM HMM Survey** at **919-543-8167 (USA)**.

Name _____

Phone Number _____

1. Do you like this manual?

   ☐ Yes   ☐ No

2. What would you like to see added, changed, or deleted in this manual?

3. What is your service experience level?

   ☐ Less than five years

   ☐ More than five years

4. Which Servers do you service most?

Thanks in advance for your response!

Problem Determination Tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Reference/Diagnostics Diskette Version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

Important

To eliminate confusion, identical systems are considered *identical* only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same Reference/Diagnostics Diskette (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between "working and non-working" systems will often lead to problem resolution.

Phone Numbers, U.S. and Canada

Note

EMEA customers should contact their Dealer or IBM Service organization.

Before you place a call to the Support Center, refer to

Authorized Dealers or Servicers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-528-7705	Bulletin Board Service - TSS Only
800-937-3737	IBM Business Partner Education
800-426-2472	IBM Customer Engineer Technical Support
800-IBM-DEAL	IBM Dealer Support Center
800-342-6672	IBM Direct Desktop Software Sales
303-924-4015	IBM Part Number ID and Look Up
800-426-7763	IBM PC HelpCenter
800-237-5511	IBM Software Defect Support (CSDs)
800-327-5711	IBM Software Ordering (Publications)
800-426-1484	IBM Supplies Technical Hotline
800-388-7080	IBM Warranty Parts Claims Center

U.S. Customers and Helpware Subscribers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-426-8322	Customer Education Business Unit
800-999-0052	Customized Operational Services
800-237-4824	EduQuest (Educational Computers)
800-964-8523	End User HelpDesk Support
800-742-2493	IBM Anti-Virus Services
800-447-4700	IBM Authorized Dealer Referrals
800-426-2468	IBM Dealer Referral
800-426-3333	IBM Information Referral Service
800-IBM-SERV	IBM Service
800-772-2227	IBM PC HelpCenter and HelpDesk
800-426-7282	IBM Technical Manuals
800-426-9402 (Ext. 150)	Multimedia Information Center
800-241-1620	Multimedia HelpCenter
800-342-6672	OS/2 Information Line
800-237-5511	OS/2 Support Services
800-284-5933	Prodigy
914-962-0310	Prodigy User Questions
800-547-1283	Technical Coordinator Program SystemXtra for Personal Systems LAN Automated Distribution/2 OS/2 Bulletin Board OS/2 Application Assistance Center
800-551-2832	Technical Solutions Magazine

IBM Canada Customer and Servicer Support

Number	Information
800-661-PSMT	Business Partner Marketing Support
905-316-5556	Business Partner Marketing Support - Toronto
514-938-6048	Business Partner Marketing Support - French
800-465-4YOU	Customer Relations
800-IBM-SERV	Customer Service Dispatch
800-263-2769	Customer Service Parts
800-465-2222	Customer Support Center (ISC)
416-443-5701	Customer Service Repair Centre
800-505-1855	Dealer Support Group (DSG)
800-465-7999	HelpClub Registration / IBM Direct
800-465-3299	HelpFax
905-316-3299	HelpFax - Toronto
800-565-3344	HelpPC
905-513-3355	IBM Certification Administrator Mail to: 50 Acadia Drive Markham, Ontario L3R 0B3
800-661-2131	IBM Education (A+ Course)
800-268-3100	IBM Information Network Support
800-387-8343	IBM PC Service Partners
800-487-7426	International Warranty Registration
800-663-7662	Lexmark Product Information
800-IBM-9990	PartnerLine
800-263-2769	Parts Orders, Exchange or Emergency
416-443-5808 (Fax)	Parts Regular Orders, Exchange
416-443-5755	Parts Orders, Inquiries
514-938-3022	PC Co Bulletin Board - Montreal
905-316-4255	PC Co Bulletin Board - Markham
604-664-6464	PC Co Bulletin Board - Vancouver
204-934-2735	PC Co Bulletin Board - Winnepeg
800-661-7768	PS Marketing Support (PSMT)
800-565-3344	PS/1 Warranty Customer Helpline
800-387-8483	PS/1 Warranty Service (DOAs)
800-465-1234	Publications Ordering
905-316-4148	Service Management Support
905-316-4100 (Fax)	Service Management Support
905-316-4150	Service (Warranty) Manager
905-316-4100 (Fax)	Service (Warranty) Manager
905-316-4872	Service Quality Programs
905-316-4100 (Fax)	Service Quality Programs
800-661-2131	Skill Dynamics (Education)
800-565-3344	ThinkPad EasyServe
416-443-5835 (Fax)	Warranty Claim Fulfillment
905-316-2445	Warranty Claim Reimbursement
905-316-3515 (Fax)	Warranty Claim Reimbursement
416-443-5778	Warranty Claim Parts Inquiry
800-505-1855	Warranty Provider Support Hotline
800-267-7472	Warranty Service, ThinkPad

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